ISSN-0976-0245 (Print) • ISSN-0976-5506 (Electronic)

Volume 11 / Number 6 / June 2020

Indian Journal of Public Health Research & Development

An International Journal

Website:
www.ijphrd.com

Indian Journal of Public Health Research & Development

Print-ISSN: 0976-0245-Electronic-ISSN: 0976-5506, Frequency: Quarterly (Four issues per volume)

Indian Journal of Public Health Research & Development is a double blind peer reviewed international journal. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, and Public Health Laws and covers all medical specialties concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and South East Asia.

The journal has been assigned International Standards Serial Number (ISSN) and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases. The journal is covered by EBSCO (USA), Embase, EMCare. The journal is now part of DST, CSIR, and UGC consortia.

Website : www.ijphrd.com

Editor

Dr. R.K. Sharma
Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)

Printed, published and owned by

Dr. R.K. Sharma
Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)

Published at

Institute of Medico-legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,
Sector- 32, Noida - 201 301 (Uttar Pradesh)

Indian Journal of Public Health Research & Development

www.ijphrd.com

Contents

Volume 11, Number 06 June 2020

The Cancer Principle-I: Introducing Cancer as a Fundamental Principle of Nature

Asima Tripathy[1], Rajat Kumar Pradhan[2]

[1]Post Graduate Department of Zoology and Microbiology, [2]Post Graduate Department of Physics, Bhadrak Autonomous College (Department of Higher Education, Govt. of Odisha), Bhadrak, Odisha, India

Abstract

In a series of five articles we put forth and establish a new principle, namely the cancer principle which we propose as a fundamental principle of nature. Cancer is an agent of the principle of disorder and is at the root of origin of life, evolution of species and may be, is also the determinant of the ultimate fate of all life. We introduce and motivate this principle and provide arguments in favor of its being at the origin of all evolution. Cancer is defined as the tendency for unrestrained proliferation that is operative in both inanimate and animate worlds and that has given rise to the phenomenon of life from the nonliving background.

Keywords: *cancer, disorder, order, evolution, self-replication*

Introduction

Cancer is unrestrained proliferation. The unicellular organisms evolved as the primary life-forms on earth at least around 3 to 3.5 billion years ago[1,2]. The multiplication rate in them is no doubt high, but the average time taken for each division is typical of the species and is constant. In multicellular organisms, the cells stop dividing when the respective organs reach their appropriate size, but in case of cancer, the cells go on dividing indefinitely. The cancerous cells are having remarkable adaptive ability for survival. They work on the surrounding cells and destroy them and create space for their own accelerated multiplication and growth[3,4].

Hippocrates (460-370BC) used the ancient Greek name *carcinos* (meaning crab), pronounced *karkinos*, which has its origin in the proto-indo-european word *korkros*, or may be, even pre-dated by the corresponding original Sanskrit word *karkata* (also meaning crab), possibly due to the finger-like projecting spiculations from the sore which make a crab-like appearance[5] and it may also be related to angiogenesis[6]. This most ancient name also surprisingly indicates that cancer is a living organism and not just a disease[7]. Perhaps, no other disease has such a name. Interestingly, the analogy with crab also catches the other prominent characteristics of cancer: the crab makes several holes for its residence by digging out lumps of mud which dry up to harden, and which do look like tumors on earth (Tumorigenesis)! If its hole is closed in one place, it digs out a lump at another place, exactly as does cancer in post-operative metastasis[8].

The increased virulence of harmful pathogens is because of their adaptive evolution in course of time. The drug resistance in the pathogens is part of the mechanism of survival fitness in terms of evolutionary advantage[9]. Insecticide resistance in a vector is an adaptation for the evolutionary advantage of the vector species for its survival and reproductive success[9,10,11]. In the chain of vigorous competition, cancer-causing pathogens have gone much ahead. In recent works, carcinogenesis has been proposed to be a form of speciation and cancer development as an evolutionary process in which nature selects some cells that can develop new metabolic pathways of aggression and resistance[12,13].

Cosmic origins of molecular Self-replication

Each elementary particle (*e.g*. an electron or a proton or even a photon) has the ability to store information and to interact in specific ways with other particles depending on their quantum numbers. When such particles come together to form larger aggregates such as nuclei in stellar

Corresponding author:
Asima Tripathy
Email ID: asimatripathy09@gmail.com

interiors and atoms in relatively colder regions such as planets, the information-storing ability increases and gets encoded in the quantum states of such composite systems[14]. In course of time and in suitable conditions such as the earth's, long chains of carbon atoms with different functional groups forming biomolecules can come up with their definite information and interaction capacities. The possibility of self-replication is inherent in long chains of carbon atoms because of the self-similarity of the chain over long segments, the reason for self-similarity being the availability of particular kind of radicals in a particular environment. Fragments of such chains of carbon atoms can become ligand as well as receptor for the formation of larger biomolecules that can replicate themselves. A chain of carbon atoms thus holds within itself the most important possibility of self-replication[15]. Too long a carbon chain may easily break into similar and smaller fragments which is the basis of self-replication of complex biomolecules such as nucleic acids and proteins[16].

Evolution and Cancer

As per the Darwinian evolution paradigm, the mutations are random and nature selects the fittest under the circumstances to survive and therefore, the individual organism seems to have very limited personal, willful choice in its evolution because it is nothing but a colony of its genes which gets propagated down the generations, presumably with naturally selected mutations[17]. Natural selection is often credited with the power to bring up complex adaptations in nature[12]. We may ask: What is the urgency in the cells to divide so rapidly as to become cancer cells? What is the origin of oncogenes? What is the active principle of natural selection of these cancer cells here? What is the purpose of the complex adaptations of a cell to be cancerous? Why natural selection is unable to drive out or kill these cancer cells from the body in order to ensure survival of the organism? Or, is there some other more powerful natural process which, in its own course, will be able to wipe out the cancer cells from the body of the organism, or is it the contrary: *Is all life going to merge in Cancer*?

Existing theories of cancer such as the SMT (Somatic Mutation Theory) and TOFT (Tissue Organization Field Theory) are partial in their success since most of the cancers remain untraceable to their underlying causes[18]. SMT holds that cancer is a disease of cell proliferation while TOFT holds that it is a disease of tissue organization. The SMT, TOFT and other such approaches are mere plausible mechanisms of cancer and don't completely address the fundamental causes thereof[19,20]. In the integrative approach, metabolic imbalance and immunologic response in the host are taken along with genetic causes as determining cancer formation as well as growth lading to eventual mortality[21]. Analysis of bioenergetics of cells lends further support to such an integrative theory of cancer as to its molecular basis in living cells, though it is yet unclear how driver mutations and passenger mutations are related and why such huge numbers of driver mutations are there in the uncogenic landscape[22,23] of the same type of cancer even.

The atavistic theory of cancer proposed by Davies and Lineweaver views it to be a return to the preferential expression of ancient genes that were present during the transition from unicellular to multicellular species[24]. This pre-dates the origin of cancer to about a billion years back when metazoan life was present which acted as an intermediate stage between unicellulars and more complex multicellulars.

All the characteristics of cancer were nicely paraphrased as the six hallmarks by Hanahan and Weinberg as: (1) self-sufficiency in growth signals, (2) insensitivity to growth-inhibitory (antigrowth) signals, (3) evasion of programmed cell death (apoptosis), (4) limitless replicative potential, (5) sustained angiogenesis, and (6) tissue invasion & metastasis[25]. There are, no doubt, natural defense mechanisms in the individual organism to fight against cancer[26]. Then what evolutionary advantage do the cancer cells gain by overpowering the defense mechanisms of the individual *i.e.* by working against the survival of the organism itself, whose constituents they actually are? Is it not the intense urge for unrestrained proliferation ingrained somehow in each cell to acquire the greatest reproductive success since the time when it was but a unicellular organism? And, since that time, it has been the organism's continuous effort to gain the ability to multiply as rapidly as possible to establish its maximum potentiality to gain reproductive and survival fitness but, only that it took its time to come to the multicellular organism? Or, is the root of cancer somewhere else?

On the other hand, there is increasing realization among biologists that cancer has played a major role in the evolution of multicellularism, cellular defenses, apoptosis, cancer suppressor genes, tumor suppressor mechanisms and epigenetic mechanisms, all in the

direction of naturally combating cancer only[27]. In the process, diversifications of many species as well as of the many viral strains of the oncovirus have all occurred and are still continuing. Thus, susceptibility to cancer seems to be a possible key selection pressure on organisms, thereby determining their evolution. Therefore, what are stated to be the causes of cancer are actually its effects[19]. We therefore envisage cancer as a fundamental principle of nature, namely the principle of unrestrained proliferation following from the principle of disorder (POD), rather than as a mere disease.

The cancer principle

We thus propose:

Cancer is at the origin of life; the incessant struggle against it is the evolution of species and finally, succumbing to it is the ultimate fate of all life.

Hugely surprising it may seem, but which fact about cancer is not surprising! Defined as *unrestrained proliferation*, it is indeed what perfectly captures the phenomenon of life. Cancer, as the tendency for unrestrained proliferation, has taken the form of life. This is the proposal of "origin of life in cancer". In fact, the astrobiological theory of cancer proposes on certain evidences that it must have been a universal phenomenon in all life in the cosmos, including alien life and those in exoplanets, because any star that supports such life must have UV radiation predominant in its spectrum against which in case of life on the earth there evolved the tumor suppressor genes P53/P63/P73, whose primary function in those early times was to protect the DNA against damage due to UV radiation[28].

The next three essays in this series will deal with the role of cancer in evolution and evolution of cancer itself since the beginning. There are many factors that try to limit the propensity of life for unrestrained proliferation, and hence comes evolution[29]. In the last decade or so, it has been increasingly realized that cancer itself has an independent evolutionary path through the expert adaptation of the oncoviruses to outcompete all others in the fray. On the other hand, tools of evolutionary biology have also been increasingly getting used for studying cancer and dealing effectively with it[30,31].

Finally, in the last two articles we deal with the last part of the principle i.e. the inevitability, invincibility and immortality of cancer, which sounds like doom-saying. But going by the rampaging trend of unstoppable march of cancer as a phenomenon (about 70% to 80% of all cancer is of unknown etiology), we feel that it can be amply justified. Davies opines, "In that sense, cancer is an accident waiting to happen"[32]. It is as certain as that! The cancer principle thus seeks to invert the argument that cancer is the product of evolutionary processes[33]; rather it is cancer that causes all evolution! What concerns us in this series is the ontology of cancer rather than its epistemology as a multistage process[34,35] or as an effect of evolution.

Conclusion

Different points of view on cancer that we have outlined here only point to its multi-facetedness and we have not exhausted all the views that have so far been proposed by way of theorizing. Cancer as a fundamental principle determining all evolution, from the origin of life itself to the dissolution, is of course a startling proposition. What we have motivated in this first article is that, if we define it as the urge for unrestrained proliferation instead of being just a disease, then it does indeed turn out to be an all-potent determining agency which, by its collusion and conformity with the principle of disorder(POD) that is universally operative, has led to all evolution by opposing the cosmic ordering principle(COP). This continuous see-saw between the ordering principle and the disorder agent (cancer) is at the root of all evolution, and even, of the origin of life itself. From the low entropy initial pre-big-bang state to the expanding universe, from structure formation to radiating stars, from abiogenesis to tumorigenesis – all are processes brought about by the principle of disorder against the cosmic ordering principle that ever acts to organize, regulate and systematize.

In trying to counteract the tendency to move towards the maximally disordered state of thermodynamic equilibrium of non-living components of the universe, the compromise obtained by COP is what we call "life". But it too is not free from the operations of the disorder principle, as it is inherent and inbuilt into the very fabric of the universe, and hence is present in all the constituents of living organisms. The living organisms are far-from-equilibrium systems which are complex dissipative structures. They maintain homeostasis, order and organization by continuous exchange of matter, energy and entropy with the surroundings, ever striving for an organized steady-state rather than sliding down to maximally disordered thermodynamic equilibrium, which is nothing but death of the organism. The COP

strives to bring forth and maintain order and organization in all systems in opposition to the POD.

Ethical Clearance- Not needed for this kind of study

Source of Funding- Self

Conflict of Interest-Nil

References

1. Knoll AH, Nowak MA. The timetable of evolution. Science Advances. 2017 3(5):e1603076. DOI:10.1126/sciadv.1603076
2. Pearce BKD, Tupper AS, Pudritz RE, Higgs PG. Constraining the Time Interval for the Origin of Life on Earth. Astrobiology. 2018; 18 (3): 343–364.
3. Crespi B, Summers K. Evolutionary biology of cancer. Trends in Ecology and evolution. 2005, 20(10): 545-552.
4. Aktipis CA, Nesse RM. Evolutionary foundations for cancer biology. 2012, Blackwell Publishing Ltd 6 (2013) 144–159, in Evolutionary Applications, ISSN 1752-4571.DOI:10.1111/eva.12034.
5. Franquet T, De Miguel C, Cozcolluela R, Donoso L. Spiculated lesions of the breast: mammographic-pathologic correlation. Radiographics. 1993;13(4):841-52.
6. Chen M, Wang W, Jia W, Tang L, Wang Y, Zhan W, Fei X. Three-Dimensional Contrast-Enhanced Sonography in the Assessment of Breast Tumor Angiogenesis Correlation With Microvessel Density and Vascular Endothelial Growth Factor Expression. J Ultrasound Med 2014; 33:835–846. DOI:10.7863/ultra.33.5.835
7. Prasad GC, Sahu M, Deshpande PJ. Concept of Cancer in Ayurveda. Ancient Science of Life 1982;I(3): 172 – 176.
8. Tohme S, Simmons RL, Tsung A. Surgery for Cancer: A Trigger for Metastases. Cancer Res. 2017;77(7):1548–1552.
9. Tripathy A. 2018. Vectorial Capacity of DDT Resistant Anopheles stephensi and Role of GSTs. Indian journal of Science and Technology. 2018; 11(39): DOI: 10.17485/ijst/2018/v11i39/131616.
10. Tripathy A, Samanta L, Das S, Parida SK, Marai N, Hazra RK, Mallavdani UV, Kar SK and Mahapatra N. 2011. The mosquitocidal activity of methanolic extracts of Lantana cramera root and Anacardium occidentale leaf: role of glutathione S-transferase in insecticide resistance. J. medical Entomology. 2011;48(2):291-5. doi:10.1158/0008-5472.CAN-16-1536.
11. Tripathy A, Pradhan RK. A Prelude to Meta-Evolution. Indian Journal of Science And Technology 2018;11(31):DOI: 10.17485/Ijst/2018/V11i31/130098, August 2018.
12. Constantin I, Ioan MV, Bogdan I, Maria FA. Contributions of Evolutionary Biology to the Understanding Of Cancer. Proc. Rom. Acad. Series B. 2012; 14(3):183–190.
13. Lacina L. et al. Evolution of Cancer Progression in the Context of Darwinism. Anticancer Research. 2019;39:1-16.DOI:10.21873/anticanres.13074
14. Tanaka Y, Markham D, Murao M. Local encoding of classical information onto quantum states. J. Mod. Optics 2007. 54,2259-73. DOI:10.1080/09500340701403301
15. Koonin EV. The cosmological model of eternal inflation and the transition from chance to biological evolution in the history of life. Biology Direct 2007;2:15 DOI:10.1186/1745-6150-2-15.
16. Walker SI, Davies PCW. The algorithmic origins of life. J R Soc Interface 2013; 10: 20120869. http://dx.doi.org/10.1098/rsif.2012.0869
17. Tripathy A, Pradhan RK. Parasite-Vector-Host Conscious Mechanism as Determinant of Parasite Virulence, Vector Infectivity and Host Susceptibility: Reproductive Success of Malaria Parasites in Plasmodia-Mosquito-Human Troika. Accepted for Publication in International Journal of Scientific Research and Reviews. 2019 a;8(1):2079-86.
18. Baker SG. A Cancer Theory Kerfuffle Can Lead to New Lines of Research. JNCI J Natl Cancer Inst. 2015;107(2): 1–8.
19. Sonnenschein C, Soto AM. Theories of Carcinogenesis: An Emerging Perspective, Semin Cancer Biol. 2008; 18(5): 372–377.DOI:10.1016/j.semcancer.2008.03.012.
20. Rozhok AI, DeGregori J. Toward an evolutionary model of cancer: Considering the mechanisms that govern the fate of somatic mutations. Proc Natl Acad Sci USA. 2015;112(29):8914-21. DOI:10.1073/pnas.1501713112.PMID:26195756. PMCID: PMC4517250.

21. Luo G, Liu N. An integrative theory for cancer. International Journal Of Molecular Medicine. 2019;43: 647-656.
22. Kauffman S. Differentiation of malignant to benign cells. J Theor Biol. 1971;31:429–451
23. Kasperski A, Kasperska R. Bioenergetics of life, disease and death phenomena. Theory in Biosciences. 2018; 137:155–168
24. Davies PCW, Lineweaver CH. Cancer tumours as metazoan 1.0: Tapping genes of ancient ancestors. Phys Biol 2011;8:015001.
25. Hanahan D, Weinberg RA. The Hallmarks of Cancer. Cell 2000 Jan 7; 100(1):57-70.
26. Jakóbisiak M, Lasek W, Golab J. Natural mechanisms protecting against cancer. Immunol. Lett. 2003 Dec 15;90(2-3):103-22.
27. Bussey KJ, Cisneros LH, Lineweaver CH, Davies PCW. Ancestral gene regulatory networks drive cancer, PNAS 2017 June 13;114(24):6160-62.
28. Torres G, Zakhary SM, Leheste JR. An Evolutionary Perspective of Neoplastic Diseases in the Universe. Cureus 2019 Feb 07;11(2): e4030. doi:10.7759/cureus.4030.
29. Casás-Selves M, DeGregori J. How cancer shapes evolution, and how evolution shapes cancer. Evolution (N Y). 2011 Dec;4(4):624-634.
30. Pepper JW, Findlay CS, Kassen R, Spencer SL, Maley CC. Cancer research meets evolutionary biology. The Year in Evolutionary Biology 2009: Ann. N.Y. Acad. Sci. 2009;1168: 62–70.
31. Thomas F. et al. Applying ecological and evolutionary theory to cancer: a long and winding road. Evolutionary Applications. 2013, 1-10. ISSN 1752-4571.DOI:10.1111/eva.12021.
32. Davies PCW. The astrobiology of Cancer, Astrobiology Magazine 2011;Feb 9: https://www.astrobio.net/origin-and-evolution-of-life/the-astrobiology-of-cancer/
33. Attolini CS, Michor F. Evolutionary Theory of Cancer, The Year in Evolutionary Biology 2009: Ann. N.Y. Acad. Sci. 2009;1168:23–51.
34. Brücher BLDM, Jamall IS. Epistemology of the origin of cancer: a new paradigm. BMC Cancer 2014, 14:331
35. Cofre J, Abdelhay E. Cancer Is to Embryology as Mutation Is to Genetics: Hypothesis of the Cancer as Embryological Phenomenon. The Scientific World Journal 2017; ID 3578090: 1-17. DOI:10.1155/2017 /3578090.

The Cancer Principle-II: Cancer as the Origin of All Life on Earth

Asima Tripathy[1], Rajat Kumar Pradhan[2]

[1]Post Graduate Department of Zoology and Microbiology, [2]Post Graduate Department of Physics, Bhadrak Autonomous College (Department of Higher Education, Govt. of Odisha), Bhadrak, Odisha, India

Abstract

Life is the urge for perpetuation and cancer as the agent of disorder is the force that drives this urge in the direction of unrestrained proliferation. The oncovirus strains like HPV and HCV are as old as life itself from its initial incipient stages and the evolution of such viruses has determined the course of evolution of species from within in a bottom-up manner purely through this urge for unrestrained proliferation. The cosmic ordering principle(COP) acts in the direction of arresting the increase of disorder (cancer) by evolving various cancer suppression or evasion mechanisms and thus both contribute to the evolution of all life.

Keywords: *Cancer, Evolution, Oncovirus, Oncogenes, abiogenesis, cosmic ordering principle (COP) and the principle of disorder (POD)*

Introduction

In the previous essay we have motivated cancer as a fundamental principle of nature that is as old as the universe itself. We wish now to establish it as an agent of the principle of Disorder (POD) that is continuously operating along with the cosmic ordering principle (COP) to give shape to all evolution[1]. Abiogenesis of life on earth can be seen in light of the cancer principle to shade light on pre-cellular evolution. Up to the formation of methane and ammonia etc. which led to the synthesis of amino acids with the help of the energy from lightening and ultraviolet radiation or from hydrothermal vents in the primordial ocean-atmosphere system there was increase of disorder as per the second law in a global sense[2]. But simultaneously, there was also the increase of local order in the formation of larger molecules and molecular aggregates gradually going to form the lithosphere[1]. Wherever the conditions favored the formation of macromolecules, there was rapid growth of such formation as long as catalytic support to the reactants was there. This process could halt only if the catalysts were withdrawn or all the reactants were exhausted, assuming no other inhibiting factors. When this primitive system favored formation of long-chained molecules such as proteins and nucleotides there were aggregates of such molecules which filled large portions of the oceans[3].

The exact number of hydrothermal vents, the extent of oceanic surface with proper catalytic conditions are matters of debate and therefore nothing definite can be said about the locations where biomolecules came up, but the ubiquitous presence of life in the form of Archea and bacteria all over the earth points to the fact that large portions of oceanic belts must have had identical suitable catalytic conditions for synthesis of biomolecules. The recent discovery of extremophiles (thermophiles and cryophiles) in uninhabitable regions on earth, hitherto considered barren for life, lead us to propose that even prior to the formation of lithosphere the entire hydrospheric envelop was filled with such biomolecules as would support evolution of life[4,5]. We may call it the Global Biomolecular Envelop (GBE). This GBE, regional climatic variations notwithstanding, must be taken as the basic substrate for life to manifest[6]. Once the biomolecules started getting synthesized, there could have been no stopping of such synthesis till different regional thresholds were reached in different belts forming the GBE. The inherent tendency in the GBE to pervade ever larger regions by proliferation is the fundamental defining feature of all life[7].

Corresponding author
Asima Tripathy
Email ID: asimatripathy09@gmail.com

The tango between order and disorder

Upon the emergence of membrane-bound pre-cellular organisms, this fundamental feature of life became converted to *proliferation-by-invasion*. This conversion is due to the operations of the cosmic ordering principle (COP) that tried to curb this inherent tendency of life to pervade by proliferation. The appearance of life on earth is due primarily to a cancerous disorder-producing force which has at its core the characteristics of proliferation and invasiveness and which has little concern for the consequences thereof. The COP has continuously acted to resist and to channelize such irresponsible tendencies as is evidenced by the gradual condensations, and also by the synthesis of macromolecules. These biomolecules started self-replicating under the action of the principle of disorder (POD) without any restraint. The information about interdependent proliferation (Protein synthesis by nucleic acids) of these macromolecules stored in the nucleic acids by the COP was encapsulated within proteinous or lipoproteinous membranes. But the tendencies for proliferation and invasiveness hid themselves within those encapsulated "individuals" as their core characters and these are nothing but the oncogenes in segments of the nucleic acids (DNA and RNA). The protein encapsulated nucleic acids were the viruses and those with lipoproteinous encapsulation were the bacteria and archea[8,9].

The tendencies for proliferation and invasiveness remained most potently with the viruses but were patent in the archea and bacteria. Invasion into one another with a view to rapid irresponsible proliferation (Cancer again!) was the operating principle among them[7]. Primordial endosymbiotic mechanisms among archea and bacteria led to the eukaryotes as the result of such invasiveness and proliferation and then on to multicellular complexity[10,11]. By endosymbiosis the COP ensured the survival of the host as well as that of the endosymbiont.

It has been found by phylostratigraphic analysis of emergence of cancer related protein domains that there was a peak at the emergence of the first living cell corresponding to caretaker cancer genes in tumor progression[12]. Thus it is that the Cancer principle is at the very origins of life through abiogesis. Davies' remark, "Cancer can give us important clues about the nature and history of life itself" is thus justifiable[13].

Origins of Oncovirus

The viruses on their part were always on the lookout for entering others to proliferate which led first to the lytic mode of virulence. Thus the fundamental traits of invasiveness and proliferation due to the POD are present in them as their such virulence factors. The COP intervened to bring about a less virulent alternative in the shape of the lysogenic mode of viral proliferation. The viruses, driven by their irresponsible core characteristic of proliferation and invasion, get attached to the DNA of the host and ensure the perpetuation of virulence[14,15,16]. Thus the endosymbiotic compromise brought about by COP against the rampaging virulence held sway for survival of both the species. The POD then makes the endosymbiont integrate its genetic material into that of the host for its perpetual proliferation utilizing the cellular mechanisms and the resources of the host. The character of proliferation got ingrained in the organisms as the genes responsible for reproduction. To curb unrestrained proliferation the COP brought about various mechanisms such as longer duration reproductive cycles, programmed cell death and also changeover from asexual to sexual reproduction which necessitates dependence on third party pollinators in case of plants and mate availability in case of animals.

The invasiveness following from POD was initially in a highly virulent mode, but the COP made it symbiotic. It is precisely in this manner that the highly detrimental lytic mode became converted to the lysogenic mode. The cancerous urge for unrestrained selfish proliferation by invasion into other organisms is so strong in the viruses that they have co-evolved alongside all known species beginning with prokaryotes right up to the humans and there are viruses specializing in infecting particular tissues of particular species. The species have also co-evolved to counter such virulence but no species has ever been able to free itself from viral infections. Thus the entire evolutionary process can be seen to be a continuous struggle to counter the core characteristics of proliferation, invasiveness and virulence. The viral strains have evolved to adopt the most unavoidable living processes as their mode of transmission e.g. respiration, reproduction etc. which increase their virulence as well as fitness factors. The most evolved of the viruses are double stranded DNA type which can attach their genetic material to that of the host and by that ensure their proliferation. The HIV, for example, is capable of completely paralyzing the immune system as if having specifically developed the ability to target

human immunoglobulins[17]. The oncovirus, on its part, appears to have specialized in silencing the tumor suppressor genes.

The oncovirus evolved, preserving within itself the original disorder-producing traits viz. proliferation, invasiveness and virulence all along, to finally be able to activate the human oncogene by producing mutations so that it can completely incapacitate and overpower the highest evolved species by attaching its double stranded DNA to that of the humans[18,19]. In this perspective it is not surprising that virulence in some form or the other has always been on the rise through the entire course of evolution to achieve a sort of invincibility even in their continuous battle against human intelligence, finally landing in the genetic mode of transmission[20].

Bacterial Origins of Cancer Cells

The fact that no exact mechanism is known behind (1) the transformation of normal cells to the primary cancer cells (PCC) that initiate cancer and (2) the transformation of PCCs to the secondary cancer cells (SCC) that are responsible for progress of cancer, has led Dong and Xing to propose the hypothesis of bacterial origins of cancer cells[21]. They base their proposal on the fact that (a) newly formed PCC and SCC are devoid of organelles and look like bacteria (2) Organelle biogenesis of cyanobacterium TDX16 to transform into TDX16-DE by acquiring the DNA of its algal host is similar to the transition of normal cells to PCC and PCC to SCC. The PCC are hypothesized to be intracellular bacteria that take up and hybridize the DNA of senescent or necrotic normal cells, while the SCC are proposed to be the PCC that take up such DNA and hybridize. This view supports the idea that cancer cells are single-celled eukaryote organisms, to which our above analysis does also point.

Cancer cells as a species

The cancer cell line HeLa has been observed to live in vitro for 50 years[22] while canine sarcoma cells known as canine transmissible venereal tumors (CTVT) evolves as a unicellular pathogen outside any host and has developed appropriate immuno-resistance to survive in the wild for decades, as if these cells were a new species[23]. Such transmissible cancers showing inter-individual metastasis prove that cancer cells are indeed living organisms having their own evolutionary adaptations for achieving maximum replication efficiency[24]. Intra-tumor genetic diversity of the cancer cells qualifies them to be called a species rather than an individual.

This schematic figure below represents the successive actions of the cosmic ordering principle (COP) and the principle of disorder (POD) in the evolution of life and species and depicts how the latter has manifested as the cancer principle and has directed evolution all along.

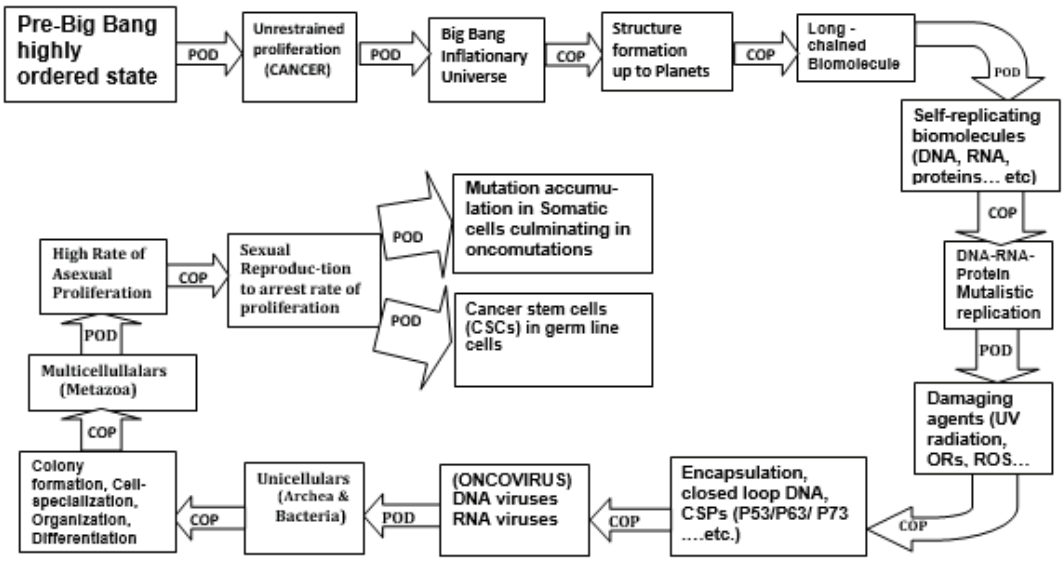


Fig.1. Schematic of Evolution from the highly ordered pre-big bang state up to prokaryotes through the actions of COP and POD

Starting from a highly ordered pre-big-bang state of the universe we have depicted the actions of COP and POD as if competing with each other, and cancer is the agent of disorder and stands for all kinds of irresponsible proliferation that is detrimental to the overall order and organization. As cancer tried to spread its deadly tentacles to engulf all life, the organisms evolved various strategies correspondingly to defend themselves against the menace. The more cancer tried to take the unavoidable routes to manifest, the more specific became the microscopic cellular defenses against it. As per the cancer principle this is the key to understanding all evolution.

Conclusion

With time our knowledge of cancer incidence and progression has entered the genetic domain and oncogenes have been identified. Some oncogenes are isomorphic to the DNA fragments of the early viral strains and which are now identifiable as either the oncoviruses or their precursors. The mtDNA as well as the vast non-coding sector of the DNA have been implicated as having the triggers for the switching on of oncogene expression by the mediation of non-coding RNAs such as mcRNA, circRNA, lncRNA, siRNA and asRNA etc[25,26].

Thus cancer can be understood as the underlying force behind the emergence of life through abiogenesis as well as the progress of life through viral and then bacterial evolution. The road from viruses onwards can be surmised to have been a series of endosymbioses that brought about the evolution of prokaryotes and then the eukaryotes. In the third essay we will argue that it is cancer that has determined the evolution of multicellularism and of all the species. This gives strength to the hypothesis that cancer is at the origin and is the cause of evolution of life in its variety.

Also there are numerous mechanisms which seem to have been designed to limit the ability of the organism to disobey the decentralized tissue principle in order to reduce the risk of getting cancer. All these important processes in evolution can thus be seen to have come up only to resist undifferentiated cell growth, which is nothing but "cancer". There seem to be two distinct forces pitted against each other: the force of cancerous growth versus the resistance to cancer. What we see as evolution of life is but the ongoing contest between these two opposing forces of order and disorder, each operating to defeat the other in multifarious ways. More about this tussle will be discussed in the next essay.

The cancer principle arose out of such musings on its character as unrestrained proliferation, as an undaunted and tenacious march towards immortality as if, it alone were immortal, while all else is mortal.

Ethical Clearance- Not needed for this kind of study

Source of Funding- Self

Conflict of Interest-NIL

References

1. Tripathy A, Pradhan RK. Consciousness as the cosmic ordering principle and the interplay of order and disorder in the physical and biological systems, IJSRR 2019 b; 8(1):859-73.
2. Dodd MS, Papineau D, Grenne T, lack JF. Rittner M, Pirajno F, O'Neil J, Little CTS. Evidence for early life in Earth's oldest hydrothermal vent precipitates. Nature 2017 Mar 1; 543 (7643): 60–64.
3. Mulkidjanian AY et al. Origin of first cells at terrestrial, anoxic geothermal fields. PNAS USA 2012; 109: 14:E821-30. DOI:10.1073/pnas.1117774109.
4. Di Giulio M. The universal ancestor and the ancestor of bacteria were hyperthermophiles. Journal of Molecular Evolution 2003; 57 (6):721-30.DOI:10.1007/s00239-003-2522-6. PMID 14745541.
5. Merino N et al. Living at the Extremes: Extremophiles and the Limits of Life in a Planetary Context, Front. Microbiol. 2019 April 15: https://doi.org/10.3389/fmicb.2019.00780
6. Cafferty BJ, Fialho DM, Khanam J, Krishnamurthy R, Hud NV. Spontaneous formation and base pairing of plausible prebiotic nucleotides in water. Nature Communications. 2016 April 25;7(1):11328. DOI:10.1038/ncomms11328. PMC 4848480. PMID 27108699.
7. Dyall SD, Brown MT, Johnson PJ. Ancient invasions:from endosymbionts to organelles. Science. 2004;304 (5668):253-7. doi:10.1126/science.1094884.PMID15073369.
8. Gribaldo S, Brochier-Armanet C. The origin and evolution of Archaea: a state of the art. Philos Trans

R Soc Lond B Biol Sci. 2006;361(1470):1007–1022. doi:10.1098/rstb.2006.1841

9. DeLong EF, Pace NR. Environmental Diversity of bacteria and Archea. Systematic biology 2001;50(4):470-78. doi:10.1080/106351501750435040. PMID 12116647
10. Lang BF, Gray MW, Burger G. Mitochondrial genome evolution and the origin of eukaryotes. Annual Review of Genetics 1999; 33: 351–97. doi:10.1146/annurev.genet.33.1.351. PMID 10690412.
11. McFadden GI (December 1999). "Endosymbiosis and evolution of the plant cell". Current Opinion in Plant Biology. 1999;2(6):513–19. doi:10.1016/S1369-5266(99)00025-4.PMID 10607659
12. Domazet-Loso T and Tautz DR. Phylostratigraphic tracking of cancer genes suggests a link to the emergence of multicellularity in metazoa, BMC Biology 2010, 8:66. http://www.biomedcentral.com/1741-7007/8/66
13. Davies PCW. The astrobiology of Cancer, Astrobiology Magazine 2011;Feb 9: https://www.astrobio.net/origin-and-evolution-of-life/the-astrobiology-of-cancer/
14. Wahl LM, Betti MI, Dick DW, Pattenden T, Puccini AJ. Evolutionary stability of the lysis-lysogeny decision: Why be virulent?. Evolution. 2019;73(1):92-98. doi: 10.1111/evo.13648.Epub 2018 Nov 26.PMID:30430551
15. Howard-Varona C, Hargreaves KR, Abedon ST, Sullivan MB. Lysogeny in nature: mechanisms, impact and ecology of temperate phages. ISME J. 2017;11(7):1511–1520.doi:10.1038/ismej.2017.16.
16. Brüssow H, Canchaya C, Hardt WD. Phages and the evolution of bacterial pathogens: from genomic rearrangements to lysogenic conversion. Microbiol Mol Biol Rev. 2004;68(3):560–602.doi:10.1128/MMBR.68.3.560-602.2004.
17. Chang Y, Moore, P. S. &Weiss, R. A. Human oncogenic viruses: nature and discovery. Phil Trans R Soc B 2017; 372: 20160264.doi: 10.1098/rstb.2016.0264.
18. White MK, Pagano JS and Khalili K. Viruses and Human Cancers: a Long Road of Discovery of Molecular Paradigms. Clinical Microbiology Reviews July 2014; 27(3): 463–481.
19. Pierangeli A, antoneli G and Gentile G. Immunodeficiency-associated viral oncogenesis, Clin Microbiol Infect. 2015;21:975–983, http://dx.doi.org/10.1016/j.cmi.2015.07.009
20. Alizon S, Bravo IG, Farrell PJ,Roberts S. Towards a multi-level and a multi-disciplinary approach to DNA oncovirus virulence. Phil. Trans. R. Soc. B 2019;374: 20190041. http://dx.doi.org/10.1098/rstb.2019.0041
21. Dong Q, Xing X. Cancer Cells arise from Bacteria, Cancer Cell International 2018;18:205. doi:10.1186/s12935-018-0699-4.
22. Masters JR. HeLa cells 50 years on: the good, the bad and the ugly. Nat Rev Cancer 2002;2:315-9.
23. Blagosklonny MV. Molecular theory of cancer, Cancer Biology & Therapy 2005; 4:6: 621-627,DOI: 10.4161/cbt.4.6.1818.
24. Ujvari B, Gatenby RA, Thomas F, Transmissible Cancer: The Evolution of Interindividual Metastasis, Editor(s): Beata Ujvari, Benjamin Roche, Frédéric Thomas, Ch. 12. Ecology and Evolution of Cancer, Academic Press, 2017, Pp 167-179, ISBN 9780128043103.
25. Gamage PA, Frezza C. Mitochondrial DNA: The overlooked oncogenome? BMC Biology 2019;17: article No. 53. https://doi.org/10.1186/s12915-019-0668-y
26. Wang T, Han C, Sun Y, Chen T, Chen Y. Noncoding RNAs in cancer therapy resistance and targeted drug development. J Hemat Oncol 2019;12:article no. 55. https://doi.org/10.1186/s13045-019-0748-z

The Cancer Principle-III: Evolution by Cancer

Asima Tripathy[1], Rajat Kumar Pradhan[2]

[1]Post Graduate Department of Zoology and Microbiology, [2]Post Graduate Department of Physics, Bhadrak Autonomous College (Departmentment of Higher Education, Govt. of Odisha), Bhadrak, Odisha, India

Abstract

Cancer evolves to make all else evolve along with it. Each cancer cell is the result of a huge number of mutations undergone till the point of activation of uncogenes by some kind of natural selection. The uncovirus evolved all along entering the primitive cellular life as an endosymbiont through the mitochondrial route and got itself thoroughly entrenched in the very life process of each living cell, waiting for the appropriate moment to trigger tumor genesis. We propose that multicellularism evolved to arrest cancerous proliferation i.e. overgrowth of single cell types. Afterwards specialized tumor suppression mechanisms, cancer suppressor proteins, lymphoid organs with immune cells evolved to protect the organism against carcinogenesis. It seems as if only to not fall into cancer's deadly trap, all creatures have evolved definite mechanisms and in the process have not only gotten their diversified morphologies, but also their specific physiological systems.

Key Words: *Cancer Principle, oncovirus, oncogenes, Cosmic ordering principle, Principle of Disorder, CSP, VEGF*

Introduction

Unrestrained proliferation of any one category is always opposed by the emergence of effective control mechanisms evolving alongside it to counter such canker. The unrestrained growth is a tendency towards disruption of order and organization in the system and thus the counteracting agency must be an ordering principle or agency that always works to restore or maintain order and organization by adopting as many means and methods as would be suitable to counteract the force of cancer. Evolution of cancer cells by mutation and selection are exactly like evolution of species by such processes[1].

Mutation risk increases with age and with number of cells of an organism. Correspondingly cancer risk too must increase, since carcinogenic mutations become more probable with increasing mass and age. It means that higher mass animals such as elephants and whales compared to humans (or humans compared to mice) should have more susceptibility to cancer, while it is not observed to be so. This is Peto's paradox[2]. There must have been selection for definite protection against cancer with evolution of new morphological and biological characteristics such as larger body size and longer life[3]. The killer capacity of cancer has been highlighted by Lichtenstein as an additional hallmark and this must have had its selection agency in the evolution of various species, their mutation rates, body sizes, longevity, susceptibility to mutagens and so on[4]. Evolution of malignant tissues has been seen to be similar to evolution of drug resistance in bacterial communities[5]. Evidences are there that skin acted as a selection agent in the evolution of black pigmentation in early hominin[6].

Species-specific and cell-specific requirements for malignancy has been studied all through, but there has also been corresponding evolution of resistance against the disease[7]. Klein has emphasized studying the genetics of cancer resistance rather than of cancer attack which is clearly an evolutionary perspective[8]. For example the P53 family of genes including P63 and P73 has its common ancestry in the P63/P73 genes found in fish and sea anemones. They have later diversified in their functions in higher vertebrates though their sole function is to protect the germ-line from genomic instability following from various stresses[9].

The contribution of cancer to evolution all along the history of life on earth is so deep that Greaves has echoed Dobjhansky's famous statement in regard to it-

Corresponding author:
Asima Tripathy
Email ID: asimatripathy09@gmail.com

"Nothing in cancer makes sense …"[10].

Multicellularism

Cancer has been branded as a disease of the multicellular organisms where multicellualrity has failed[11]. How cancer permeates the entire landscape of multicellular life forms has been reviewed by Aktipis *et al*[12]. Note that cancer, in this series of essays, is an evolutionary force of unrestrained proliferation and not just a disease.

The autonomous unicellular became multicellular only to resist cancer. Is that autonomy somehow stored in the highly complex and organized multicellular organisms? Are the individual cells incessantly endeavoring for selfish reproductive success resulting in this tug-of-war for reproductive success between the organism and its "would-be-cancer-cells"? Indeed, the reproductive success of the organism might be the explanation for the late-age appearance of cancer[13]. Nature in this manner gives a chance to the organism to propagate itself by struggling and maximizing its reproductive success against its individualistically endeavoring "would-be-cancer-cells". Success of cancer cells proves that nature favors them or they have molded nature successfully so that oncomutations get inherited thereby. Further, competition among cancer cells leads to the faster dividing cells overpowering and outcompeting the comparatively slower dividing cells. Nature thus favors the cellular over the organismic reproductive success! Cellular reproduction has overpowered natural selection[14] !

Evolution of sexual reproduction

Reproduction as a process of fulfilment of the instinct for perpetuation is the common characteristic of all life[14]. However, no life-form has been able to proliferate indefinitely. The emergence of multicellularism from unicellularism is one such stage where unrestrained growth of unicellular life was halted in favor of complexity. Indeed, phylostaratigraphic tracking of oncogenes suggests that multicellularism in metazoa emerged as a micro-evolutionary transition following a complex multi-level selection[15]. Further, divergence of species occurred at different epochs of evolution owing to various selection pressures. Such diversification effectively controlled unrestrained proliferation of any one species by competition. For this reason, cancer is seen to be a failure of multicellularity[16]. Similarly sexual reproduction evolved from the asexual mode to drastically reduce asexual proliferation of the particular type.

Differentiation of cells in an organism is similar to diversification of species in the sense that both can be seen as an effect of a regulatory force that restricts undifferentiated growth of a particular kind. A tumor in an organism is just such an undifferentiated growth, which may become cancerous. The cancer suppressor gene, apoptosis, autophagy and such other cellular mechanisms have evolved only to suppress or eliminate the possibility of such undifferentiated cell growth or tumor formation. The existence of the definite times for cell division in different tissues is also such an effective mechanism[17].

Cancer Suppression Mechanisms

Cancer suppressor proteins(CSP) are part of the defense system of the body against cancer cells. If there is any abnormality or deviation in the cell multiplication, then these CSPs cause the cell to die or lead to its senescence. Thus CSPs are the reason for normal growth and make us fittest for survival[17]. Then how does CSP fail to halt the success of normal cells and give in to the cancerous mode? Is it only to gain higher uncontrolled reproductive success or it has some other deeper meaning?

For example, among the CSPs, P^{16} is one which causes senescence of abnormally multiplying cells. Contrary to this, VEGF (Vascular Endothelial Growth Factor) stimulates blood vessels to supply the cancer cells with sufficient nutrients for successful growth and multiplication. Here which one competes with which? The P^{16} competes with VEGF or nature competes with the supreme conscious evolutionary force? While nature's objective is reproductive success, the evolutionary force has for itself the role of ultimately monitoring nature's forces and consequences and takes care of things by endowing the organism with P^{16} against VEGF. Or, do both operate simultaneously on both P^{16} and VEGF to compete among themselves and finally it is the achievement of the beneficial one (P^{16}) to win? It has been found that the tumors become refractory and then become resistant to any antibodies tried against the VEGFs[18]. Similarly Tumor suppressor protein P53 is pitted against MDMX and MDM2 (or HDM2 in case of humans) that inactivate them[19]. Cancer seems to be winning in this battle of evolutionary competition!

Similarly, the genes responsible for facilitating the human fetus to form placenta in to the womb, normally remain silent in adult tissues. In cancer cells these genes become active and trigger aggressive growth of blood vessels to ensure energy supply for their growth and multiplication. It seems as if a cancer cell were the knower of all advantageous set-ups of the body and specializes in employing them for its own purpose! Indeed recent studies indicate that ancient retroviruses had a significant contribution in the development of placental gene regulatory networks in mammals[20]. The huge variation in mammalian placental form and function across species as well as phenotypic plasticity may be linked to the evolutionary diversifications of the retroviruses themselves[21,20].

Lymphoid organs and immune cells

In both vertebrates and invertebrates antigen-specific immunity serves the purpose of defense against virus, bacteria and other pathogens and primarily they protect the organism against pre-cancerous and cancerous cells and thus they contribute towards tumor suppression[23]. Immune system is comparatively more developed and complex in vertebrates[24,25]. The design of the whole lymphoid system such as primary lymphoid organs (bone marrow, thymus), secondary lymphoid organs (lymph nodes, spleen, mucosa associated lymphoid tissue, skin associated lymphoid tissue and lymph cells) and immune cells such as B cells, T cells and NK cells; phagocytes i.e. monocyte-macrophage system and neutrophils; antigen presenting cells (APCs), granulocytes, mast cells, platelets is to defend the body[26]. The cell-mediated and humoral (antibody) responses of the immune system result from the coordinated activities of all the immune cells, organs and tissues found throughout the body and they combinedly function to defend the body against antigens.

The whole micro-system of the body is protected by a cascade of defense mechanisms including Tertiary Lymphoid organs (TLOs) and Ectopic Lymphatic Organs (ELOs), but still cancer can easily take its place successfully[27,28]. It seems as if cancer were already there and in response to it the body has tried to develop some successful mechanisms but finally could only develop these defense systems which are but too feeble to defend against cancer so much so that even if cancer is detected and treated at an early stage and in an early age, premature ageing of the survivors starts[29].

Enucleation of RBCs in mammals

RBCs are pivotal to the life of many higher organisms and in the mammals, they are bereft of nucleus and hence are devoid of DNA. The increased oxygen carrying capacity, the flexibility of having a biconcave shape after the ejection of the nucleus and mitochondria are definitely potent reasons for the enulcleation. But the more important reason seems to us to be to not have any genetic material which can possibly become cancerous, from which there would be no escape from certain death[30,31]. The greatest advantage of getting rid of mitochondria and nucleus on the part of the mature RBC is thus to avoid cancer by getting rid of all genetic material, since it is seen that (Nucleated RBC) NRBC appear in adult patients just 2 to 3 weeks before death.

We tabulate below the cancer inhibitory and the cancer supportive processes respectively brought about by the actions of the cosmic ordering principle(COP) and the principle of disorder(POD)[32]. Therapeutic approaches to counter cancer are merely the actions of COP acting through our intelligence to restore order in the system affected by cancer(POD). This lets us put them under COP, though it may be said to be artificial while the systemic defenses are natural. But the natural-artificial divide here is itself quite artificial since intelligence-based therapeutic approaches are only too natural for human beings to take recourse to!

Table 1: Action of COP in cancer inhibition and POD in Cancer progression:

Processes	**Cosmic Ordering Principle(COP)**	**Principle of Disorder(POD)**
A. Cellular Processes	1. Growth inihibition signals	Self-sufficiency in growth signals
	2. Limited Replicative potential	limitless replicative potential
	3. Apoptosis	Evasion of Apoptosis
	4. Autophagy	Inhibition of Autophagy
	5. Necroptosis	Inhibition of Necroptosis
	6. Anoikis	Anoikis resistance
	7. Oxydative Phosphorilation	Glycolysis (Warburg effect)
B. DNA related processes	1. Chromatin remodeling 2. Histone modification 3. Epigenetic Control 4. Transcription factors 5. RNAi 6. DNA damage sensors 7. Non-homogeneous end-joining path way (Repair mechanism)	DNA damage:- adducts and lesions Mutation accumulation. oncogenes Mutational inactivation of Tumor suppressor genes. DNA Repair failure. Intra tumor heterogeneity
	8. Antioxidant defense system	Over-production of oxyradicals and ROS.
	9. Telomere erosion	Telomere preservation/reactivation
C. Immune system	1. Immune cells of different kinds 2. Immune editing 3. Lymphoid organs	Immune suppression
	4. Cancer suppressor proteins	VEGF (Vascular Endothelial Growth factor), sustained angiogenesis, Lymphangiogenesis
	5. Macrophages	Anti-inflammatory immune suppressor
D. Extra-cellular processes	1. Cell-cell adhesion	Metastasis
	2. Tumor progression inhibitory microenvironment	Tumor progressive adaptations, Degradation of extra-cellular matrix to create new passages for metastasis
E. Therapeutic intervention	1. Surgical intervention 2. Ancillary clinical strategies such as anaesthetics, analgesics and anti-inflammatory drugs 3. Other therapeutic approaches	Post-operative accelerated metastasis and peri-operative immuno-suppression, All round Systemic dysfunction, multiple organ failure and the resultant appearance of host of other diseases

Conclusion

We focused on how cancer has shaped up evolution in crucial stages and in decisive ways, out of which we explicitly dealt with evolution of multicellularism, reproduction, immune system and a few other aspects. Multicellularism arrests unicellular proliferation but, the organization of tissues and decentralization of responsibilities by their spatially limiting the urge for proliferation of the cells create a pressure on the somatic cells to react and become cancerous. Cancer is thus a fundamental factor in evolution of multicellulars with all kinds of tumor-suppression mechanisms. In the extracellular niche, the cells proliferate and are continuously under competition pressure for nutrition, survival and space. Thus, the cell may reach a competing state to acquire high ability to grow, divide and gain strength to attain immortality, by acquiring an oncomutation. Though tumor-suppression mechanisms are in place, cancer has its ways to wade around them and metastasize. Indeed, nothing in evolution makes sense except in the light of cancer.

Ethical Clearance- Not needed for this kind of study

Source of Funding- Self

Conflict of Interest-NIL

References

1. Casás-Selves M, DeGregori J. How Cancer Shapes Evolution and How Evolution Shapes Cancer. Evolution: Education and Outreach. 2011;4(4):624–634
2. Peto R. *et al*. Cancer and ageing in mice and men, Brit. J. Cancer. 1975;32:411-426.
3. Leroi A. *et al*. Cancer selection. Nature reviews. Cancer. 2003;3:226–231
4. Lichtenstein AV. On evolutionary origin of cancer. Cancer Cell International. 2005;5(1):5-13.
5. Lambert G, Estevez-Salmeron L, Oh S, Liao D, Emerson BM, Tlsty TD, Austin RH. An analogy between the evolution of drug resistance in bacterial communities and malignant tissues. Nat Rev Cancer. 2011;11(5):375–82.
6. Greaves M. Was skin cancer a selective force for black pigmentation in early hominin evolution? Proc Biol Sci B. 2014;281(1781):20132955.
7. ***Rangarajan A,*** *et al*. Species- and cell type-specific requirements for cellular transformation. Cancer Cell. 2004;6:171–183
8. Klein G. Toward a genetics of cancer resistance. Proceedings of the National Academy of Sciences of the United States of America. 2009;106:859–863
9. Belyi VA *et al*. The origins and evolution of the p53 family of genes. Cold Spring Harb Perspect Biol. 2010 ;2(6):a001198
10. Greaves M. Nothing in cancer makes sense except… BMC Biology 2018**;**16:22. https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-018-0493-8
11. Trigos AS, Pearson RB, Papenfuss AT, Goode DL. How the evolution of multicellularity set the stage for cancer. British Journal of Cancer (2018) 118, 145–152.DOI: 10.1038/bjc.2017.398.
12. Aktipis CA *et al*, Cancer across the tree of life: Cooperation and cheating in multicellularity, Phil Trans R Soc B. 2015; 370: 20140219. http://dx.doi.org/10.1098/rstb.2014.0219
13. Rozhok AI, DeGregori J. The evolution of lifespan and age-dependent cancer risk. Trends Cancer. 2016;2(10):552–560.DOI:10.1016/j.trecan.2016.09.004
14. Tripathy A, Pradhan R. The Indomitable Force of Instinctive Urge in Competitive Success, Stress Response and Evolution, IJSRR Apr-Jun 2019a; 8(2):2286-2300.
15. Domazet-Loso T, Tautz D. Phylostratigraphic tracking of cancer genes suggests a link to the emergence of multicellularity in metazoa, *BMC Biology* 2010,**8**:66. http://www.biomedcentral.com/1741-7007/8/66
16. Pennisi E. Is cancer a breakdown of multicellularity? *Science* 29 Jun 2018;360(6396):1391,DOI:10.1126/science.360.6396.1391
17. Jakobisiak M, Lasek W, Golab J. Natural mechanisms protecting against cancer, Immunol Lett. 2003 Dec 15;90(2-3):103-22.
18. Shibuya M. Vascular Endothelial Growth Factor (VEGF) and Its Receptor (VEGFR) Signaling in Angiogenesis: A Crucial Target for Anti- and Pro-Angiogenic Therapies. Genes & Cancer 2011;2(12):1097–1105.DOI: 10.1177/1947601911423031.
19. Sherr CJ. Principles of Tumor Suppression. Cell

2004; 116(2): 235-246. https://doi.org/10.1016/S0092-8674(03)01075-4

20. Chuong EB, Rumi MA, Soares MJ, Baker JC. Endogenous retroviruses function as species-specific enhancer elements in the placenta. Nat Genet. 2013;45(3):325–329. DOI:10.1038/ng.2553
21. Sharif J, Shinkai Y, Koseki H. Is there a role for endogenous retroviruses to mediate long-term adaptive phenotypic response upon environmental inputs? Phil Trans Roy Soc. B 2013;368(1609):20110340. http://dx.doi.org/10.1098/rstb.2011.0340
22. Chuong EB. The placenta goes viral: Retroviruses control gene expression in pregnancy. PLoS Biol. 2018;16(10):e3000028 .doi:10.1371/journal.pbio.3000028
23. Buchmann K. Evolution of innate immunity: clues from invertebrates via fish to mammal 2014; 5 Article 459 : 1
24. Cooper MD, Alder MN. The Evolution of Adaptive Immune Systems. Cell 2006 Feb; 124(4):815-822. DOI:https://doi.org/10.1016/j.cell.2006.02.001
25. Hirano M. Evolution of vertebrate adaptive immunity: immune cells and tissues, and AID/APOBEC cytidine deaminases. Bioessays. 2015 Aug; 37(8):877-87.doi: 10.1002/bies.201400178. Epub 2015 Jun 17.
26. Engelhard VH, Rodriguez AB, Mauldin IS, Woods AN, Peske JD, Slingluff Jr. CL. Immune Cell Infiltration and Tertiary Lymphoid Structures as Determinants of Antitumor Immunity J Immunol. 2018; 200 (2): 432-442.DOI: https://doi.org/10.4049/jimmunol.1701269
27. Colbeck EJ, Ager A, Gallimore A, Jones GW. Tertiary Lymphoid Structures in Cancer: Drivers of Antitumor Immunity, Immunosuppression, or Bystander Sentinels in Disease? Front. Immunol. 2017; 8:1830.DOI:10.3389/fimmu.2017.01830
28. Lin L, Hu X, Zhang H, Hu H. Tertiary Lymphoid Organs in Cancer Immunology: Mechanisms and the New Strategy for Immunotherapy. Front Immunol. 2019; 10:1398.DOI:10.3389/fimmu.2019.01398
29. Cupit-Link MC, Kirkland JL, Ness KK, et al. Biology of premature ageing in survivors of cancer. ESMO Open 2017; 2:e000250.DOI:10.1136/esmoopen-2017-000250
30. Schering JL, Munoz J, Raybon E, Hegab S, Hanbali AS, and Kuriakose P. The diagnostic and prognostic implications of nucleated red blood cells in myelophthisis. Journal of Clinical Oncology 2011; 29(15): 6576-6576
31. Danise P, Maconi M, Barrella F, et al. Evaluation of nucleated red blood cells in the peripheral blood of hematological diseases. Clinical Chemistry and Laboratory Medicine (CCLM) 2011; 50(2): 357-360.DOI:10.1515/cclm.2011.766
32. Tripathy A, Pradhan RK. Consciousness as the cosmic ordering principle and the interplay of order and disorder in the physical and biological systems, IJSRR 2019 b; 8(1):859-73

The Cancer Principle-IV: The Inevitability and Invincibility of Cancer

Asima Tripathy[1], Rajat Kumar Pradhan[2]

[1]Post Graduate Department of Zoology and Microbiology, [2]Post Graduate Department of Physics, Bhadrak Autonomous College (Departmentment of Higher Education, Govt. of Odisha), Bhadrak, Odisha, India

Abstract

The inevitability and invincibility of cancer despite the evolution of various systemic strategies such as apoptosis, senescence and autophagy etc. over millennia in all species, point to its fundamental ingrainment in all existence as the principle of unrestrained proliferation. Cancer is in real command of all cellular and organismic processes and can reorient and modulate them all to its advantage. It seems reasonably clear that all life, whether unicellular or multicellular, individual or species, is destined to end in a cancerous boom. It has found ways to evade all suppression mechanisms and strategies and can stem from many sources and causes such as external chemical and viral carcinogens and also internal genetic reasons.

Key words: *apoptosis, oncovirus, oxyradicals, immortality*

Introduction

Cancer has defeated all our attempts to control any of its hallmarks precisely because neither its pathology nor its biology completes its etiology[1,2]. It seems that it has some inbuilt strategy to counteract any attempt from outside for prevention, intervention, treatment and eradication by multipronged therapeutic approaches. This strong never-say-die character of cancer hints at the deepest principle of immortality which is operative in all organisms as the struggle for survival.

Continuously occurring mutations in a cell lineage over a length of time increase the chances of hitting upon an oncomutation provided mutations are truly random. In contrast metaevolutionary transencoding of urges and instincts into the genes through epigenetic channels may suffice to give more definite routes for oncomutations to occur. In particular long term impact of stress and repercussions of acute shock induced by accidents and bereavements may be sufficient to produce oncomutations in the DNA by over-production of ROS. Inevitable exposure to environmental carcinogens (UV radiation, chemical mutagens etc.) leads to a faster rate of cellular proliferation which leaves little scope for the DNA repair mechanisms to heal the damages caused. Our approach to cancer prevention has to be modified by a suitable shift of attitude since cancer is not a disease but a living force that has proved its mettle for survival since times immemorial.

Cancer as a late age phenomenon

Generally, cancer is the disease in late ages[3,4]. The delay is possibly because the cells should gain multiple variations before they become cancerous as if the cancerous cells know and remember that multiple variations are required for being selected to survive to the next generation unfailingly. The multicellular organisms are equipped with efficient tumor suppressive mechanisms, otherwise it would have been impossible for them to develop into a well coordinated organized organism[5]. Recently, by Monte Carlo simulation of the effect of key somatic evolutionary parameters on carcinogenesis, ageing-dependent somatic selection and evolution of species-specific tumor suppression mechanisms have been demonstrated to have played significant roles in cancer incidence across tissues as well as species[4]. Similarly Xu and Taylor studied epigenetic changes by DNA methylation that lead to a lowering of threshold for malignant transformation that partly explains the increased incidence of cancer with age[6]. In our view, all these fundamentally imply that in

Corresponding author:
Asima Tripathy
Email ID: asimatripathy09@gmail.com

addition to the urge for reproduction, the urge to avoid becoming a tumor cell was also a primary objective for the unicellular in the primordial stages of evolution.

Cell senescence and apoptosis

Cell suicide (Apoptosis) and cell senescence and autophagy are mechanisms in the cells to get rid of carcinogenic mutations[7]. These mechanisms can also be seen as having developed to achieve tumor suppression[8]. Suppression of rogue cell growth was thus a primary objective of the primordial living cell. It implies that though unrestrained cancerous proliferation is at the origin of life, the whole process of origin and evolution of complexity of life can be seen as a continuous struggle only to enhance the tumor suppressive mechanisms to limit cancer. In fact, cancer treatment by exploiting cell senescence mechanisms have long been proposed since by the early onset and acceleration of senescence in the tumor cells, they can be made to die before proliferating too much[9]. Similarly, if massive autophagy can somehow be triggered in the cancer cells in a targeted manner, tumors can be effectively eradicated.

Apoptosis is the natural design for the cell for its death in fixed time. Apoptotic mechanisms are highly regulated to ensure such programmed cell death[10]. It is the process of elimination of unnecessary and unwanted cells. The information for apoptosis is encoded in every gene but the process gets activated, if there is DNA damage or uncontrolled proliferation[11]. There is loss of apoptotic regulation in cancer[12]. The apoptotic pathway is regulated by intracellular (mostly mitochondrial) and extracellular (death receptor) mechanisms. The signals generated at intracellular level are DNA damage, deprivation of growth factors and deprivation of cytokine. The signals which are generated from extracellular level are by toxic T cells for the damaged cells for death of infected or impaired cells[13].

We observe that apoptosis is designed specifically for the prevention of cancer[14]. Because of loss of apoptotic regulation the tumor cells survive longer, as a result of which mutations get accumulated, thereby increasing invasiveness and virulence and thus angiogenesis is stimulated which enhances cell proliferation and negatively affects cell differentiation[15]. The mitochondrial pathway of apoptosis may be seen as the initial action of the COP to make mitochondria endosymbiotic in bacteria for multicellularism to come up and restrict the unrestrained proliferation of unicellulars, but afterwards resistance mechanisms to it developed leading to apoptotic deregulation by which cancer thrives. Now researchers are focusing to effect apoptosis by targeting such pathways so that cancer cells will become apoptotic to eradicate cancer cells[16]. But who can guarantee that cancer is not already in the know of such attempts and can easily find its way out?

Stem cells and Telomeres

As per Darwinian view, cancer might be the attempt of a cell to adapt to a changing and unsuitable environment. Thus it supports our hypothesis of primal role of cancer in the first emergence of life since during that time the environment was changing and not suitable. This answers the question: Why cancer targets stem cells for initiation and why are stem cells situated in highly shielded locations[17-19]? It seems that only to evade cancer only stem cells have a highly shielded niche. Stem cell mechanism is in place in the organism in such a way that it must prevent somatic cell division through divergence, as if it were suspected pretty prior to the multiplication of somatic cells that they will definitely grow cancerous if left differentiated! All the stem cells of the respective tissues are positioned in well planned locations which guarantee protective niches for them, but almost all cancers with more than two mutagens have been observed to have some link to mutations at the level of corresponding stem cells, though the transit cells are more prone to replication errors than the average stem cell[17].

The chromosomes are capped by telomeres to maintain the DNA codons which thus act as part of the tumor suppressive mechanisms. In unicellular organisms and the germ cells, telomeres are maintained to ensure exact propagation of the original genetic code. But in case of adult tissue, the somatic cells cannot maintain telomeres since they get reduced in length by repeated cell division. The shortened telomere causes cell death and this might be the reason for decline of tissues during aging[20]. The cancerous urge of the somatic cells to acquire immortality in spite of telomere erosion by possible reactivation mechanisms leads to tumors[21].

Invincibility of oncovirus

Cancer occurs through mutations and these mutations make them grow faster, survive better and reproduce faster[25]. As the organisms grow in complexity and organization, this particular instinct in each individual cell is suppressed by the corresponding evolution of

the cancer suppressor genes whose only function is to control the rate of multiplication in specific manner. On the contrary, the viral strains continue to increase their virulence by becoming more and more specific to their hosts and were always looking for infecting any organism which would guarantee their fastest rate of multiplication. This they achieve by disabling the cancer suppressor gene in a particular infected cell. The most dominant factor of evolution has been the instinct for multiplication right from the stage of the peptides and nucleotides. When mitotic cell division became the prominent mode of multiplication, this particular instinct drove organisms towards the fastest possible multiplication in their existing environments but when multicellularism evolved, this particular instinct in every cell for the fastest rate of multiplication could not be fulfilled because of specificity of their functions for ensuring survival of the multicellular organism. Cancer cells acquire immortality by gaining the ability to divide for ever (Infinite reproduction fitness). This is how tumors arise as a consequence of the most dominant instinct for fastest multiplication in every cell.

Biotic interactions may be having their role in the evolution of the individual to divide faster than others, which is responsible for origin of cancer. This is similar to the competition occurring between somatic and germ cells. As per ecological theory, species extinctions may have a role in preventing cancer. Along with species extinction cancer elimination occurs either by their habitat destruction[26] or competition or resource limiting factors that disrupt their life. So, this unavailability of resource may be one reason for metastasis of the cancer cells exactly as in case of organisms, resource unavailability leads to diversification of the population (dispersal). So it seems nature selected cancer cells first and cancer suppression mechanisms came in after such selection.

Stress, Oxyradicals and the inevitability of cancer

The eventual expression of the oncogenes is so inevitable that so far only unsuccessful suppressor mechanisms of different kinds have evolved against it through the entire course of evolution of life on earth. Therefore, no single cancer suppressor mechanism has proved itself effective enough to eradicate cancer as if the cosmic ordering agent acting against it were certain about the invincibility of cancer and hence the suppression mechanisms are only to continuously improve in an unending succession.

One of the reasons for the inevitability of cancer is its relation to mental and physical shock and stress, both of which can lead to tumors. The mechanism has to do with stress induced oxy-radicals in the cellular level which damage DNA and thereby increase chances of carcinogenesis[27,28]. Overproduction of ROS leads to mitochondrial malignancy[29]. For example, bereavement of a loved one can cause such a melancholic vacuity in the mind that it can act in a psycho-somatic way on the physical body and form tumor in a specific organ[30,31]. Similarly, an accidental physical injury (Such as a burn injury) suffered in any organ leading to a fibrosis (Scarring) may turn malignant in course of time[32]. And, who on earth can be completely free from shocks, stress and accidents in life!

Mitochondrial DNA as the Uncogenome

The role of mtDNA mutagenesis in cancer initiation and progression has recently been in focus[33,34]. Oxidative damage is one of the primary causes of such mutagenesis though replicative polymerase error is also proposed to be the next possible reason. Free oxy-radicals in the mitochondria are abundant as it is the site of cellular respiration and these free radicals can cause oxidative damage to the mtDNA. About 60% of all solid tumors have more than or equal to one mtDNA mutation, though not all are caused by oxidative damage[35,36]. Still, the fact that the damaged mtDNA lead to cancer, only shows its inevitability since respiration is an unavoidable cellular process and this happens in the mitochondria and is associated with oxidative damage to mtDNA. Further, it could be surmised that it might be cancer that drove the mitochondrion in the first place to become endosymbiont in the process of evolution of the eukaryotes.

Conclusion

Each cell in an organism has a different history, and hence a different life, specific to itself. For this reason oncogene expression in a particular cellular lineage is specific to that lineage having its own evolutionary time scale to become manifest. This is the reason why successful treatment of cancer of one affected tissue does not protect the organism against cancer of other tissues. Continuous exposure to organic and inorganic carcinogens increases the stress and thus pro-tumorigenically alters the cellular processes such as redox homeostasis and makes the oncogenes expression more probable and hastened.

Faster growing populations are thus more favored by the cancer principle to survive as species and indeed the lower organisms such as viruses and bacteria, having faster growth rates are the ones that are seen to be vastly outnumbering the higher organisms in nature. They, like cancer cells, not only multiply faster but also adapt at a faster pace to changing selection pressures in the biotic and abiotic environments. Faster multiplication and expert adaptation are key characteristics of the cancer cells as well as of the favored species in nature. Somatic cells try to become immortal by outcompeting the reproductive cells which have conditional immortality (if they take part in reproduction) and thus become cancer cells. Immortality seems to be a fundamental feature of life and all life is striving for immortality only. "Survival of the fittest" cannot mean survival till a certain death occurs, even for that fittest of organisms or species. Cancer points to this fundamental fact of immortality beyond the death of the organism.

Ethical Clearance- Not needed for this kind of study

Source of Funding- Self

Conflict of Interest- NIL

References

1. Hanahan D, Weinberg RA. Hallmarks of cancer, Cell 2000;100:57-70.
2. Hanahan D, Weinberg RA. Hallmarks of cancer: the next generation. Cell 2011;144: 646–674.
3. Harding C, Pompei F, Lee EE, and Wilson R. Cancer Suppression at Old Age. Cancer Res. 2008;68(11). DOI:10.1158/0008-5472.CAN-07-1670
4. Rozhok AI, DeGregori J. The evolution of lifespan and age-dependent cancer risk. Trends Cancer 2016;2(10):552–560.DOI:10.1016/j.trecan.2016.09.004
5. Rozhok AI and DeGregori J. Toward an evolutionary model of cancer: Considering the mechanisms that govern the fate of somatic mutations. Proc Natl Acad Sci U S A.2015;112(29):8914-21. DOI:10.1073/pnas.1501713112.PMID:26195756. PMCID: PMC4517250.
6. Xu Z, Taylor JA. Genome-wide age-related DNA methylation changes in blood and other tissues relate to histone modification, expression, and cancer. Carcinogenesis 2014;35(2): 356-64. DOI:10.1093/carcin/bgt391.
7. Childs BG, Baker DJ, Kirkland JL, Campisi J, van Deursen JM. Senescence and apoptosis: dueling or complementary cell fates? EMBO reports 2014;15(11):1139
8. Cerella C, Grandjenette C, Dicato M, Diederich M Roles of Apoptosis and Cellular Senescence in Cancer and Aging. Curr Drug Targets. 2016;17(4):405-15.
9. Lee S, Lee JS. Cellular senescence: a promising strategy for cancer therapy. BMB Rep. 2019;52(1):35-41.PMID:30526771,PMCID:PMC6386234.
10. Wong RSY. Apoptosis in cancer: from pathogenesis to treatment, Journal of Experimental & Clinical Cancer Research 2011;30:87. http://www.jeccr.com/content/30/1/87
11. Danial NN. Korsmeyer SJ. Cell death: Critical control points. Cell 2004;116:205–219.
12. Fernald K, Kurokawa M. Evading apoptosis in cancer. Trends Cell Biol.2013;23(12): 620–633. DOI:10.1016/j.tcb.2013.07.006
13. Ouyang L. et al, Programmed cell death pathways in cancer: a review of apoptosis, autophagy and programmed necrosis. Cell Proliferation 2012;45:487–498.DOI:10.1111/j.1365-2184.2012.00845.
14. Sellers RW and Fisher DE. Apoptosis and cancer drug targeting. J Clin Invest. 1999;104(12):1655-1661.https://doi.org/10.1172/JCI9053.
15. Lowe SW, and Lin AW, Apoptosis in cancer. *Carcinogenesis 2000;*21(3):485–495, https://doi.org/10.1093/carcin/21.3.485
16. Nguyen C, Pandey S. Exploiting Mitochondrial Vulnerabilities to Trigger Apoptosis Selectively in Cancer Cells.Cancers 2019;*11*(7):916. https://doi.org/10.3390/cancers11070916
17. Cairns J. Somatic stem cells and the kinetics of mutagenesis and carcinogenesis. Proc Natl Acad Sci U S A. 2002;99(16): 10567–70. PMCID:PMCPMC124976. pmid:12149477
18. Reya T, Morrison SJ, Clarke MF, Weissman IL. Stem cells, cancer, and cancer stem cells. Nature 2001; 414(6859):105–11.[PubMed: 11689955]
19. Gatenby RA, Gillies RJ, Brown JS. Evolutionary dynamics of cancer prevention. Nat Rev Cancer. 2010; 10(8):526–7.[PubMed: 21137109]
20. Shay JW, Wright WE. Senescence and immortalization: role of telomeres and telomerase.

Carcinogenesis 2005;26(5):867-74.

21. Bernal A, Tusell L. Telomeres: Implications for Cancer Development, Int J Mol Sci. 2018; 19: 294;DOI:10.3390/ijms19010294
22. Alizon S, Bravo IG, Farrell PJ, Roberts S. 2019 Towards a multi-level and a multi-disciplinary approach to DNA oncovirus virulence. Phil. Trans. R. Soc. B 374: 20190041. http://dx.doi.org/10.1098/rstb.2019.0041
23. Kareva, I. What can ecology teach us about cancer? Translational oncology 2011;4:266–270.
24. Vaiko M, Izakovic M, Mazur M, Rhodes CJ, Telser J. Role of oxygen radicals in DNA damage and cancer incidence. Mol Cell Biochem. 2004;266(1-2):37-56
25. da Fonseca RR, Johnson WE, O'Brien SJ, Vasconcelos V, Antunes A.. Molecular evolution and the role of oxidative stress in the expansion and functional diversification of cytosolic glutathione transferases. BMC Evol Biol.2010;15(10): 281. DOI:10.1186/1471-2148-10-281.
26. Ralph SJ et al. The causes of cancer revisited: "Mitochondrial malignancy" and ROS-induced oncogenic transformation – Why mitochondria are targets for cancer therapy. Molecular Aspects of Medicine 2010;31(2):145-170. https://doi.org/10.1016/j.mam.2010.02.008
27. Soung, NK, Kim, BY. J Anal Sci Technol.2015;6:30. https://doi.org/10.1186/s40543-015-0070-5
28. Braem MG, Onland-Moret NC, Schouten LJ *et al*. Multiple miscarriages are associated with the risk of ovarian cancer: results from the European Prospective Investigation into Cancer and Nutrition. PLoSOne.2012;7(5):e37141. DOI:10.1371/journal.pone.0037141
29. Wallingford SC, Olsen CM, Plasmeijer E, Green AC. Skin cancer arising in scars: a systematic review. Dermatol Surg.2011;37(9):1239–1244. DOI:10.1111/j.1524-4725.2011.02060.x
30. Song S, Gong S. *et al*. The interaction between mitochondria and oncoviruses, BBA - Molecular Basis of Disease, 2018;1864 (2):481–487
31. Gammage PA, Frezza C. Mitochondrial DNA: the overlooked oncogenom**e?** BMC Biology Aug 2019;17: 53.
32. Stewart JB, Alaei-Mahabadi B, Sabarinathan R, Samuelsson T, Gorodkin J, Gustafsson CM, Larsson E. Simultaneous DNA and RNA mapping of somatic mitochondrial mutations across diverse human cancers. PLoS Genet. 2015;11(6):e1005333.
33. Yuan Y. *et al*. Comprehensive molecular characterization of mitochondrial genomes in human cancers. bioRxiv.2017:161356.
34. Strakova A, Murchison EP. The cancer which survived: insights from the genome of an 11000 year-old cancer. Curr Opin Genet Dev.2015;30:49-55. DOI:10.1016/j.gde.2015.03.005.
35. Lotka AJ. Contribution to the Theory of Periodic Reaction, *J Phys Chem.*1910.14
36. Lotka AJ. Analytical Note on Certain Rhythmic Relations in Organic Systems. Proc Nat Acad Sci USA.1920;6:410.

Review of Statistical Analysis and Effects of Meditation on Mental Health and Cognitive Skill Development

A.Kamaraj[1], J.Senthil Kumar[2], C.Kalyana Sundaram[1]

[1]Asst. Prof.(Sr.G), [2]Asso. Prof., Department of ECE, Mepco Schlenk Engineering College, Sivakasi

Abstract

Study of brain wave signals and proper analysis of them helps us to understand the impact of meditation in much more broader extent. This review paper examined various practices like Mindfulness, Full Attention, Open Meditation, Jhana, Yoga asanas, Mind Body Intervention and Heartfulness. It also extended to the study of effects of meditation on practitioners and narrates the cases with better cognitive skill development. Every meditation process analysis included with number of persons involved in the process along with the study of affected region in the brain due to the continuous practice of meditation. It is observed that signal frequency of communication from heart to brain is improved by Heartfulness meditation. This strengthens brain rewiring of a continuous meditation practitioners and its effects are visualized from the characteristics of EEG and fMRI signals. Analyzes from different literatures, it is evident that cognitive skills, contextual memory, attention, logical thinking, and problem solving capability are highly improved in the practitioner. Also, emotional and behaviour characteristics of the meditation practitioners are greatly improved, in turn life style enhanced.

Keywords: *Meditation, Cognitive skills, fMRI, Heartfulness.*

Introduction

The human brain has Left and Right hemispheres. The Left is for Analytic thoughts, Logical thinking, and Reasoning. The Right is for creativity, intuition, holistic thoughts. The brain signals are classified as α, β, θ, δ and γ based on the frequency of operation of the signals[1]. The network can be re-organized by External or Internal Stimulation called as Neuro-plasticity[2].

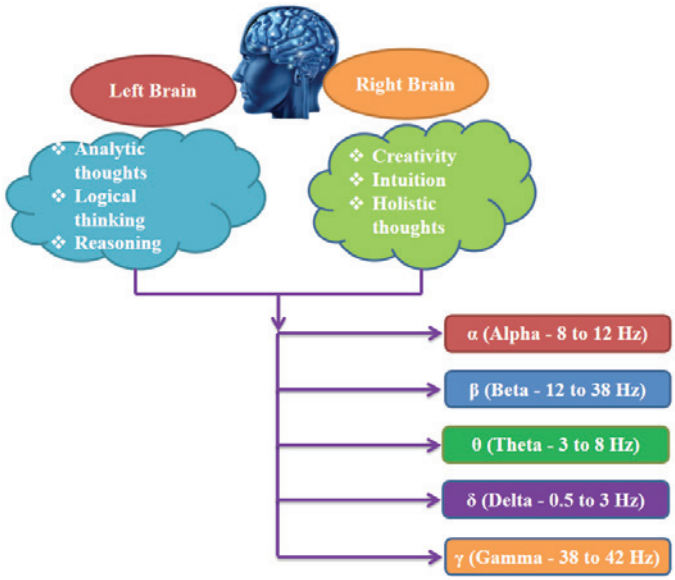


Fig. 1. Classification of Brain Signal

Fig. 1 shows the general classification of the left and right brain activities and brain signal frequency range. The researches are done based on Mindfulness Meditation (MM), Zen Meditation and few are addressing the other meditation techniques[3]. The meditation is classified as Full Attention (FA) and Open Monitoring (OM)[4,5]. The working memory (WM) capacity can be improved by adaptive and extended cognitive training[6]. The classification of medical data has been classified using Deep Learning Neural Network (DLN)[7, 8]. The MRI and fMRI data of the Alzheimer's persons are effectively classified using DLN[9].

Mind is full of thoughts; it is generating thoughts each and every moment. The regulation of thoughts creates better environment inside and outside[10,11]. The most popular meditation practices are Mindfulness, Zen Meditation[7], Vipassana Meditation, and Heartfulness. Patanjali states that, yoga has 7 steps; starts with purification of mind as a first step to Samathi (Liberation) via meditation as the last step[12].

Dr. Masaru Emoto proven that the words and thoughts are having impact on the crystal structure of the water[13]. The human body consists of around 70% of water; thus the mood, thoughts and the out spoken words have more impact on the human both mentally and physically. The Heart communicates to the entire body through nervous system through control signals. Therefore the electromagnetic (control) signals generated by the Heart affects the thoughts produced in the mind[14].

There are many articles stating and and proving the benefits of Meditation with experiments on Children, Students, Adults and family[15,16]. Few researchers extended their contribution on Meditation effects on disease cure[17]. The number of articles dealing with the meditation is increasing over the years as shown in Fig.2. More than 31,000 are conducted on various meditation techniques and its effects. Heartfulness technique is gaining popular for the last couple of years which provides positive results in a very short span of practice [18].

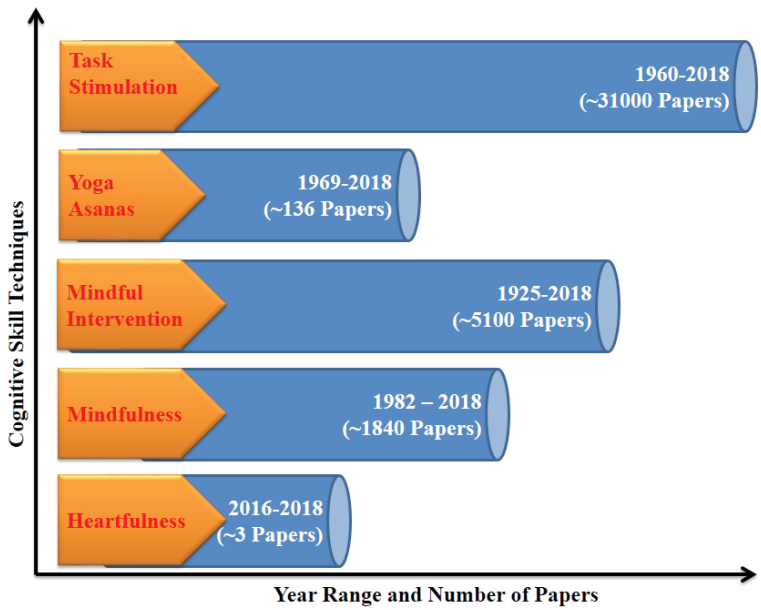


Fig.2. Number articles published in Meditation

Mindfulness Meditation

Mindfulness meditation has a positive impact on various parts of the brain; which are anterior, cingulate, thalamus, insula, amygdala, hippocampus and Gyrus[19]. Mindfulness meditation alters the rs-FC in the brain[20]. The EEG shows the positive reflection of meditation on theta wave[21]. These are scientific proofs of Mindfulness meditation. Standard tests like KIMS, Stroop[22], CAT[23], COWAT, SDMT[24] and d2 tests[25] prove the improvements in the cognitive skills. The analysis of the effects of meditation is estimated using Analysis of variance (ANOVA)[26,27]. Thus the Mindfulness meditation produces good positive life changing

characteristics in the practitioners which improve their life in the society[28]. It has very positive impact on the Dementia / Alzheimer patients[29].

HTKS and Ten-Sticker Sharing Tasks are used for testing the emotional change in kinder garden school children[30]. MAAS, SCS and EF are used for evaluate and improve the mind regulation cognitive intelligence of School Students[15]. MOT methods are applied for adults for mind regulation observations[31]. SART is developed as computer based software testing system using SPSS-21 Software for estimating Self-sustain mindfulness capability of the practitioners[32]. BOLD testing was performed on stressed unemployed adults and the changes in the Gyrus and right parietal cortex area are observed[33].

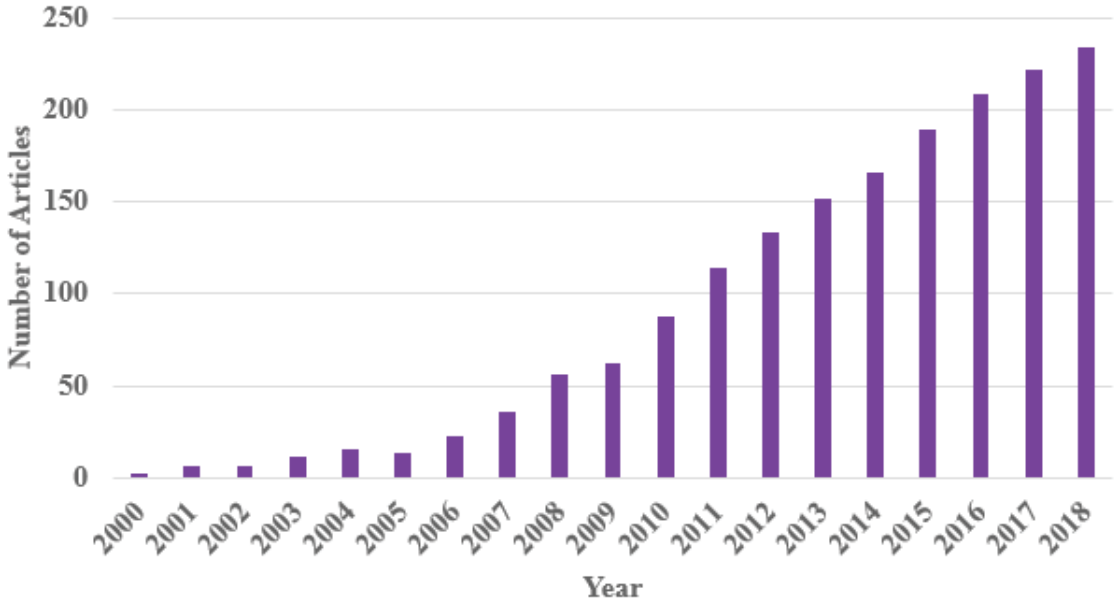


Fig.3. Mindfulness research articles

Fig.3 shows the statistics of mindfulness related research articles published for past two decades. The effects of mindfulness meditation practiced with different set of control group and members are listed in Table 1. Other impacts of Mindfulness meditation techniques are, reduction of Mind Wandering [32] and increase in functional connectivity[24,34] and Volume change in various parts of brain.

Table 1: Mindfulness

Ref. No.	Affected region	Analysis			No. of practitioner	
		EEG	fMRI	Other	Control	Meditation
[24]	-			KIMS, Stroop, d2-test	25	25
[34]	-			SDMT, COWAT, Digit span	25	24
[27]	Theta	Yes		SVM	-	34
[21]	White matter	-	Diffusion tensor imaging	-	31	33
[16]	Family characteristic					

Cont... **Table 1: Mindfulness**

[30]	Emotional Change			HTKS, Ten-Sticker Sharing Task		127
[15]	Mind regulation	-	-	MAAS, SCS and EF	-	210
[19]	Hippocampus	Yes				
[31]	Mind regulation			Visual for aging, Switching, MOT. ANOVA	30	41
[32]		SPSS 21 Software		SART		147
[11]	Working Memory			Cognitive measures		43
[20]	Gyrus, right parietal cortex		fMRI	Functional BOLD		35
[26]	Mood change			ANOVA		10
[29]	Dementia Patients		Yes			

Full Attention and Open Meditation

The research on Full Attention and Open Meditation are carried over the last decade. The research data are analysed using EEG, fMRI and other standard tests. It has been found that, gamma and alpha wave activity are increased[35], functional connectivity and reorganization of brain is improved, and reduced mind wandering are some of the positive impacts of the meditation practitioners.

Table 2: Full Attention and Open Meditation

S. No.	Type of Practice	Affected region	Analysis			No. of practitioner	
			EEG	fMRI	Other	Control	Meditation
[4]	FA (Samatha) and OM (Vipassana)	Anterior Insula.	Yes	Yes		-	8
[3]	FA on Tanden	Pre-frontal cortex	Yes + ECG		BOLD, POMS	-	15
[36]	FA – Meditation	Cingulate		Yes		-	14
[37]	Vipassana, Himalayan Yoga and Isha Shoonya	Occipital	Yes		Analysis of variance (ANOVA)	32	67

Heartfulness Meditation Techniques

Recently, Heartfulness meditation technique[38] is popular among the seekers. The research is carried on COPD patients[17], Students, novices, Teachers[39] and normal human. The research platforms for this meditation technique are varying across Schools, Colleges and Hospitals. It has very positive results on them in a very short span of time across all platforms[40]. Telomeres length improvement[41], Heart Rate and RR[49] regulation, brain coordination[43] and Stress reduction[44] are the changes observed on the practitioners. Most importantly, it brings out and develops the emotional balance on the practitioners; which is very much essential in today's living environment for the youngsters[45]. Recent literatures started elaborating the effects of Heartfulness meditation and it is gaining highly popular because of its large positive effects in cognitive skill development. Table 3 lists the effects of Heartfulness meditation practiced observed from various recent literatures. It is studied that it drastically reduces the stress level of students[46] and thereby making them emotionally stable and be skilled with better cognitive skills[47].

CRT and RAT are used for analyzing the effect of Heartfulness. It is observed that increased alpha in brain[43]. DASS 42 questioners based testing is used for estimating the stress scale with observations on 42 symptoms for a Heartfulness practitioners[45].

Table 3: Effects of Heartfulness Meditation

Ref. No.	Affected region	Analysis			No. of practitioner	
		EEG	fMRI	Other	Control	Meditation
[41]	Telomeres length	-	-	-	12	35
[42]	HR, RR and SBP.	-	-	-	-	134
[43]	Alpha wave	Yes	-	CAT, RAT		60
[45]	-	-	-	DASS 42 and stress scale.	80	80
[46]	-	-	-	Questionnaire		848
[39]	-	-	-	INSPIRE		90
[49]	HRV, BP and HR	-	-	ANOVA	-	30
[44]	Stress reduction in Students			Stress Questionnaire		120

Heartfulness also develops their emotional intelligence to a larger extent. The statistics it is also observed that it improves heart rate, blood pressure[48] and cognitive function. Hence, Heartfulness meditation technique provides the very positive impact on the practitioners in a very short span (3 hours); both mentally and physically. So, we can say that Heartfulness meditation has good score of Intelligent Quotient (IQ), Emotional Quotient (EQ) and Spiritual Quotient (SQ)[49].

Conclusion

Human beings are daring to have a better world and safeguard themselves from other fellow beings with their improved Cognitive skills. This survey analyzed the effects of different meditation techniques like Mindfulness, FA and OM, MBI and Heartfulness practiced by experts and novices. The impact of the meditation practices are evaluated using EEG, fMRI and Standard Questionnaire processes. It is commonly observed that the meditation practice improved the functional connectivity and neural plasticity. It is

practically visible that practitioners had improved mind regulation, characteristic changes and Cognitive level. Recently, Heartfulness meditation is popular and its communication between heart and brain is effective. It has positive impact on sleep pattern, stress reduction and disease control in a short span. From the survey on different literatures, it is obvious that Cognitive skills and Life Style behaviour of the meditation practitioners are highly improved by consistent meditation.

Source of Funding: Self

Ethical Clearance: Taken from College Ethical Committee

Conflict of Interest: Nil.

References

1. Khare KC, Shashi Kant Nigam. Study of Electroencephalogram in meditators. Indian J Physiol Pharmacol. 2000 Apr; 44(2):173-78.
2. Angela Gutchess. Plasticity of the aging brain: New directions in cognitive neuroscience. The Science. 2014 Oct; 346(6209): 579-82.
3. Xinjun Yu, Masaki Fumoto, Yasushi Nakatani. Activation of the anterior prefrontal cortex and serotonergic system is associated with improvements in mood and EEG changes induced by Zen meditation practice in novices. Int J Psychophysiol. 2011 May; 80(2):103-11.
4. Antonietta Manna, Antonino Raffone, Mauro Gianni Perrucci. Neural correlates of focused attention and cognitive monitoring in meditation. Brain Res Bull. 2010 Apr 29; 82(1-2):46-56.
5. Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/ recurrence in major depression by mindfulness-based cognitive therapy. J Consult Clin Psychol. 2000 Aug; 68(4):615-623.
6. Torkel Klingberg. Training and plasticity of working memory. Trends Cogn Sci. 2010 Jul; 14(7):317-24.
7. Sotetsu Koyamada, Yumi Shikauchi, Ken Nakae. Deep learning of fMRI big data: a novel approach to subject-transfer decoding. 2015 Jan; arXiv:1502.00093v1.
8. Nur Farahana Mohd Suhaimi, Zaw Zaw Htike, Nahrul Khair Alang Md Rashid. Studies on Classification of fMRI Data using Deep Learning Approach. ARPN Journal of Engineering and Applied Sciences. 2015 Nov; 10(21): 9748-52.
9. Saman Sarraf, Ghassem Tofighi. DeepAD: Alzheimer's Disease Classification via Deep Convolutional Neural Networks using MRI and fMRI. Scientific Journal. 2016 Aug; 1-15..
10. Vivekananda S. The complete works of Swami Vivekananda. 1st ed. India: Manonmani Publishers; 2015. 4361 p.
11. Devon Brunner, Amitai Abramovitch, Joseph Etherton. A yoga program for cognitive enhancement, PLoS One. 2017 Aug 4; 12(8):e0182366. 1-12.
12. Bharati J. Yoga sutras of Patanjali: Interpretive translation. 2007 Mar 13, 2008 from http://www.swamij.com/downloads.htm; 1-63.
13. Masaru Emoto. The Message from Water. 2nd ed. New York: Hado Publishing; 1999. 196 p.
14. Rollin McCraty. Science of the Heart: Exploring the Role of the Heart in Human Performance. 1st ed. HeartMath Institute; 2015. 112 p.
15. Hee-Sung Shin, David S, Black, Eleanor Tate Shonkoff, Nathaniel R, Riggs, Mary Ann Pentz. Associations Among Dispositional Mindfulness, Self-Compassion, and Executive Function Proficiency in Early Adolescents. Mindfulness (N Y). 2016 Dec; 7(6):1377-1384.
16. Fox KC, Spreng RN, Ellamil M, Andrews-Hanna JR, Christoff K. The wandering brain: meta-analysis of functional neuroimaging studies of mind-wandering and related spontaneous thought processes. Neuroimage. 2015 May 1;111: 611-21..
17. Raja Amarnath, GhanshyamVerma, SugirthaJenitha, Jaya Prasanthi. Efficacy of Heartfulness Meditation on Improving Outcomes in COPD Patients. Research J of Pharmaceutical, Biological and Chemical Sciences. 2017 Apr; 8(2): 2359-66.
18. Jayaram Thimmapuram, Robert Pargament, Kedesha Sibliss, Rodney Grim, Rosana Risques, Erik Toorens, Effect of heartfulness meditation on burnout, emotional wellness, and telomere length in health care professionals. J Community Hosp Intern Med Perspect. 2017 Mar 31; 7(1): 21-27.
19. Peter Malinowski, Liliana Shalamanova. Meditation and Cognitive Ageing: the Role of Mindfulness Meditation in Building Cognitive Reserve. Journal of Cognitive Enhancement. 2017 June; 1(22): 1-12.

20. Adrienne A, Taren,Peter J, Gianaros, Carol M, Greco, et al. Mindfulness Meditation Training and Executive Control Network Resting State Functional Connectivity: A Randomized Controlled Trial. Psychosom Med. 2017 Jul/Aug; 79(6):674-683.
21. Davide Laneri, Verena Schuster, Bruno Dietsche, Andreas Jansen, Ulrich Ott, Jens Sommer. Effects of Long-Term Mindfulness Meditation on Brain's White Matter Microstructure and its Aging. Front Aging Neurosci. 2016 Jan 14;7: 254.
22. Elisa H, Kozasa, João R, Sato, Shirley S, Lacerda. Meditation training increases brain efficiency in an attention task. Neuroimage. 2012 Jan 2;59(1):745-9..
23. Ian J. Deary, Steve Strand, Pauline Smith, Cres Fernandes. Intelligence and educational achievement. Intelligence Elsevier. 2007 Feb; 35(1):13-21.
24. Adam Moore, Peter Malinowski. Meditation, mindfulness and cognitive flexibility, Conscious Cogn. 2009 Mar;18(1):176-86..
25. Micah Allen, Martin Dietz, Karina S, Blair. Cognitive-Affective Neural Plasticity following Active-Controlled Mindfulness Intervention, J Neurosci. 2012 Oct 31; 32(44): 15601–15610.
26. Britton WB, Davis JH, Loucks EB, Peterson B, Cullen BH, Reuter L, et al. Dismantling Mindfulness-Based Cognitive Therapy: Creation and validation of 8-week focused attention and open monitoring interventions within a 3-armed randomized controlled trial. Behav Res Ther. 2018 Feb;101:92-107.
27. Ahani A, Wahbeh H, Nezamfar H, Miller M, Erdogmus D, Oken B. Quantitative change of EEG and respiration signals during mindfulness meditation. J Neuroeng Rehabil. 2014 May 14;11:87.
28. Savina E. Does play promote self-regulation in children? Early Child Development and Care. 2014 Jan; 184(11): 1-14.
29. Jesse Russell-Williams, Wafa Jaroudi, Tania Perich, Siobhan Hoscheidt, Mohamad El Haj, Moustafa AA. Mindfulness and meditation: treating cognitive impairment and reducing stress in dementia, Rev Neurosci. 2018 Sep 25;29(7):791-804..
30. Melanie Viglas. Benefits of a Mindfulness-Based Program in Early Childhood Classrooms, Ph.D. Thesis. Department of Applied Psychology and Human Development University of Toronto, 2015. 153 p.
31. Mirjam Hartkamp, Thornton IM. Meditation, Cognitive Flexibility and Well-Being. Journal of Cognitive Enhancement, 2017 June; 1(2):182-196.
32. Rahl HA, Lindsay EK, Pacilio LE, Brown KW, Creswell JD. Brief Mindfulness Meditation Training Reduces Mind-Wandering: The Critical Role of Acceptance. Emotion. 2017 Mar;17(2):224-230.
33. Adrienne A, Taren,Peter J, Gianaros, Carol M, Greco, et al. Mindfulness Meditation Training and Executive Control Network Resting State Functional Connectivity: A Randomized Controlled Trial. Psychosom Med. 2017 Jul/Aug; 79(6):674-683.
34. Zeidan F, Johnson SK, Diamond BJ, David Z, Goolkasian P. Mindfulness meditation improves cognition: Evidence of brief mental training. Conscious Cogn. 2010 Jun;19(2):597-605.
35. Fink A, Schwab D, Papousek I. Sensitivity of EEG upper alpha activity to cognitive and affective creativity interventions. Int J Psychophysiol. 2011 Dec;82(3):233-9..
36. Hasenkamp W, Barsalou LW. Effects of meditation experience on functional connectivity of distributed brain networks, Front Hum Neurosci. 2012 Mar 1;6:38..
37. Claire Braboszcz, Rael Cahn B, Jonathan Levy, Manuel Fernandez, Arnaud Delorme. Increased Gamma Brainwave Amplitude Compared to Control in Three Different Meditation Traditions, PLoS One. 2017 Jan; 12(1): e0170647.
38. Joshua Pollock, Kamlesh DP. The Heartfulness Way. 1st ed. Chennai: Westland Publications Private Limited, Reveal Press (New Harbinger Publications); 2018. 212 p.
39. Heartfulness Education, INSPIRE: Teacher Training Program, Tinsukia: 2017 July: 1-3.
40. Dr. Sriramachandramurthy V. Neuro physiological basis of raja yoga in the Light of Sahajmarg. 1st ed. Shahjahanpur: SMRI; 1979. 228 p.
41. Jayaram Thimmapuram, Robert Pargament, Kedesha Sibliss, Rodney Grim, Rosana Risques, Erik Toorens, Effect of heartfulness meditation on burnout, emotional wellness, and telomere length in health care professionals. J Community Hosp

Intern Med Perspect. 2017 Mar 31; 7(1): 21-27.

42. Amarnath Raja G, Prasanthi J, Natwar Sharma, Sugirtha Jenitha, Chitra Rajan. Efficacy of Heartfulness meditation in moderating vital parameters - A comparison study of experienced and new meditators. International Journal of Medical Research & Health Sciences, 2017; 6(7): 70-78.
43. Norman Farb, Anirudh Kumar, Abdul Subhan, Pallavi Gupta, Jahnavi Mundluru, Abdul Subhan, Shankar Pathmakanthan. Studying the Effect of Heartfulness Meditation on Brain Activity, International Scholarly and Scientific Research & Innovation. 2017 Feb; 11(5): 32.
44. Raja Amarnath G, Raja Marimuthu S, Sugirtha Jenitha, Chitra Rajan, Sujatha Karumari and Swati Patel. Impact of Heartfulness Meditation on Reducing Stress in Nursing Students: A Prospective Observational Study, International Journal of Medical Research & Health Sciences, 2018; 7(1): 98-109.
45. Soumya Mishra, Kumar Sai Sailesh, Srilatha Bashetti, Swathy Ashok, Archana R, Mukkadan JK, Udaya Kumar Reddy. Beneficial effects of heart fullness meditation on depression, anxiety, stress and cognition in school children of rural area of Telangana, Journal of Chemical and Pharmaceutical Sciences. 2017 Mar; 10(1):189-191.
46. Raja Amarnath G, Sekhar Karumuri S, Prasanthi J, Sugirtha Jenitha, Impact of Heartfulness Meditation Master class on reducing stress in college students- A prospective observational study, International Journal of Recent Scientific Research. 2017; 8(8): 19493-19498.
47. Sapana M Adhalli, H Umadevi, Guruprasad S P and Rajeshwari Hegde, Design and Implementation of EEG Signals Analysis on FPGA, International Journal of Engineering and Computer Science. 2016 May; 5 (5):16658-16667.
48. Narendra Kumar Arya, Kamlesh Singh, Anushree Malik, Rahul Mehrotra, Effect of Heartfulness cleaning and meditation on heart rate variability, Indian Heart Journal, 2018 Dec; 70(3):1-6.
49. Heartfulness Magazine, Issue 10, 2016 Aug;. 8-11.

The Cancer Principle-V: Cancer Prevention and Therapeutics

Asima Tripathy[1], Rajat Kumar Pradhan[2]

[1]Post Graduate Department of Zoology and Microbiology, [2]Post Graduate Department of Physics, Bhadrak Autonomous College (Departmentment of Higher Education, Govt. of Odisha), Bhadrak, Odisha, India

Abstract

Organisms evolve in attempting to evade cancer while they perish ultimately by succumbing to it because cancer, being at the very core and source of life and evolution is simply undefeatable and is destined to win in the long run. Rather, due to the depth and versatility of cancer that they aim to counter, they end up causing many other diseases due to wholesale systemic dysfunction in the organism. Every cancer cell therefore has its own independent aberration profile and as such can be treated as an independently evolving organism with its own inbuilt mechanisms of survival and perpetuation. There is as fundamental feature of immortality associated with cancer which is its primordial origin. Therefore therapeutic strategies fail invariably to contain cancer progression and metastasis.

Keywords: *Cancer therapeutics, Cancer prevention, meditation, Immortality*

Introduction

Cancer as a killer disease seems to be but the tip of the iceberg that lies hidden from our view because of an error in our perception of the true causes behind any phenomenon. A gross physiological effect such as a tumor has its origins not just at the genetic levels but beyond the submicroscopic physical, at the metaphysical level of a principle. The rational quest ingrained in the curiosity of human intelligence truly rests satisfied when it reaches the metaphysical realm of the fundamental principles behind all observed phenomena. We elevate cancer to the status of a fundamental principle that serves to increase disorder and opposes the cosmic ordering principle (COP) in its operations at every moment everywhere. The survival of cancer cells *in vitro* and *in vivo* that has been observed experimentally is thus only a negligible facet of its immortality.

Cancer progression has been likened to asexual proliferation of micro-organisms[1]. Was evolution of life up to the asexually reproducing micro-organisms any way different from that of cancer? The aberration profiles of no two tumors match due to differences in genetic and epigenetic factors[2]. But the timing and location of mutations in a pair of cancer cells belonging even to the same tumor are random and continuous. Thus, it becomes difficult to adopt any particular suppression mechanism to effectively tackle cancerous proliferation.

Acquiring random mutations is an adaptation of the cancer cell to gain multidimensional fitness to strengthen the functional aspect of its genetic niche[3]. Metastasis adds to such fitness. Intra-tumor differences following mutation burden difference among cells increases their ability to hide the reasons behind their heterogeneity. Further, if one oncomutation is figured out, several such mutations develop and make it impossible to trace the exact reason behind specific driver mutations.

Immortality of cancer cells

The canine sarcoma CTVT (Canine Transmissible Venereal Tumour) has now been updated to be carrying a continuously evolving strain since more than 11000 years[4]. Its inter-individual metastasis is an adaptation which makes it survive beyond one affected body to infect another, as if it were a free living species, like bacteria or other living pathogens. This shows again that cancer has evolved and simultaneously led to the evolution of the canine species in fighting it away. Its survival by immune suppression since such a long time by genetic, epigenetic and extra-genetic mechanisms and its viral origins show that cancer alone is immortal while all else is mortal.

Corresponding author:
Asima Tripathy
Email ID: asimatripathy09@gmail.com

Its ability to sustain and replicate using anaerobic glycolysis pathway to metabolism shows that it has the requisite functional machinery from the time of its presence in and as an anaerobic life-form when conditions were anexic or hypoxic. From this perspective, it ranks among the most ancient pre-oxic life on earth. It existed at first as a biomolecule like free floating RNA or DNA fragments (oncogenes), and then became a virus (family of oncoviruses) and then became an anexic organism and then entered its hosts from bacteria onwards up to humans. Such is the ancientness of cancer.

Population explosion and Species extinction

They say, development of cancer in the individual has evolutionary significance, but we have proposed that individuals (and species) have emerged from, evolved through, and ultimately dissolve in the lap of cancer! The Lotka-Voltera type oscillations in prey-predator interactions are rather idealistic dynamical variations in interdependent species populations[5,6,7,8]. Even in these, the fall in species population follows a boom in that population that creates a local and temporary imbalance in the ecosystem. Dinosaurs were very abundant before going extinct. Any population that goes for an over-growth invites such balancing forces of nature that the proliferation is effectively checked, and even at times, entire population is wiped out. There are species where cannibalism or mass suicide is in place precisely for the same purpose. The species don't consciously do it for bringing down population by census or consensus and resource availability calculations, but are driven by their instinctive nature to do so. This is like programmed cell death in case of cells. They are simply programmed that way by nature to avoid cancerous over-growth.

Thus we find that just like bamboo blooms before death, all species, all individuals, all cells may suffer the cancerous boom before the death of that particular line. This succumbing to overgrowth seems to be the common fate of all of them. The booming of cells before death is called tumor and the organism is said to succumb to cancer. Cancer is the natural death process of all life-forms. They struggle and they survive only to finally succumb to cancer in some form or the other.

Therapeutic approaches to cancer

One of the primary therapeutic interventions in cancer is surgical removal of the tumor, but cancer is powerful enough to induce several peri-operative processes *viz.* increased shedding of motile cancer cells into blood, suppression of anti-tumor immunity, upregulation of adhesion factors in new target sites for metastasis, modulation of cells in the target site for fresh tumor formation, utilization of immune cells to trap cancer cells for metastasis, enhancing motility and invasion ability of cancer cells etc.[9]. This is as true of surgery as of radiation therapy, chemotherapy, immunotherapy, stem cell therapy, hormone therapy and other targeted therapies.

Anticancer chemotherapy, for example, acts to enhance ROS-dependent apoptotic pathways for cancer cells. But ROS are like the proverbial "double-edged sword" in the sense that they can in addition lead to disruption of redox homeostasis in normal cells and tissues leading to additional complications of an irreversible nature[10]. ROS have both pro- and anti- tumorigenic potential. Fine tuning of the redox homeostasis depends on the antioxidant defense system which is paralyzed by cancer[11].

Numerous are the side effects of any form of cancer treatment. Further, if cancer of one type is targeted to be treated, it switches to another type or to another site as if it were having an answer inbuilt to any therapeutic intervention.

Prevention of cancer

Cancer being a manifestation of a tremendous primordial urge for unrestrained proliferation can be completely eradicated by a reversal of such an urge through the adoption of the principles of submission to the cosmic ordering principle which envisages life as an ordered movement towards a realization of the fundamental unity underlying all diversity. Living in accordance with the COP that ever endeavors to mould creatures in the direction of unification can only reverse the cancerous propensity of multiplication and diversification. For the human beings this can be effectively implemented by resorting to practices such as concentration and meditation as individuals or in groups which have realization of unity of consciousness as their goal[12]. There has already been ample published evidence of efficacy of such practices in halting and reversing the progress of cancer[13,14,15,16].

It seems that meditation, not medication, may be the final and complete solution to cancer[17]. Success in meditation requires as a prerequisite a balanced approach to life in its daily movements. This balance is the conscious approach towards more and more order in

the system such that ultimately there can be successful meditation. Meditation becomes effortless for one having a well-concentrated serene mind devoid of too many bubbling and crowding thought-forms as a result of too many desires. Thus the very exercise of meditation is a conscious willful enhancement of order in one's living and thinking.

Theories of cancer

The important theories of cancer origin are tabulated and explained below.

Table-I: Theories of cancer origin and their evolution

Sl. No.	Theory	Proposer(s) and time of proposal
1	Humoral origin theory	Hipocrates (300 BC)
2	Lymphatic origin theory	F. Hoffman and G. Stahl
3	Chronic irritation theory	R. Virchow (1858)
4	Trauma theory	H. Ribbert (1899)
5	Somatic Mutation Theory	T. Boveri (1914)
6	Viral origin theory	Huebner and Todaro (1969)
7	Tissue Organisation Field theory	Sonnenschein and Soto(1991)
8	Atavistic Theory	Davies and Lineweaver (2011)
9	Disorder theory	Tripathy and Pradhan (2019)

According to **the Humoral origin theory** the time of probable cancer origin must date back to the emergence of triploblasts which branched into different phyla having distinct so called 'humors' (blood, phlegm, yellow bile, black bile).The timing of triploblasts has been estimated to be around 600 to 700 million years ago[18]. **The lymphatic theory** ascribes malignant tumor to the fermentation and degeneration of accumulated lymph leaked from the lymphatic vessels[19]. The timing of cancer origin according to this theory dates back roughly to the same era as in the humoral theory. **The chronic irritation theory** proposes chronic irritation if tissue as the cause of malignancy. The origin of cancer thus dates back to the emergence of animal's having distinct organized tissue systems[20]. Somewhat related to the chronic irritation theory is **the trauma theory** of Hugo Ribbert which proposes traumatic tissue injury as the cause of malignancy which has however little support till date[21]. The injured tissue can be considered to be the site of chronic irritation and can evolve to a malignant tumor, though the possibility of such development is not very frequent. The series of modern theories of cancer started in the early 20th century when the seeds of **The Somatic Mutation Theory (SMT)** were sown by Boveri who proposed the idea that combination of chromosomal defects can lead to cancer[22]. Bauer gave the specific proposal that mutations can cause cancer[23].

Failures of SMT to account for all types of carcinogenesis led Sonnenschein and Soto to propose **Tissue Organization Field Theory** (TOFT) that sees tumorigenesis as a reaction to the spatial limitations of tissue organization against the default state of proliferation inherent in every cell[24]. This theory dates the origin of cancer to the time of appearance of multicellularity (complex metazoan) around 600 million years ago. According to **the atavistic theory** cancer is a relapse to phylogenetic capabilities of an earlier age corresponding to evolution of simple metazoans with

multicellular features and dates the origin of cancer back to around 0.5 to 1.5 billion years[25]. Huebner and Todaro hypothesized that the viral information responsible for converting normal cells to cancer cells is transmitted and preserved in all the cells of all vertebrates by inheritance. Though the initial proposal was in connection with C-type RNA-viruses in vertebrates, later on with the identification of many DNA-viruses responsible for carcinogenesis, the viral oncogenesis hypothesis has been extended to include all eukaryotes[26]. About 20% of all cancers is of viral origin. Since fossil records show the period of evolution of eukaryotes from prokaryotes to be around 1.5 to 2 billion years ago, the origin of cancer in this theory roughly dates back to this period.

Disorder theory of Cancer: We propose a new theory of origin and progression of cancer in which evolution is the interplay of order and disorder, with cancer being the primary agent of disorder. Cancer as the tendency for unrestrained proliferation has been there at the very roots of creation of the universe. But the COP in trying to restrain it has led to the current state of the universe as discussed in detail in these essays[27,28,29,30]. In an earlier work we have discussed the interplay of order and disorder in general in the dynamical evolution of all physical and biological systems, where it is proposed that it is consciousness that acts as the COP but the agency of disorder (POD) was as such not identified apart from its role as entropy in all systems[31]. Here we identify POD manifest as cancer and entropy, the physical facet of it. The successive actions of order and disorder in the evolution of life and species and how cancer has evolved to its present invincible status is discussed in detail in the previous essays. We name it **the disorder theory of cancer**. It makes cancer a primordial operative principle that is as old as the universe itself and thus the game of finding the date of its first appearance comes to a venerable closure.

Conclusion

The disorder theory views cancer as an agent of cosmic disorder which was at the very origin of the universe itself and has all along acted towards unrestrained proliferation by multiplication and diversification as opposed to the organizing actions of the ordering principle at all levels.

Appearance of cancer is thus inevitable as it is inbuilt into every particle, nay, every point of space, as the tendency for proliferation. But by means of moving towards more and more order in all levels of one's being one can strengthen the ordering principle in oneself and can keep away cancer which is the agent of disorder. Our finite life-span of can be filled with order in all levels of our being by meditating and attuning ourselves to the cosmic order that is the all-pervading consciousness. This is possible because the consciousness in us can only be aware of this cosmic consciousness and can consciously attune itself with it. The human being alone has this endowment of conscious practice of attunement and it will keep away cancer till one ends one's life-span, thereby effectively eradicating it from one's life. Ultimately order only can counter the disorder that cancer is.

Ethical Clearance- Not needed for this kind of study

Source of Funding- Self

Conflict of Interest-NIL

References

1. Sprouffske, K. et al. Cancer in light of experimental evolution. Curr Biol.2012;22:R762–R771.
2. Stratton MR. Campbell PJ, Futreal PA. The cancer genome. Nature 2009;458:719–724
3. Tripathy A and Pradhan RK. Niche Classification, Niche Processes and Niche Dynamics: Role of Consciousness. International Journal of Scientific Research and Reviews 2019; 8(1):1316-1328.
4. Strakova A, Murchison EP. The cancer which survived: insights from the genome of an 11000 year-old cancer. Curr Opin Genet Dev.2015;30:49-55.DOI: 10.1016/j.gde.2015.03.005.
5. Lotka AJ. Contribution to the Theory of Periodic Reaction, *J Phys Chem.*1910. 14
6. Lotka AJ. Analytical Note on Certain Rhythmic Relations in Organic Systems. Proc Nat Acad Sci USA.1920;6:410.
7. Volterra V. Variazioni e fluttuazioni del numero d'individui in specie animali conviventi. Mem. Acad. Lincei Roma.1926;2:31–113.
8. Volterra V. Variations and fluctuations of the number of individuals in animal species living together. In Chapman, RN. (ed.). Animal Ecology. McGraw–Hill. 1931.
9. Tohme S, Simmons RL, Tsung A. Surgery for Cancer: A Trigger for Metastases. Cancer

Res.2017;77(7):1548–1552.DOI:10.1158/0008-5472.CAN-16-1536.

10. Liou GY, Storz P. Reactive oxygen species in cancer. *Free Radic Res*. 2010;44(5):479–496. DOI:10.3109/10715761003667554
11. Molony JN, Cotter TG. ROS signaling in biology of cancer, Semin Cell Dev Biol. 2018 Aug;80:50-64.DOI:10.1016/j.semcdb.2017.05.023.
12. Heeter C, Lehto R. Benefits of Yoga and Meditation for Patients with Cancer; Oncology Nursing News. https://www.oncnursingnews.com/publications/oncology-nurse/2018/may-2018/benefits-of-yoga-and-meditation-for-patients-with-cancer
13. Agarwal RP, Maroko-Afek A. Yoga into Cancer Care: A Review of the Evidence-based Research. Int J Yoga. 2018,11(1):3–29.DOI:10.4103/ijoy.IJOY4217
14. Danhauer S, Sohl S, Addington E, Chaoul A, Cohen L. Yoga Therapy During Cancer Treatment: Clinical insights. In: The Principles and Practice of Yoga in Health Care. Endenburgh: Handspring Publishing; 2016. p.339–74.
15. Culos-Reed S, Long R, Walter A, Van Puymbroeck A. Yoga Therapy for Cancer Survivors: Clinical insights. In: The Principles and Practice of Yoga in Health Care. Endenburgh: Handspring Publishing; 2016.p.375–400.
16. Greenlee H, DuPont-Reyes MJ, Balneaves LG, Carlson LE, Cohen MR, Deng G, et al. Clinical practice guidelines on the evidence-based use of integrative therapies during and after breast cancer treatment. CA Cancer J Clin.2017;67(3):194–232.
17. Rao RM et al. Role of Yoga in Cancer Patients: Expectations, Benefits, and Risks: A Review. Indian J Palliat Care.2017;23(3):225–230.doi:10.4103/IJPC.IJPC10717.
18. Monahan-Earley R, Dvorak AM, Aird WC. Evolutionary origins of the blood vascular system and endothelium.J ThrombHaemost2013;11(Suppl. 1):46–66.
19. RT Javier, JS Butel. The History of Tumor Virology. Cancer Res.2008;68(19):7693-7706
20. E Walter and M Scott. The life and work of Rudolf Virchow 1821–1902: "Cell theory, thrombosis and the sausage duel". J Intensive Care Soc.2017;18(3):234–235. doi:10.1177/1751143716663967
21. Ewing J. The classic: the Bulkley Lecture: the modern attitude toward traumatic cancer. 1935. *Clin Orthop Relat Res*. 2012 Mar; 470(3):642-62. doi:10.1007/s11999-011-2235-x.PMID:22270465.
22. Boveri T. Zur Frage der Entstehung maligner Tumoren. Verlag von Gustav Fischer, Jena;1914:29–32.
23. Bauer KH. Mutationstheorie der Geschwulst-Entstehung. Berlin: Julius Springer Verlag;1928.
24. Sonnenschein C, Soto AM. The Society of Cells: Cancer and Control of Cell Proliferation. Springer Verlag; New York, NY;1999:9-133
25. Davies PCW, Lineweaver CH. Cancer tumours as metazoan 1.0: Tapping genes of ancient ancestors. Phys Biol 2011;8:015001
26. Huebner RJ, Todaro GJ. Oncogenes of RNA tumor viruses as determinants of cancer. Proc Natl Acad Sci USA.1969;64:1087–94.
27. Tripathy A, Pradhan RK .The cancer principle-I:Introducing Cancer as a Fundamental Principle of Nature.. IJPHRD (2020; 11(6):1-5)
28. Tripathy A, Pradhan RK .The Cancer Principle-II:Cancer as the Origin of All Life on Earth. IJPHRD (Replace by: 2020; 11(6):6-10)
29. Tripathy A, Pradhan RK .The Cancer Principle-III:Evolution by Cancer.IJPHRD (2020; 11(6): 11 16)
30. Tripathy A, Pradhan RK .The Cancer Principle-IV:The inevitability and invincibility Cancer. IJPHRD (2020; 11(6):17-21)
31. Tripathy A, Pradhan RK. Consciousness as the cosmic ordering principle and the interplay of order and disorder in the physical and biological systems, IJSRR 2019 b; 8(1):859-73

Living with Urostomy: Patient's Perspective

Meenal Sharma[1], Sukhpal Kaur[2], Amlesh Seth[3], Prabhjot Singh[4]

[1]Ph.D Scholar at National Consortium by INC and RGUHS, [2]Lecturer, National Institute of Nursing Education, PGIMER, Chandigarh, [3]Head of Department, Department of Urology, AIIMS, New Delhi, [4]Associate Professor, Department of Urology, AIIMS, New Delhi

Abstract

The diagnosis of bladder cancer and necessity of urostomy is profoundly life changing. This qualitative study was conducted in order to assess lived experiences of patients who had received urostomy due to bladder cancer or any other urinary pathology. The sample included 30 patients with urostomy admitted in the Urology ward, AIIMS, New Delhi. Purposive sampling was used and data was collected using semi structured interviews. Narrative data was analysed using Colaizzi's steps of analysis for qualitative data. Ten themes emerged from the analyses which were further categorized into sub themes. The theoretical framework of the themes and subthemes defined the phenomenon of living with urostomy in entirety.

Key words: *Qualitative research, Lived Experience, Bladder cancer, Urostomy, Colaizzi's Steps of Qualitative Analysis*

Introduction

Urostomy is a procedure that reroutes the flow of the urine out of the body.[1] Urostomy surgery may be required for many reasons, the most frequent indication being bladder cancer, which is the second most common urologic malignancy.[2] Of all bladder cancers, 10-20 percent is the muscle invasive type which is classically treated with cystectomy and urostomy.[3]

Creation of a urostomy significantly alters elimination pattern and can have both physical and psychological effects. The most common physical complications with urostomy are infectious, gastrointestinal, wound related and genitourinary. The physiologic complications involve changes of the stoma and peri-stomal skin including dermatitis, pain, bleeding, necrosis, prolapse, stenosis, herniation, infection and retraction of the stoma.[4,5]

Many urostomy patients have emotional, social and sexual problems. Urostomy patients are concerned about the effect of the stoma on their ability to carry out activities of daily living. Ostomy surgery is a life-enhancing procedure that restores a vital bodily function, but it's not easy to accept.[6]

Nurses involved in the care of patients with a stoma should have an understanding of the reasons for stoma creation, and the types of stoma and appliances available. Issues related to diet, sexual relationships and self-image should also be discussed with patients. [7, 8]

There have been significant advances in stoma appliances and an increase in nurses specialising in stoma care. Despite this, a large proportion reportedly up to 75% of patients continue to experience adjustment problems, which suggest that improvements in stoma management are by themselves not enough to enhance functioning.[7] This inspired the examination of problems of urostomy patients in this study.

Objective: To explore the lived experiences of the patients living with urostomy.

Materials and Methods

Research Design and Sampling:

A phenomenological qualitative research design was used. Sample size was limited to 30 when data saturation

Corresponding Author:
Ms Meenal Sharma,
Ph.D Scholar at National Consortium by INC and RGUHS

occurred. Purposive sampling was used to select patients who had undergone radical cystectomy and ileal conduit surgery. Patients after 5 days of the surgery, above 18 years of age and willing to participate in the study were enrolled.

Research Tools

1. ***Demographic Profile Sheet:-***

The demographic profile sheet was used to collect socio-demographic data of patients. Content validity was obtained from the experts.

2. ***Semi-Structured Interview Guide:-***

An interview schedule was developed which listed the open ended questions to explore the experiences of the urostomy patients. It was validated by experts.

Data Collection

The study was conducted from January 2018 to July 2018. The willing participants were explained about the study and informed consent was signed. Anonymity, confidentiality and privacy of patients were maintained. Face to face interview was conducted by the researcher with a fairly open framework. An interview session lasted 10-30 minutes and was audio taped with the consent of the patient. Field notes were maintained. The place for interview was a private room in the urology ward. Active attention was given to the body language, posture, facial expressions and voice intonation of the participants. Short pauses and silences were dealt with patience as they helped the patient to understand their feelings and put them into words. Emotional support was extended when patient got distraught and cried during the interview.

Data Analysis

The demographic data was analysed using descriptive statistics in SPSS. Statistical tests used to describe the data were frequency distribution, mean and standard deviation.

Qualitative analysis was done simultaneously with data collection. Recorded interviews were transcribed verbatim and translated into English by the researcher and rechecked by translator. Colaizzi's steps of qualitative analysis were used for analysis. The data was read and re-read numerous times to identify the significant responses. A total of 623 significant responses were extracted from the interviews. Meanings were formulated for these significant responses. In total 808 meanings were identified and grouped under 10 themes as some of the responses were not exclusive but were interrelated and overlapping. Formulated meanings were coded in a MS Excel sheet to extract common themes which were further categorized into sub- themes. The derived theoretical framework integrated participants description to achieve comprehension of the experience of living with urostomy.

Results

Demographic description of sample

The sample composed of primarily male participants 90% (n=27) with average age of 57±11.61 years. Urinary bladder cancer was the primary disease in 28 patients, with only two female patients having urinary bladder metastasis. Majority of the patients had radical cystectomy and ileal conduit with or without nephroureterectomy, prostactectomy and lymph node dissection. The mean weight of the participants was 62±9.97 kgs and mean height was 173.2±9.6cms. Most of the patients were not employed 53.3% (n=16). A large proportion of the patients 36.6% (n=11) belonged to lower income group. A striking number of patients 60% (n=18) have smoked or chewed tobacco before diagnosis.

Qualitative Analysis

Ten themes emerged from the lived experiences of the urostomy patients which were further divided into sub themes. [Number] in brackets is the number of significant responses for the particular theme and sub theme. *Italicised sentences* are the expressions of the participants. Following themes were identified.

1. **Knowledge regarding urostomy**

Most of the patients confirmed lack of knowledge regarding urostomy [36].

…"*I don't know how to wear or change bag and also how to manage if a leakage occurs.*"Patient 6

Due to lack of knowledge, patients experienced dependence on the health care staff for changing

urostomy bag [14]. Some patients expressed readiness to learn urostomy care [19].

…"*I want to know about the diet, how to change the urostomy bag and what is the frequency of bag changes and also can I lay in prone position*?" Patient 20

2. **Physical problems**

Patients experienced numerous physical problems related to their disease, treatment and urostomy. Weakness [20] and fatigue [25] was present in most of the patients

…"*I feel very much physically weak. I face difficulty in daily activities."* Patient 1

Skin problems around urostomy were fairly common [9]. Most of the patients had pain and oozing at surgical site [15] thus increasing the risk of infection. [4] Urine leakage from the urostomy was a difficulty faced by almost all the patients [23]. Continuous lying down in bed also caused discomfort [5].

... "*Because of constant lying down on the bed, I have developed bed sores on my back."* Patient 13

Patients had difficulty in maintaining hygiene due to surgical incision and urostomy [6]. Surgical creation of illeal conduit requires resection of illeal segment causing digestive problems in the patient postoperatively like abdominal bloating [18], stomach ache [15], nausea, vomiting [1], and loss of appetite [23], constipation [4] and diarrhoea [1].

…"*I was distressed by stomach ache and gas for which they gave medicine and now it's better.* Patient 25

3. **Psychological Problems**

Mental tension [15] and depression [17] were evident followed by feelings of hopelessness [4], helplessness [24] and dependency [12].

…"*It feels as if half of my life has slipped out of my hands.*"Patient 1

…"*Yes, mental tension is there. It is better to die than to suffer from this.*" Patient 3

Most of the patients were middle aged males and sole earner for the family. They were highly stressed due to the failure to meet family role [22].

…"*We are helpless for my son's education. Even if I sell my land, then where will we go? I dreamt of making him a doctor (Pause).*" Patient 23

Patients had fear of urine leakage from urostomy [7] and were anxious [6] and embarrassed because of the urostomy [16].

…"*I feel sometimes, that why has this happened in front of my children. Now, they will have to even tie my pyjama. I feel ashamed because of that.*" Patient 20

Some patients also expressed anger [11].

… "*Everyone has to die one day, but it should not be so early in my case.*" Patient 27

Feelings ranged from disbelief, confusion and ambivalence towards urostomy [14]. Some patients vehemently denied mental stress [12] to avoid stressful disclosure with the researcher, while some were unwilling to communicate on certain questions [3]. Conversely, some patients talked optimistically about urostomy and were hopeful of the future [43]. Positivity was also noted by in terms of readiness to change to a healthy lifestyle [16].

... "*This operation saved my life otherwise I would have died. So, whatever has happened is for good*. Patient 28

…"*Isn't there is something which can be fitted inside the body. It would be better, if it is not visible outside.* Patient 22

4. **Impact on daily activities**

Patients reported difficulty in performing their daily activities [9]. Sleeping was disturbed in some of the patients [5].

…"*Yes, the sleep is stressful, I worry that it may leak and spoil the bed.*" Patient 27

Doubts related to diet were common [16]. Travelling was deeply impacted because of urostomy [21]. Patients were concerned about bag leakage [10] and practical difficulties in driving [8]. Dressing was also a matter of concern for most of the patients like ability to wear undergarments and their regular clothes [23].

... "*If I wear pants below the stoma, it is not very comfortable, so, I try to wear it above the stoma. The pants have to be stitched according to the stoma.*" Patient 27

5. **Social Problems**

Many of the patients restricted their social activities. They were concerned about extra preparations needed for urostomy [26].

…"*If there is a function somewhere, I won't be able to attend as I will have to keep supplies with me*." Patient 23

Most of the patients felt social stigmatization because of the urostomy and recognized the lack of social support system [22].

…"*People will wonder that what disgusting problem I am suffering from. My neck will be hung in shame.*" Patient 11

6. **Family Problems**

Family functioning was greatly disturbed. Most of the patients perceived anxiety and stress in the family members [7] and were aware of the caregiver's burden on their attendants [5].

…"*Everybody has been caring for me from last 1 year. There has been lot of tension in the family*." Patient 10

Most of the patient were male and were experiencing sexual difficulties but they were not comfortable enough to discuss it with the researcher except few [5].

…"*I have very much problems. I can't talk about sex right now. Please ask about it later.*" Patient 23

…"*I am not able to maintain sexual relations with my wife (nonverbally messages not to talk about sexual problems),*" Patient 26

7. **Occupational Problems**

Patients were anxious about their inability to do heavy work [21] and were uncertain of whether occupation can be continued. Financial consequences of incapability to work were a cause of turmoil.

… "*I am sitting idle for about 3 years now. My work is done partly by my children, so I am able to live. What can I do?*" Patient 2

8. **Financial Problems**

Majority of the patients with few exceptions had strained finances [14] and was worried about additional expense of urostomy [23].

…"*The main problem is monetary expenses. The supplies are very costly.*" Patient 26

Few patients were unable to procure supplies for urostomy and struggling for daily needs [5].

…"*Sometimes, the bag bursts. If by chance we don't have money to buy bag that day, then my clothes are drenched in urine whole day.*" Patient 3

9. **Religious and Spiritual Problems**

Some patients quoted the need to change to spiritual lifestyle considering they have got a second chance at life because of urostomy [5]. In contrast, urostomy was considered causing impurity of body because of bodily contact with urine by some [14]. Patients were emotionally stressed because they couldn't offer prayers [2].

…"*In our religion, even if a drop of urine touches the body then prayers are not offered. We have to be totally pure to pray. (Eyes well up with tears)*." Patient 16

10. **Health Care Issues**

The patients from remote areas were stressed because of the inaccessibility of health care near their home [7]. Some patients experienced distress due to delayed care because of limited health care staff and resources [6].

… "*Staff is very less here.*" Patient 23

Most of the patients had faith in capability of health care team [3].

…"*They have done really good for me. Whatever happened with me has been good so far.*" Patient 24

The detailed description of the themes and sub

themes facilitate vision of the overall experience of living with urostomy. Researcher observed that the experiences of different patients were as varied as their personalities, demographics and social circumstances, but were unified by their common struggle of living with urostomy.

Discussion

In the last 30 years, much has been done to improve the quality of life for patients with stoma. In spite of these, however, even today it is a very difficult to live with urostomy. Literature describes the numerous problems of urostomy patients. The present study also confirmed these issues.

The findings of the present study are consistent with other researchers who have discussed physical problems of urostomy patients.[8] In the present study some of the physical problems were problems due to location of urostomy. Skin problems and urine leakage was a major issue. Patients also described lots of digestive problems.

Around one-quarter of stoma patients experience clinically significant psychological symptoms postoperatively.[9] In this study, mental tension and depressive feelings were present in most of the patients. Patients had fear of urine leakage and were embarrassed of the urostomy and declared it as retribution for their bad conduct. Socially, urostomy patients found themselves vulnerable to other's reaction to the urostomy, thus restricting their social activities.[10] In general, family and friends can be an immense source of support which was also narrated by most of the patients in the study.[11] Ostomy surgery may affect the patients' sexual relationship with their intimate partner which was also the case in present study. [12]

Most of the participants belonged to lower economic group with few exceptions. It was difficult for them to bear the burden of disease and urostomy. Another important finding relates to religious issues. As with many religions, it is important to be clean, especially when praying. This was regarded as the worst effect of the urostomy by some patients. Study participants expressed faith in the health care professionals although they were aware of the shortage of the health care staff and resources.

In this qualitative study, researcher was able to establish a trusting relationship with most of the patients. Interview offered the patients an opportunity to express their thoughts, feelings and beliefs without being judged. Patients acknowledged the interview to be therapeutic. The findings of this study cannot be extrapolated to wider populations because qualitative research results cannot be tested for statistical significance.[13] However, the findings are useful for health care providers when creating a supportive environment to improve quality of life of urostomy patients.

Conclusion

Living with a urostomy takes significant adjustment in daily living. A detailed knowledge can facilitate health care personnel to understand the problems of these particular patients and design the health care accordingly. Motivation of the patient to take independent care of their urostomy will lead to better self care efficacy and psychosocial adjustment.

Ethical Clearance- Taken from Ethics Committee, AIIMS, New Delhi.

Source of Funding- Self

Conflict of Interest - Nil

References

1 Available from Internet: http://kidney.niddk.nih.gov/kudiseases/pubs/urostomy/#diversion. Accessed on 30 Aug 2019.

2 Borwell B. Rehabilitation and stoma care: addressing the psychological needs. Br J Nurs. 2009 Feb 26-Mar 11; 18(4):S20-2, S24-5.

3 Available from Internet: www.urotoday.com/Bladder-Cancer/epidemiology-prevalence-4482.html. Accessed on 20 July 2019.

4 Takada N, Abe T, Shinohara N, Sazawa A, Maruyama S, Shinno Y et al. Peri-operative morbidity and mortality related to radical cystectomy: a multi-institutional retrospective study in Japan. BJU Int. 2012 Dec; 110(11 Pt B):E756-64.

5 Pittman J, Rawl SM, Schmidt CM, Grant M, Ko CY, Wendel C et al. Demographic and clinical factors related to ostomy complications and quality of life in veterans with an ostomy. J Wound Ostomy

Continence Nurs. 2008 Sep-Oct; 35(5):493-503.

6 Thompson J. A practical ostomy guide. Part one, RN. 2000 Nov; 63(11):61-6.

7 Gemmill R, Sun V, Ferrell B, Krouse RS, Grant M. Going with the flow: quality of life outcomes of cancer survivors with urinary diversion. J Wound Ostomy Continence Nurs. 2010; 37:65-72.

8 Mohamed NE, Diefenbach MA, Goltz HH, Lee CT, Latini D, Kowalkowski M, et al. Muscle invasive bladder cancer: from diagnosis to survivorship. Adv Urol. 2012; Available from Internet: http://dx.doi.org/10.1155/2012/142135. Accessed on 15 July 2019.

9 White CA, Hunt JC. Review: Psychological factors in postoperative adjustment to stoma surgery. Ann R Coll Surg Engl 1997; 79: 3-7.

10 Nordström G, Nyman CR, Theorell T. Psychosocial adjustment and general state of health in patients with ileal conduit urinary diversion. Scand J Urol Nephrol. 1992; 26(2):139-147.

11 Notter J, Chalmers F. Living with a colostomy: a pilot study. Gastrointestinal Nursing. 2012; 10(6):16−24.

12 Nichols T, Riemer M. The impact of stabilizing forces on postsurgical recovery in ostomy patients. J Wound Ostomy Continence Nurs. 2008; 35:316–320.

13 Dabirian A, Yaghmaei F, Rassouli M, Zagheri M, Tafreshi. Quality of life in ostomy patients: a qualitative study. Available from Internet: http://citeseerx.ist.psu.edu/viewdoc/download. Accessed on 16 Aug 2019.

An Epidemiological Study of Prevalence of Skin Diseases among Secondary School Going Children in District Meerut

Abhishek Kumar Burman[1], Rahul Bansal[2], Saurabh Sharma[3], Arvind Krishna[4] Sartaj Ahmad[5]

[1]Post Graduate Student, [2]Head &Professor, [3]AssociateProfessor, Department of Community Medicine, [4]Head &Professor, Department of Skin and Venereal Diseases, Subharti Medical College, Meerut ,U.P. India, [5]Associate Professor, Medical Sociology, Swami Vivekananda Subharti University Meerut

Abstract

Introduction:-Skin disorders are a common cause of morbidity, especially among school children, worldwide. Present study was conducted among secondary school going children in urban and rural field area of district Meerut to find the prevalence of skin diseases and suggest preventive measures based on the study findings.

Material and Methods:-A Cross-Sectional study was conducted among 400 secondary school going children (aged between 13-15 years from class VIII to X^{th}) of district Meerut . Multistage simple Random Sampling Technique was applied and a self-design, semi structured schedule was used.

Result:-In study 212 (53%) were male and 188 (47%) were female children. Overall prevalence of skin diseases was 195(48.75%). Prevalence of skin diseases was more in rural 134(60.6%) than urban 61(34.1%). Skin diseases were more in males 119 (56.13%) than females 76 (40.43%).Skin diseases were more common in Muslims 39(82.98%) than any other religion. Most common skin diseases in study population were pyoderma (28.20%) followed by scabies (22.56%),Tinea-corporis(10.25%),Nutritional disorders (5.13%), Pediculosis-capitis (5.12%),warts (4.62%) , Folliculitis (4.10%), Miliaaria (4.10%),Molluscum-contagiosam (3.08%). Pityriasis-versicolor (2.56%), Acne (2.56%), Tinea-capitis (2.06), Insect bite (2.06), disorder of nails (2.06), Urticaria (1.03%), Tinea-pedis (00.51%).

Conclusion:-Skin diseases were common among students.Pyoderma, scabies and tinea were most common and these can be prevented by maintaining good hygiene.Periodic orientation programmes for students and parents should be done to make them aware of common skin diseases and prevention. Teachers should be trained to inspect hygiene among students and suggest correction measures.

Keywords: *Skin diseases, School going Children, Prevalence, Urban, Rural*

Introduction

Pediatric dermatology is a significant part of dermatology that manages the determination, treatment, and prevention of skin illnesses happening in earliest stages, youth, and immaturity[1]. Prevalence of skin disorders are more among school children from low socioeconomic classes and developing countries like India[2]. School going children are more vulnerable and constitute special risk group in any population deserving Special health care. It is in this age their personality develops. Also they are exposed to various environmental factors which might cause problems and require health, guidance and care.

School setting provides opportunity to be exposed to infectious agents (viruses, bacteria, fungus, insects and animals) in addition; children share personal items. However, when calculating risk factors for skin disease, there are many other ecological and environmental

Corresponding Author:
Dr. Saurabh Sharma
saurabh.krishnatra@gmail.com
Subharti Medical College, Meerut,U.P.
Contact no:-8958207039

considerations. Children are often exposed to climatic and social conditions that predispose them to develop skin infections and suffer from minor skin injuries [3].

The incidence of skin diseases among children in various parts of India has ranged from 8.7% to 38.8% in different studies usually school-based surveys[4].The acute and chronic conditions which can occur during schooling anywhere in the world include scabies, dermatitis, impetigo, pediculosis, warts, furuncle, molluscumcontagiosum[5].

We conducted this study in order to find out the prevalence and factors associated with occurrence of skin disease among school going children in district Meerut ,India. and to suggest preventive measures based on the findings of study.

Methodology

The present Cross-Sectional study was conducted among 400 secondary school going children aged between 13-15 years from class VIII to X^{th} standard in Urban and Rural population of district Meerut. Predesigned pretested and semi structured schedule was used. Multistage simple Random Sampling Technique was applied**.** Duration of study was from 1st March 2018 to 28th February 2019.Sample size calculation was done by using formula$(1.96)^2pq/L^2$ .p was kept 50%(based on a previous study) q = 1-p , L= Absolute Allowable error taken as 5 %..4 Schools were selected randomly by chit method from the list of schools provided by Basic Sheksha Adhikari Meerut,U.P. 2 schools each from urban and rural area were taken. 100 students from each school were selected randomly by chit method using roll numbers of students provided by the school. Training of diagnosis of skin diseases clinically and their examination and investigation was provided by the Professor & Head Dermatology, Venerealogy and Leprosy, Subharti Medical College, Meerut .

Inclusion criteria was the children who were studying at the selected Government/private secondary schools and both boys and girls aged between 13-15 years available at the time of data collection .Exclusion criteria included students who were not available during the study, students who were in the age group of below 13 years and above 15 years and students who refused to take part in the study. Informed written consent was obtained from the concern school authorities. Ethical clearance was obtained from institutional ethical committee. Data entry was done in Microsoft Excel and analysis by SPSS version 19.

Result

The overall prevalence of skin diseases was 48.75% (195).Infections were most common among all the types of skin diseases (Table 1).The most common skin disease in study population was pyoderma (28.20%) followed by scabies (22.56%) (Table 2). There was statistically significant association between Gender, Religion, Residence with skin disease (Table 3).

Table no 1-Type of Skin diseases in the study population

S.R	Type of disease	Frequency	%
1	Infection [Bacterial 63 (58.33%), Fungal 30 (27.78%), Viral 15(13.89%)]	108	55.38
2	Skin diseases caused by Arthropods,	58	29.74
3	Disorders of skin appendages.	17	8.72
4	Abnormal vascular responses	2	1.03
5	Nutritional disorders.	10	5.13
TOTAL	195	100	

Tabel 2:-Distribution of Skin diseases in study population

S.R	**Skin diseases**	**Frequency**	**%**
1.	Pyoderma	55	28.20
2.	Folliculits	8	4.10
3.	Tinea-capitis	4	2.06
4.	Tinea-corporis	20	10.25
5.	Tinea-pedis	1	00.51
6.	Pityriasis-versicolor	5	2.56
7.	Warts	9	4.62
8.	Molluscum-contagiosam	6	3.08
9.	Scabies	44	22.56
10.	Pediculosis-capitis	10	5.12
11.	Insect bite	4	2.06
12.	Acne	5	2.56
13.	Miliaria	8	4.10
14.	Disorder of nails	4	2.06
15.	Urticaria	2	1.03
16	Nutritional disorders.	10	5.13
TOTAL	195	100	

Tabel [3]:-Association between sex, religion and residence with skin disease

Sr. No.	**Variables Yes (N=195)**		**Skin diseases**		**Chi-Square (x2 Test)**	**p value**
			No (N= 205)			
	Sex	Male	119 (56.13%)	93 (43.87%)	X2=9.22	p=0.001
		Female	76 (40.43%)	112 (59.57%)		

Cont... **Tabel [3]:-Association between sex, religion and residence with skin disease**

	Religion and the skin diseases	Hindu	132 (42.86%)	176 (57.14%)	X2=31.758	p=0.000
		Muslim	39 (82.98%)	8 (17.02%)		
		Sikh	23 (60.53%)	15 (39.47%)		
		Christian	1 (14.29%)	6 (85.71%)		
	Residence	Rural	134 (60.6%)	87 (39.4%)	X2=26.861	p=0.000
		Urban	61 (34.1%)	118 (65.9%)		

Discussion

A total 400 school going children aged 13 to 15 years were studied by using Multistage Random Sampling Technique .Out of total participants 212 (53%) were males and 188 (47%) were females.

Skin diseases were seen in (48.75%) of study populace which is almost similar to Negi K S (2001) et al[6] with 50.69% and Valia R A (1991) et al [7] with 43%. The study by Dogra S and KumarB (2003) [8] and Sharma N K (1986) et al [4] , the prevalence of dermatoses was (38.80%) and (14.30 %) which is less when contrasted with our investigation. This may be a result of country region (rural).

In our study skin diseases were seen in 56.13% of males and 40.43% of female students, and the difference was found to be statistical significant, In the examination directed by RAO S G(1999) et al[9]and another investigation by Anil K Gupta (2018) et al [10] both uncovered that boys (78.74%) are exceptionally delicate for dermatological diseases than young ladies (71.47%), however in the investigation of Talukdar K (2015) et al[11],and Ewaldo V K (2010) et al[12] ,Tulsyan SH (2012) et al[13] and , Basti B D (2016**) et al[14]** revealed that the prevalence of skin ailments was high among female youngsters.

In the study prevalence of skin disease was significantly higher in Muslims (82.98%) followed by Sikhs (60.53), Hindus(46.86%),Chritians (14.29%), TalukdarK (2015) et al[11] also found that the prevalence of skin illnesses was high among Muslim youngsters .

Skin sicknesses were seen in (60.6%) of rural populace pursued by (34.1%) of urban population. Which is comparative to Devinder Mohan Thapa (2002) [15]stated that schools from provincial (rural) regions indicated moderately higher prevalence of skin diseases.. Numerous different researches from different nations additionally bolster (support) this finding. T TAmin (2011) et al [3], Sehgai V N (1972) et al[16],Yaseen U (2013) et al[17] .

The most common skin disease in study population was infectious lesion (55.38%) followed by skin diseases caused by Arthropods (infestation) (29.74%), Disorders of skin appendages (8.72%), nutritional disorders (5.13%), In a study done by Sugat A Jawade (2015) et al[18] in >1 months to 14 years age group similarly

the most common dermatoses found were infectious disorders that were (56.40%) of the study populace.

The study done in Meerut by Sharma Radha , Rathore B S, Arvind Krishna (2016)[19] the most common contaminating infection in their study was Bacterial then Viral and Fungal and seen in (37.4%), (16.7%) and 15 % of the examination population. Among bacterial infection, pyoderma was the most common followed by dermatophytic diseases (Fungal infection). Bacterial disease incorporate pyoderma which included bullous impetiga, impetigo contagiosum, furuncle, and secondary pyoderma. In a study from eastern piece of India in (1994), pyoderma was the most common and widely distributed skin diseases (35.6%), followed by scabies (22.4%), molluscumcontagiosum (4.6%), Miliaria (2.8%) Ghosh S K (1995) et al[20].

Among fungal infection (27.78%) the most common fungal infection in study population was Tineacorporis 20 (10.25%) followed by Pityriasis-versicolor 5 (2.56%), Tinea-capits 4 (2.06%) and Tinea-pedis 1 (00.51%). This finding is practically like studis led by Shameena A.U et al (2017) (21) fungal disease (13.50%) to (26.1%) with more dominance to pityriasisversicolar. In the investigation led by Anil K Gupta (2018) et al[10] dermatophytic contaminations comprised the limit of the Fungal infection including the skin (48.5). Among dermatophytic infection, tinea-corporis comprised the most elevated extent, i.e., (56.12%), followed by tinea-cruris 28% and tinea-capitis 9%.The high prevalence in our study could be expected due to the humid and hot climatic conditions which straight forwardly supports parasitic contaminations and fungal infection.

Among viral infections 15 (13.89%) the most common viral infection in study population was viral warts 9 (4.62%) followed by Molluscumcontagiosum 6 (3.08%). Sharma Radha , Rathore B S, Arvind Krishna (2016)[19] revealed that prominent common viral infections were warts, molluscumcontagiosum, the kids were school going or having positive family history. While investigations of Patel J K (2010) et al[22] molluscumcontagiosum was most common of all viral infections, followed by viral warts .

In the present study, among Skin diseases caused by Arthropods 58 (29.74%) the most common Skin diseases caused by Arthropods, worm & protozoa in study population was was scabies 44 (22.56%) infestation followed by pediculosis capitis10 (5.12%) and followed by insect bite 4 (2.06%). Incidence rate of scabies, found in different reports, ranges from (5.1%) to (22.4%) .[Dogra S et al[8], Balai M et al[23], Bhatia V et al[24],Negi K S et al[6], Ghosh S K et al[20], Rao SG et al[9]].High rate of scabies in our study could be due to poor hygiene, most cases from low socio-economic strata and over crowding. In various studies like, Talukdar K (2015) et al[11] in his examination expressed that Prevalence of scabies was (21.7%) among the understudies pursued by pityriasis(19.6%) . Prevalence of pediculosis was seen as (18.5%) , and tinea disease among the kids was 16% .Dogra S and Kumar B (2003)[8] Conducted a study in Wardha among tribal younger students found that head lice (42.8%) followed by scabies (36.6%) among younger students.

Among the Disorders of skin appendages (8.72%) ,the most common Disorders of skin appendages was miliaria 8 (4.10%) , Acne was found in 5 (2.56%) in study population. While in a study led by Shekhat P (2017) et al[25]Appendageal issue were (13.41%) of all dermatoses. Among all appendageal disorders, the most noteworthy number of cases was of acne with (33.33 %), followed by milliaria with (31.70%).

In present study Abnormal vascular responses (urticaria) was seen 2 (1.03%) among study populace is almost similar to the finding of Karthikeyan K (2004) et al[26].

In our study, among skin disorders nutritional deficiency dermatoses were seen in 10 (5.13%)which is similar with Rao SG (1999) et al[9] study (6.71%). However, in an investigation by Negi KS (2001) et al[6] it was discovered (17.5%).This distinction may exist on the grounds that the examination was done in a rural region while our investigation focus was in a urban zone and rural zone.

Conclusion

In this study, prevalence of skin diseases was found to be very high. Skin diseases were found to be more common in Muslim male students of rural background. Regular health education to both teachers and parents regarding common skin diseases, personal hygiene practices and appropriate nutrition of the children. Periodic health checkup of all children in schools , providing health care facilities and timely treatment by the doctor.

Acknowledgements: The authors are thankful to all

students who participated in this study

Funding: No funding sources

Conflict of Interest: There is no Conflict of interest

Ethical approval: The study was approved by the Institutional Ethics Committee of Subharti Medical College Meerut UP

References

1. G. A. BenSaif and S. A. AlShehab, "Pattern of childhood dermatoses at teaching hospital of Saudi Arabia," International Journal of Health Sciences, vol. 2, no. 2, pp. 63–74, 2008.
2. Marlow DR. text book of Pediatrics. 1st ed. New Delhi: Saunders WB Company; 1999. 2572-2578.
3. TT Amin. AAli.FKaliyadan. Skin disorders among male primary school children in Al Hassa, Saudi Arabia: prevalence and socio-demographic correlates - a comparison of urban and rural populations. *Journal of rural and remote health Research Education practice and policy*.28 February 2011;1-1517 Available from: www.rrh.org.au/publishedarticles/article_print_1517.pdf.
4. Sharma NK, Garg BK, Goel M. Pattern of skin diseases in urban school children. Indian J DermatolVenereolLeprol. 1986;52:330–1.
5. Manisha Balai, Ashok Kumar Khare, Lalit Kumar Gupta, Asit Mittal, and C M Kuldeep. Pattern of Pediatric Dermatoses in a Tertiary Care Centre of South West Rajasthan. *Indian J Dermatol.* Jul-Aug2012;
6. Negi KS, Kandpal SD, Parsad D. Pattern of skin diseases in children in Garhwal region of Uttar Pradesh. InPediatrics 2001;38:77-80.
7. Valia R A, Pandey S S, Kaur Paramjeet, Singh Gurm.Prevalence of skin disease in Varanasi school children, IADVL-1991, Vol. 57/ Issue 3/ 141-143.
8. Dogra S, Kumar B. Epidemiology of skin diseases in school children: A study from Northern India. Pediatr Dermatol 2003;20:470-3. [PUBMED]. Available from: http://www.ncbi.nlm.nih.gov/pubmed/14651562.
9. Rao SG, Kumar P, Kuruvilla M. Prevalence of various dermatoses in school children. In J Dermatol Venereol Leprol 1999;65:126-7.
10. Anil K Gupta,Ali Mohammad, Lalit Mohan, S K Singh, Snehlata, Amit Kumar Soni, Sushantika, Naveen Kumar,Epidemiological study of childhood dermatosis in Eastern Uttar Pradesh,International Journal of Scientific Study | August 2018 | Vol 6 | Issue 5.
11. Talukdar K, Baruah R. Prevalence of Skin Infection and Personal Hygiene Practices Amongst Primary School Children: A Community Based Cross Sectional Study in Kamrup (Rural) District of Assam. Int J Sci Stud 2015;3(3):11-14.
12. Ewaldo V Komba, Yassin M Mgonda The spectrum of dermatological disorders among primary school children in Dar es Salaam BMC Public Health. 2010; 10:765.
13. Tulsyan SH, Chaudhary S, Mishra D. A school survey of dermatological disorders and associated socio-economic factors in Lucknow; a region of North India. Egypt Dermatol Online J 2012;8:4.
14. Basti BD et al. Int J Community Med Public Health. 2016 Jul;3(7):1957-1962 http://www.ijcmph.com.
15. Thappa DM. Common skin problems in children. In J Pediatr 2002;69:701-06.
16. Sehgai VN, Rao TL, Rege VL, Vadiraj SN. Scabies: a study of incidence and a treatment method. Int J Dermatol. 1972;11:106.
17. Umar Yaseen, Iffat Hassan. Prevalence of various skin disorders in school going children of Kashmir valley of North India: A cross-sectional study. Indian journal of pediatric dermatology.2013;14(3):67-72,Available from: http://www.ijpd.in/article.asp?issn=2319-7250.
18. Sugat A Jawade, Vishal S Chugh, Sneha K Gohil, Amit S Mistry,Dipak D Umrigar ,A Clinico-Etiological Study of Dermatoses in Pediatric Age Group in Tertiary Health Care Center in South GujaratRegion Indian J Dermatol.2015,Nov-Dec;60(6):635.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4681222/.

19. Radha Sharma, BS Rathore, Arvind Krishna, 2016 Indian Journal of Paediatric Dermatology | Published by Wolters Kluwer - MedknowIndian | Vol 17 | Issue 4 | Oct-Dec 2016,p 263-266,.
20. Ghosh SK, Saha DK, Roy AK. A clinico-aetiological study of dermatoses in paediatric age group. In J Dermatol 1995;40:29-31.
21. Shameena A.U.,sanjeev badiger,Nanjesh Kumar,Pattern of common skin conditions among

school children in an urban area of a district in coastal Karnataka;a cross-sectional study,International journal of Community Medicine and Public Health,August 2017; vol 4,Issue 8,p290.

22. Patel JK, Vyas AP, Berman B, Vierra M. Incidence of childhood dermatoses in India. Skinmed. 2010;8:136–42.
23. Manisha Balai, Ashok Kumar Khare, Lalit Kumar Gupta, Asit Mittal, and C M Kuldeep. Pattern of Pediatric Dermatoses in a Tertiary Care Centre of South West Rajasthan. *Indian J Dermatol.* Jul-Aug2012; 57(4):275-278 Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3401841/.
24. Bhatia V. Extent and pattern of paediatric dermatoses in rural areas of Central India. In J Dermatol Venereol,Leprol 1997;63:22-5.
25. Parth Shekhat, Rashmi Mahajan, Kishan Ninama, Som Lakhani, Freny Bilimoria, Pediatric Dermatoses: A Study of 313 Cases,Indian Journal of Clinical and Experimental Dermatology, October-December 2017;3(4):187-193.
26. Karthikeyan K, Thappa DM, Jeevankumar B. Pattern of Pediatric dermatoses in a Referral Center in South India. Ind Pediatrics 2004; 41:373-7.

Prevalence of Musculoskeletal Dysfunction in Clinical Physiotherapist

Aishwarya A. Vedpathak[1], Radhika Chintamani[2]

[1]Final year BPTh Student, [2]Assistant Professor, department of Manual Physiotherapy , Krishna College of Physiotherapy, KIMS 'Deemed to be' University, Karad, Maharashtra, India

Absract

Objectives : Objectives of this study was to find out musculoskeletal pain or dysfunction in clinical physiotherapist. On the basis of questionnaire rating the scale pain assessment was done. The ratings was graded by work related musculoskeletal disorders (WMSDs) questionnaire.

Methodology : There were total 150 subjects , out of which 120 subjects were participates of this study. This was a study of musculoskeletal dysfunction in clinical physiotherapist. Here we evaluated scoring of pain by the work related musculoskeletal disorders (WMSDs) quessionnaire

Result : There is various musculoskeletal joint pain present in clinical physiotherapist. Musculoskeletal joint dysfunction more found in males than females. Shoulder joint pain and knee pain is common in clinical physiotherapist due to standing posture.

Conclusion : There is prevalence of musculoskeletal dysfunction in clinical physiotherapist.

Keywords: *Musculoskeletal dysfunction in clinical physiotherapist.*

Introduction

Low back pain is defined as pain in lower back area that can relate to problems with the lumbar spine, the discs between the vertebrae , the ligaments around the spine , the spinal cord and nerves, muscles of the low back , internal organs of the pelvic and abdomen , or the skin covering the lumbar area[1.] Incidence of low back pain in general and working population has been focused on various investigation. There are 62% to 80% of the population will suffer from LBP. The lifetime incidence of LBP vary from 50% to 80% with average incidence of 60%. As reported by anderssson (1998) women and men have similar prevalence and in most of the studies , highest prevalence rate is seen in 40 to 60 year age group.

The incidence of low back pain appears to be age related. Physiotherapist they are also exposed to many of the same occupational risk factor leading to work related musculoskeletal problem especially with regard to the lower back. The purpose of the present study was to determine the incidence of work related LBP and other musculoskeletal problem among physiotherapist and to determine common personal and professional characteristics of physiotherapists reporting work related musculoskeletal problem. We hypothesized that musculoskeletal problem are related to occupational stress in physiotherapists(1) . Low back pain including lost productivity and expense of medical , rehabilitation and surgical intervention and cost of disabling pain and limited daily function.(7)

Cervical joint dysfunction : The presence of painful upper cervical joint dysfunction is diagnostic criterion for cervicogenic headache. Cervicogenic headaches arise from dysfunction in cervical musculoskeletal system. Dysfunction should be located within upper three cervical joint . Detecting the presence of relevant painful upper cervical dysfunction is therefore a vital part of diagnostic decision making to. Identify cervicogenic headache the physical examination method to detect joint dysfunction are active movement examination and manual passive segmental examination. The detection of symptomatic joint dysfunction by manual examination method has been used in a number of studies. This is perform by a manual examination of the upper cervical segment C0-1 , C1-2 , and C2-3(2)

Shoulder pain : Spinal and shoulder dysfunction are common in orthopedic conditionfound in elderly people. As increasing in age there are changes in spine and shoulder are generally cause kyphosis , spinal sagittal imbalance and limited shoulder range of motion[5]. Neck and shoulder painwas significantly higher for workers with shorter working duration , lower limb for pain was significantly higher for worker with longer duration [6] .

Sacroiliac dysfunction: The confusion and lack of awareness of sacroiliac joint .chronic spinal pain is multifactorial disorder with many possible etiology.the structure responsible for pain originating in the spine and affects on low back and lower extremity include sacroiliac joints and nerve root, spinal cord , spinal muscles and ligaments. [3]

Neck pain : Posture control is a complex task that requires vision, vestibular and somatosensory inputs from all over body assess the position and motion of the body there is ability to generate forces to control body position.[4]

Knee pain : In epidemiological studies have associated prolonged standing at work with lower extremity pain or discomfort. Alternate from sitting to standing its varies mobility during standing. [5]

As far as our knowledge very few studies have been conducted on cluster of musculoskeletal dysfunction in clinical physiotherapists. Hence this study is undertaken.

Methodology

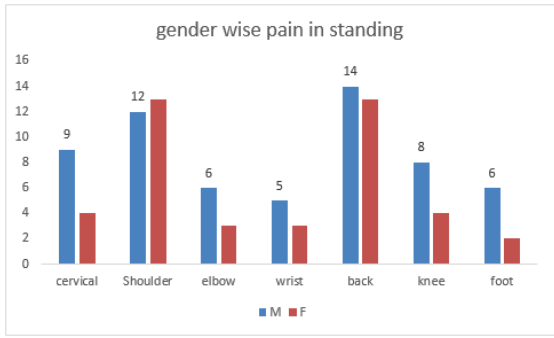
- Type of study- Observational study.
- Place of study - Krishna college of Physiotherapy, Karad.
- Sample size – 150
- Sampling method – convenient sampling.
- Study duration – 6 month

Materials

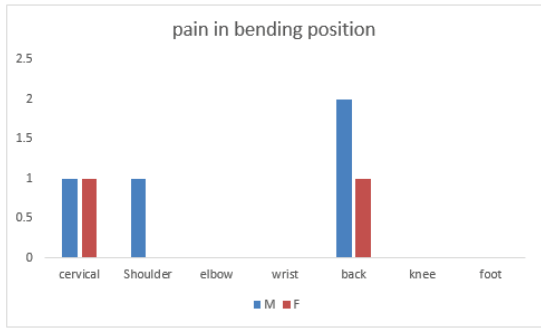
- Question Paper
- pen
- Data collection sheet

Mean± standard deviation	3.447
t value	0.10
p value	<0.442
Interference	Extremely significant

(1) **Pain in standing position**



(2) Pain in bending position



Interpretation :

In this graph shows that physiotherapist are affecting during standing position. There are male and female both are considered in this study. Blue colour shows male and red colour shows female. So for cervical pain 9 male and female 4, shoulder pain male 12 and female 13 , elbow pain male 6 and female 3, wrist pain male 5 and female 3 , back pain male 14 and female 13, knee pain male 8 and female 4 , foot pain male 6 and female 2.

(2) **Pain in bending position**

Interpretation

In this graph shows pain during bending position. In this study

Neurophysiotherapist have pain in bending position. Both male and female physiotherapist participate in this. Cervical pain male 1 and female 1, shoulder pain male 1, and back pain male 2 and female 1.

Pain experience in 5 year

Table no.1 :

5 years	cervical	shoulder	elbow	wrist	back	knee	foot
sum	143	149	124	48	173	39	46
average	5.1	5.32	4.42	1.71	5.96	1.39	1.64

Interpretation :

Pain experience in 5 years in total physiotherapist are as followings . There is total pain in sum and average of all physiotherapist : cervical pain experienced by 143 and its average is 5.1 , shoulder pain by 149 and its average is 5.32 , elbow pain by 124 and its average is 4.42, wrist pain by 48 and its average is 1.71 , back pain by 173 and its average is5.96, knee pain by 39 and its average is 1.39 , foot pain by 46 and its average is 1.64.

Pain experience in 6 years

Table no.2 :

6 years	cervical	shoulder	elbow	wrist	back	knee	foot
sum	21	26	19	11	31	6	4
average	6.2	5.2	3.8	2.2	6.2	1.2	0.8

Interpretation :

Pain experience in 6 years in total physiotherapist are as followings: cervical pain experienced by 21 and its average is 6.2 , shoulder pain by 26 and its average is 5.2 , elbow pain by 19 and its average is 3.8, wrist pain by 11 and its average is 2.2 , back pain by 31 and its average is 6.2, knee pain by 6 and its average is 1.2 , foot pain by 4and its average is 0.8.

Pain experience in 7 years

Table no.3 :

7years	cervical	shoulder	elbow	wrist	back	knee	foot
sum	11	12	6	3	14	7	1
average	5.2	6	3	1.5	7	3.5	0.5

Interpretation :

Pain experience in 7 years in total physiotherapist are as followings: cervical pain experienced by 11 and its average is 5.2 , shoulder pain by 12 and its average is 6 , elbow pain by 6 and its average is 3, wrist pain by 3 and its average is 1.5 , back pain by 14 and its average is 7, knee pain by 7 and its average is 3.5 , foot pain by 1 and its average is 0.5.

Result

The result analyzed for gender,duration of work and duration of constant posture.The prevalence of neck

pain was substantially higher in men (75%) and female (66.67%), which is not in relation with study by B. Cagnie et al[1] which suggests that women had almost twofold risk compared to male. Often holding the neck flexed in a single posture for a prolonged period of time leads to neck pain, though the pain varies with angle of neck flexion. . In 7 year of experiences there is more low back pain and knee pain. There is increasing in age muscles get affected . This study conclude that there is increase in back pain as increase in age position back pain is more due spinal mobility.as increasing in age increase there is more low back pain.in standing and knee pain . The result may be varying because of selection bias due to approaching time limit in the office to the subjects. The result showed $p < 0.05$ which is significant.

Discussion

The current study aimed to find the various musculoskeletal dysfunction in clinical physiotherapist .Physiotherapist are work in most of in standing position .As they increase their year of experience, they may have increase in the pain. Most common problem seen in cervical, shoulder , knee and most common is back pain . continuous standing while treating and assessing affect spinal muscle because of which physiotherapist may develop pain in lower back . In this study we noticed pain increases of year of work increases in clinical physiotherapist. Physiotherapist also have to work in standing , bending and constant sitting position most common position is standing position most of all musculoskeletal and neurological techniques are given in standing position . one of the professional an occupation an dysfunction is musculoskeletal pain. There are mens physiotherapist are affected more than womens physiotherapist as increasing in age they developed knee pain along with back pain. In clinical Neuro-physiotherapist and paediatric physiotherapist they treat patient in bending position. These therapist are treating in low plinth so they may also develop cervical pain and shoulder pain. As this study we noticed pain in increasing as increasing in experience of year in clinical physiotherapist .Physiotherapist have to work in standing , bending and sitting position.

The present study showed that we calculated all over pain by VAS scale . 0 is no pain 5 is minimum pain and 10 is unbearable pain. In this study we calculate all over pain of all physiotherapist and add them and average it . In 5 year experience it seen increase in back pain avg is 5.96,.cervical 4.42, shoulder 5.1. In 6 year back 6.2 in avg and shoulder 5.2. In 7 year shoulder 5.2 ,knee pain is increased in 3.5 back 7 in avg. cervical pain is 5.2 in average. In bending position seen back pain is increased. in men than women. There is increasing in age and increasing in age of experience there is musculoskeletal dysfunction is seen in clinical physiotherapist . female physiotherapist are more affected than male physiotherapist. Common seen conditions are low back pain , knee pain in lower limb . in upper extremity cervical pain and shoulder pain are commonly seen .During mobilization there physiotherapist have to maintain that position then after that session they feel the pain. They given glides to the patients then after that they feel pain in the joint and the mucle.

Conflicts of Interest: There were no conflicts of interest in this study.

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna institute of medical sciences.

Source of Funding: Self- funding

References

1. RUGELJ, Darja. Low back pain and other work-related musculoskeletal problems among physiotherapists. Applied ergonomics, 2003, 34.6: 635-639.
2. JULL, Gwendolen, et al. Inter-examiner reliability to detect painful upper cervical joint dysfunction. Australian Journal of Physiotherapy, 1997, 43.2: 125-129.
3. BROLINSON, P. Gunnar; KOZAR, Albert J.; CIBOR, Greg. Sacroiliac joint dysfunction in athletes. Current Sports Medicine Reports, 2003, 2.1: 47-56.
4. N Vuillerme, N Pinsault - Experimental brain research, Experimental neck muscle pain impairs standing balance in humans 2009 – Springer
5. K Messing, F Tissot, S Stock - American journal, Distal lower-extremity pain and work postures in the Quebec population…, 2008 - ajph. aphapublications.org
6. Imagama S1, Hasegawa Y, Wakao N, Hirano K, Muramoto A, Ishiguro N. Impact of spinal alignment and back muscle strength on shoulder range of motion in middle-aged and elderly people

in a prospective cohort study., 2013

7. Chee HL1, Rampal KG., Work-related musculoskeletal problems among women workers in the semiconductor industry in Peninsular Malaysia. Int J Occup Environ Health. 2004 Jan-Mar;10(1):63-71.

Implications of Physical Therapy to Aid Weight Loss in Individual Suffering from Obesity: A Physical Therapist Perspective

Aksh Chahal[1], Narinder Kaur Multani[2], Harbir Kaur Rao[3], Rajinder Singh Gupta[4]

[1]Professor, MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India, [2]Professor, Department of Physiotherapy, Punjabi University, Patiala, Punjab, India, [3]Professor, Department of General Medicine, [4]Professor, Department of General Medicine, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India

Abstract

Obesity is referred when Body Mass Index of an individual is greater than 30. Making it clearer, individuals with Body Mass Index between 25 to 30 are termed 'overweight' while more than 30 are 'obese'[1]. Till recent years, obesity was considered to be a problematic condition restricted only to developed countries[2]. But, over the course of time with negligence towards dietary habits and lack of physical activity, obesity also started to entrap population of developing countries. India is no exception to it. As per latest statistics, Obesity has emerged as a crucial health problem among Indian population of varied age groups (children, adolescent, middle aged and elderly). Obesity are treated by implementation of therapies via a multi-disciplinary team consisting of Physician, Endocrinologist, Dieticians/Nutritionist, Physical Therapist/Physiotherapist, Psychiatrist/ Psychologist while in severe Obesity, surgery is usually advised.

Keywords*: Obesity, Body Mass Index, Physician, Therapist, Education, Diet*

Introduction

Obesity is referred when Body Mass Index of an individual is greater than 30. Making it clearer, individuals with Body Mass Index between 25 to 30 are termed 'overweight' while more than 30 are 'obese'[1]. Till recent years, obesity was considered to be a problematic condition restricted only to developed countries[2]. But, over the course of time with negligence towards dietary habits and lack of physical activity, obesity also started to entrap population of developing countries. India is no exception to it. As per latest statistics, Obesity has emerged as a crucial health problem among Indian population of varied age groups (children, adolescent, middle aged and elderly). Looking at the demographic stature of India, majority of population resides in rural areas than urban cities. The population staying in rural areas are comparatively fit than urban population due to reduced accessibility towards personal vehicles, lack of public transport facilities, prevalence of malnutrition, reduced availability of junk food, restriction towards surplus purchase and occupations involving more physical activity. According to latest figures, 30 to 65 percent of adults living in urban India are overweight or obese. This can be attributed to reasons of higher income, accessibility to different cuisine, abundance of food venues, easy availability of public transport, occupations involving more of mental dominance rather than physical work and not the least maximization of personal vehicles making commuting easy for individuals of all age groups. As a individual becomes Obese, greater develop the risk to major health problems like Type 2 Diabetes Mellitus and Cardio vascular disease[3], Gallstones, Obstructive sleep apnoea and Dyslipedemia[4]. In addition Depression[5], falls[6], Osteoporosis[7,8], Urinary incontinence[9], Chronic low back pains[10,11,12,13] become a daily issue leaving the patient with low morale,

Corresponding Author:
Aksh Chahal
Professor, MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India
E-mail: drakshchahal@gmail.com

reduced self esteem, lack of interest in daily living and social integration. These issues associated with Obesity are treated by implementation of therapies via a multi-disciplinary team consisting of Physician, Endocrinologist, Dieticians/Nutritionist, Physical Therapist/Physiotherapist, Psychiatrist/Psychologist while in severe obesity, surgery is usually advised.

In the current article, the author concentrates on different therapeutic interventions from a Physical Therapist point of view to treat Obesity and reduce the physical, mental, social and economic burden[14] on the individual. The strategies are as followed:

1. Providence of psychological support.

Individuals' suffering from obesity are usually depressed, low in morale following which they execute less interest in personal, social and professional arena. Repeated jokes and humour being imposed make the condition even more worse. These individuals are counselled at regular intervals to keep them alleviate in terms of mood and positive energy as reducing weight is gradua land steady process taking a course of time for which a continuous motivation is required from professionals. Hence they are taught to be focussed on their path of weight reduction without bothering of external disturbances trying to impend their mode of action or bulling them due to the current bodily status.

2. Incorporation of physical activities on daily basis.

Incorporation of impact physical activities like brisk walking/slow jogging/running is embossed in the activity plan. 30 to 45 minutes of any activity at least 4 times a week should be practised to bring observable deference by 2 to 3 month from the commencement of program. In addition, talking the steps at office, parking vehicle far from the place of concentration are prioritised to bring additional calorie burns. These additional task help to show faster results due to more lose of calorie burn on daily basis.

3. Regularization in life style modification.

This component is greatly focused on as it is one of a primary factor to prevent reoccurrence of Obesity in later stage of life even after a individual lose weight in present ongoing program. Lifestyle modifications like discarding junk food, less consumption of fried products, no food consumption at least 3 hours before sleep, maintaining a protocol of heavy breakfast followed by a moderate lunch subsequently with a fruit as supper and finally a low calorie dinner. This dietary habit should be practised on daily basis to continue being fit throughout life. Any change in quantity of diet intake at inappropriate timing will again predispose the individual towards Obesity.

4. Initiation of self monitoring on daily diet.

Individuals are taught to monitor their diet from morning till they go to bed at night. This can be done by maintaining a register/diary wherein the time and type of food being consumed are documented on daily basis[15]. At the end of each week the individual goes through the weekly dietary consumption to check the compliance with diet plan and realising occurrence of cheat days per week. Individuals should also compare their daily diet with the protocol recommended by the therapist. A slight deviation in diet is considered as normal act because being concentrated on daily basis makes the plan monotonous which escalate the chance of the individual to drop out from the program. But, a large deviation from the expected dietary protocol will reinforce calorie deposition which will add to the already deposited calorie bank in the individual's body. During initial days of weight reduction, cheat days should be avoided and not appreciated. By the time individual completes 2 to 3 months of weight reduction protocol, one cheat day per week can be instituted. This cheat day helps in rejuvenating by consumption of one's desirable food which keeps the individual happy and motivated for continuation of program.

5. Habituation of slow food consumption.

Slow food consumption is another way to accelerate weight loss program. This activity firstly, renders less portion of food inside the body and secondly, greater chewing activity makes the individual feel tired due to which only a smaller portion of food is consumed in a diet. This when followed for all meals bring about significantly reduction in addition of new calories to the body. In addition, when food is chewed to smallest pieces, it is easily digested by the stomach. These individuals are explained about the fact that, longer the food stays in the stomach, greater the chance of obesity.

6. Setting of practical and realistic goals.

While counselling an individual with Obesity, a Physical Therapist puts focus on setting practical and realistic goals to be achieved during the course

of treatment. The individual is explained the fact of continuity as a major goal rather than commencing a weight loss program with enthusiasm and dropping out due to lack of internet after few weeks. A steady go on treatment protocol is the key to success. Amount of weight to be loss per month is calculated depending on individual's current body weight, health condition, psychological mindset, time available for weight loss program. In addition, regular collection of latest information by reading books, articles, newspaper and social media is encouraged.

7. Realization of passive education.

Passive education meaning education/information attained by the individual himself from reading books, articles, newspapers and social media. New concepts and formulations facilitate the progress of ongoing weight loss program[16, 17]. Viewing photographs of people undergone successful weight loss program wherein they compare their pre and post weight loss images motivate individuals to attain success with similar results. Meeting people undergoing same treatment strategies help in sharing views, positive and negative aspects being experienced by individuals help to bring about significant changes. In addition 'Myths and Truths' can be visited and challenged via communication in personal or by making use of social media.

8. Channelization familial/social support.

Active participation from family members plays vital role in success of a weight loss program. Their presence and positive ideology help to motivate and regulate the individual on a regular basis. While counselling the individual's family members should be asked to join for few sessions as they too can appreciate the advantages, disadvantage, positive and negative effects of various aspects as it is wise to think that all of us have different doubts for which there exist personal clarifications. In addition, difference in views between individual and family members can abrupt the smooth implementation of weight loss strategies[18].

9. Prioritising meal replacements.

Replacement of solid meals with liquid food should be incorporated on daily basis to add extra weight loss[19, 20]. Individuals should be made to understand the benefits of liquid diet on solid food. Liquid diet is light and gets easily digested in the stomach which prevents its bloating. In addition, it prevents acidity and percussions of burps. Repeated burps make people embarrassed in social gatherings hence making them vulnerable to jokes embossed on them.

10. Active parental participation in obese children.

Active parental participation play important role in kids and school going children with Obesity. It is usually due to parent's excessive passiveness, affection, overspending on food and excessive consumption of junk food which leads to Obesity in children. As kids and school going children are difficult to comprehend regarding positive and negative impact of Obesity on their health, it becomes the sole responsibility and dependency on the parents to initiate, monitor, control and accelerate the weight loss program from commencement till completion[21]. Grown up children with time, get accustom to the daily dietary and activity schedule but still parents need to put their active participation on a regular basis.

11. Incorporating stretching and strengthening exercises.

Physical therapists recommend regular stretching followed by strengthening exercises[17]. Stretching exercises could be done on the bed, floor and mat, while strengthening exercises are easily performed in a gym. Any regular gym with only basic equipments is also enough, provided the individual is greatly focused and determined to lose weight. Stretching of Pectoralis, Latissmus Dorsi, Rhomboids, Biceps, Triceps, Back Extensors, Rectus Abdominus, External Oblique, Quadriceps, Hamstrings and Gastronemius should be focused without failure. In addition a 'roller' can be prescribed to develop core strength of back and abdominal muscles working in combination with each other. As using a roller is slightly difficult in the initial stages, with regular use an individual can easily expertise.

12. Convincing towards Pet Therapy.

In addition to the about treatment strategies, the author likes to advocate 'Pet Therapy' wherein, if one has a Pet, the human will need to take them for walk and play. When making them perform these activities, it provides additional calorie burn for their humans which speed up the expectancy of results when working on a weight loss program[22]. Pets help human to maintain a discipline schedule of waking up and returning back to home early, preparing food for them. All these activities

help to augment the physical activity altitude, mental attentiveness alongside with fitness[23].

Findings

Management of Obesity is a Multi-disciplinary team work wherein professionals from different domains of healthcare contribute towards weight reduction and hence improving the overall quality of life of an Obese individual.

Conclusion

Physical therapy interventions contribute markedly in weight reduction for obese individuals.

Conflict of Interest: NIL

Source of Funding: NIL

Ethical Clearance: Not applicable

References

1. Bhardwaj PR, Bhardwaj AK. Therapeutic Applications of Yoga for Weight Reduction in Obese Population: An Evidence Based Overview. Online Journal of Multidisciplinary Research.2015; 1(1):1-5.
2. Jacob JJ, Isaac R. Behavioural therapy for management of obesity. Indian Journal Endocrinology Metabolism.2012; 16(1):28-32.
3. Gupta R, Gupta VP, Sarna M, Bhatnagar S, Thanvi J, Sharma V et al. Prevalence of coronary heart disease and risk factors in an urban Indian population: Jaipur Heart Watch-2. Indian Hear Journal.2002; 54:59-66.
4. Castelnuovo G, Pietrabissa G, Manzoni GM, Cattivelli R, Rossi A et al. Cognitive behavioural therapy to aid weight loss in obese patients: current perspectives. Psychol Res Behav Manag.2017; 10:165-173.
5. Chahal A, Chaudhuri P, Malhotra N, Qasheesh M, Shaphe A, Beg RA, Shah MN. Practise of therapeutic exercise, physical therapy, modalities and Pet therapy in negotiating with depression in adolescents, adults and elderly population: A narrative review. Bioscience Biotechnology Research Communications. 2019; 12(2):251-257.
6. Chahal A, Malhotra N. Screening in healthy individuals for risk of falls by employing various tools: A clinical study. Bioscience Biotechnology Research Communication. 2018; 11(2):224-230.
7. Chahal A, Multani NK, Rao HK. Impact of therapeutic Interventions in Patients of Osteoporosis. Indian Journal of Physiotherapy and Occupational Therapy-An International Journal. 2016; 10(2):61-65.
8. Chaudhuri P, Kiba NZ. Effectiveness of balance training program in improving the functional mobility and risk of fall in obese and osteoporotic patients. Bioscience Biotechnology Research Communication. 2019; 12(2): 491-495.
9. Malhotra N, Chahal A. The effectiveness of pelvic floor exercises on symptoms in females with stress urinary incontinence. Bioscience Biotechnology Research Communication. 2018; 11(4): 681-686.
10. Alhakami AM, Davis S, Qasheesh M, Shaphe A, Chahal A. Effect of McKenzie and stabilization exercises in reducing pain intensity and functional disability in individuals with nonspecific chronic low back pain: a systematic review. Journal of Physical Therapy Science. 2019; 3(7):590-597.
11. Malhotra N, Chahal A. Effect of pelvic floor exercise on non-specific lower back pain in post-partum women. Bioscience Biotechnology Research Communications. 2018; 11(3):469-475
12. Anwer S, Ahmed H, Shaphe MA, Iqbal A, Khan AR. Effect of Trunk Stabilization using a Gym Ball with or without Electromyography- Biofeedback in Patients with Chronic Low Back Pain: An Experimental Study. Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, Georg Thieme Verlag KG Stuttgart. 2016; 26(2):79-83.
13. Ahmed H, Iqbal A, Shaphe MA. Comparison of Trunk Stabilization Exercises Using a gym Ball and Conventional Back Care Exercise for Patients with Chronic Lower Back Pain. Middle East Journal of Rehabilitation and Health. 2016; 3(2):e37493.
14. Chahal A, Qasheesh M, Shalaby AS, Shaphe A, Hany M, Beg RA, Chaudhuri P, Malhotra N, Kirmani J. A cumulative physiotherapy education program assessment in Jazan University: Need for a healthy society in Saudi Arabia. A Retrospective study. Bioscience Biotechnology Research Communication. 2019; 12(2):317-323
15. Guare JC, Wing RR, Marcus MD, Epstein LH, Burton LR, Gooding WE. Analysis of changes in eating behaviour and weight loss in type II diabetic patients. Which behaviours to change. Diabetes Care.1989; 12:500-12.

16. Pedersen SD, Kang J, Kline GA. Portion control plate for weight loss in patients with type 2 diabetes mellitus: a controlled clinical trial. Arch Intern Med.2007; 300:2631-7.
17. Wing RR, Phelan S. Long-term weight loss Maintaince. American Journal Clinical Nutrition.2005; 82:S222-5.
18. Avenell A, Broom J, Brown TJ, Poobalan A, Aucott L. Systematic review of the long term effects and economic consequences of treatments for obesity and implications for health improvement. Health Technol Assess.2004; 8(21): iii-iv,1-182.
19. Ditschuneit HH, Flechtner MM. Value of structured meals for weight management: risk factors and long-term weight Maintaince. Obes Res.2001; 9(4):284S-9S.
20. Hannum SM, Carson L, Evans EM, Canene KA, Petr EL, Bui et al. Use or portion-controlled entrees enhances weight loss in women. Obes Res.2004; 12:538-46.
21. Stewart L, Reilly JJ, Hughes AR. Evidence based behavioural treatment of obesity in children and adolescents. Child Adolesc Psychiatric Clin N Am.2008; 18:189-198.
22. Beetz A, Uvnas-Moberg K, Julius H, Kotrschal K. Psychological and Psychophysiological Effects of Human-Animal Interactions: The Possible Role of Oxytocin. Frontiers in Psychology.2012; 3:Art.234:1-15.
23. Gee NR, Sherlock TR, Bennett EA, Harris SL. Pre schooler's adherence to instruction as a function of presence of a dog and motor skill task. Anthrozos.2001; 22:267-276.

Prioritising Patient's Safety in Hospital, Home and Outdoor Premises by Minimising Architectural Barriers: A Physical Therapist Perspective

Aksh Chahal[1], Narinder Kaur Multani[2], Harbir Kaur Rao[3]

[1]Professor, MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India, [2]Professor, Department of Physiotherapy, Punjabi University, Patiala, Punjab, India, [3]Professor, Department of General Medicine, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India, Punjabi University, Patiala, Punjab, India

Abstract

Physical therapy is a branch of science which treats patients by means of physical agents to reduce their sufferings from impairments and disabilities. It processes cost efficient mode of treatments which help to reduce the unwarranted burden on patient's personal economy to a vast extent. Hence, it is improvised to improve the overall quality of life. Physical therapy is been in existence since World War II. Over the decades, extensive research led to advancement in assessment and therapeutic intervention to take Physical therapy to its current stature. In this article, the author would like to concentrate on a single parameter which should significantly be given prior most importance while assessing and rehabilitating a patient. These are addressed as "Safety measures". Safety concern for patient from the moment of stepping in for consultation to return to his personal premises should be prioritised as they play a vital role in developing positive mental setup which improves psychological wellbeing leading to early disbursement of disability.

***Keywords**: Safety, Hospital, Rehabilitation, Home, Therapist*

Introduction

Physical therapy is a branch of science which treats patients by means of physical agents to reduce their sufferings from impairments and disabilities. It processes cost efficient mode of treatments which help to reduce the unwarranted burden on patient's personal economy to a vast extent[1]. Hence, it is improvised to improve the overall quality of life. Physical therapy is been in existence since World War II. Over the decades, extensive research led to advancement in assessment and therapeutic intervention to take Physical therapy to its current stature. Physical therapy imparts treatment strategies with varying time period. There can exist a sequential comeback of patient for either days/weeks/ month or years to come depending on the disability. While treating a patient, a therapist mainly works in domains of assessment and rehabilitation of the patient. Both these domains when worked in combination with good communication skills yield presidential results in patient's recovery[2-11]. In this article, the author would like to concentrate on a single parameter which should significantly be given prior most importance while assessing and rehabilitating a patient. These are addressed as "Safety measures". Safety concerns for patient suffering from stroke[12], Alzheimer's diseases[13], Dementia[14,15],Cancer[16,17,18,19], Depression[20], Osteoporosis[21,22,23], Urinary incontinence,[24] Chronic low back pains[25,26,27,28] etc from the moment of stepping in for consultation to return to his personal premises is prioritised by a Physical Therapist as they play a vital role in developing positive mental setup which improves psychological wellbeing leading to early disbursement of disability. For a healthy individual, usually safety is of minimal concern, but for any patient suffering with

Corresponding Author:
Aksh Chahal
Professor, MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India
drakshchahal@gmail.com

mental or physical impairment and disabilities, it is the highest point of consideration. In Physical therapy this component is tackled in a professional way for the betterment of the patient. With time new strategies have regularly been put into force in improving safety measures. From a Physical therapist point of view these concern towards patient safety in different settings shall be discussed under the following headings:

1. Safety measures in healthcare settings.

2. Safety measures at home.

3. Safety measures during outdoor travel and entertainment.

1. Safety measures at healthcare settings (Clinic, Nursing home, Old Age Homes and Hospital etc):

1. The outpatient department should either be in basement or on the ground floor to keep travel distance to minimalist for the patient.

2. Floor should be of non-slippery nature to prevent predisposing a fall.

3. The entry and exit gateway should possess a ramp for a possible and easy movement of partial and non-ambulatory patients.

4. Handrails should be fixed in walls at the entry, exit and walk areas to provide for accelerating walking with confidence. The same handrails can be used to provide immediate support to maintain balance and prevent fall during rehabilitation.

5. Patient treating areas should be embossed with sufficient light for enabling patient's concentration on therapist commands during treatment sessions.

6. Furniture endings should be blunt or rounded to prevent incidence of physical injuries while assessing or training patient.

7. Overcrowding of furniture should be avoided in order to create ample open area for the patient and therapist to walk around without any hurdles.

8. The walls should be painted with soothing colours, as light colours help the patient to relax and calm during rehabilitation phase of treatment.

9. If possible, a height adjustable couch should be used which can be adjusted according to individual patient's height which prevent sudden or jerky moments while getting in and out of the couch.

10. If a non-adjustable couch is used in a setup, a set of stairs should be placed nearest to the couch used for easy climbing and descending by the patient.

2. Safety measures at home:

1. A patient's personal area should be adjusted near to entrance of the house for easy entry and exit thus, preventing any unwanted physical and mental discomfort to the patient.

2. Matt finished flooring should be encouraged in room to prevent loss of balance during moving in and out of bed for basic activities.

3. Room and pavement area should be well lighted with either white or yellow coloured lights. If possible Red, blue and green colours lights should be avoided.

4. Normally, large door handles and locks should be embossed on for easy opening and locking of doors.

5. The height of the bed should be adjusted according to the patient's height which accelerates easy getting in and moving out of the bed.

6. Toilet facility should be in closest proximity for easy and fast go and back.

7. Almirah, cupboards, side table and any other supportive furniture should be placed in extreme corners of the room to create safe walking area.

8. Rough flooring should be used in toilet and bathrooms to minimise falls.

9. Switch board with switches for light, fan etc should be installed to the nearest point around the bed of the patient for preventing unnecessary travel in the room for the cause.

10. A bell should always be placed near the patient which can be used in case of any emergency to call the family members.

3. Safety measures while outdoor entertainment and travel:

1. Whenever planning an outdoor travel, neither too tight nor loose clothing should be worn. This is due to the fact that tight clothing reduces the overall mobility and loose clothing predisposes the patient to loss of balance and lead to fall.

2. Flat or nearly flat heeled footwear should be used while walking outdoors to overcome any unusual or unseen obstacle which can disrupt then patient's balance.

3. Any required assistive device should always be carried without fail. This is attributed to the fact that if a patient encounters a new walking surface which they have not been accustomed of, might lead to the patient getting unstable and loosing balance. This can predispose him to fall.

4. An adult member should accompany the patient to provide basic or emergency help in the shortest interval of time.

5. While travelling in car, patient should be offered seat closest to door for easy accessibility and exit from vehicle.

6. If possible, patient should be entertained in less crowded areas as firstly, over crowdedness might make the patient uncomfortable psychologically and secondly, a physical push or pull from unwanted external sources might engrave the patient to lose balance and ultimately fall.

7. Whenever travelling, a healthy conversation between patient and accompany should be encouraged to give positive feeling of wellbeing.

8. When travelling via aircraft, seats near the aircraft doors should be preferred to accelerate easy move in and out with minimal energy expenditure and risk.

9. When walking outdoors, patient should be taught to look for obstacles in their way. On noticing of inability to cross the obstacle, accompany should be informed as any miscalculation in crossing over the obstacle might prove to be dangerous for the patient.

10. Certain physiological changes occurring inside the body can be seen as distinguishable facial expressions. These expressions should be taken care of by family members/friends/ peer group when entertaining the patient in outdoor facilities as occasionally patient's don't intend to interrupt the joy of their accompanies.

Findings

While training a patient in any setup, safety from all physical and architectural barriers should be prioritised. Reduction of these barriers to the minimalist boosts patient's confidence and reduces incidence for loss of balance predisposing the patient towards fall. In addition, identification of obstacles in outdoor settings and basic modifications in home can be of great value for patient in early recovery and improving overall quality of life.

Conclusion: Physical therapist should encourage modifications at home and while outdoor engagements by the patient or their family members. These modifications enable the patient to make easy in and out movements without unknown hurdles, hence reducing incidence of loss of balance which is the biggest predisposing factor for falls in any age group.

Conflict of Interest: NIL

Source of Funding: NIL

Ethical Clearance: Not applicable

Reference

24. Chahal A, Qasheesh M, Shalaby AS, Shaphe A, Hany M, Beg RA, Chaudhuri P, Malhotra N, Kirmani J. A cumulative physiotherapy education program assessment in Jazan University: Need for a healthy society in Saudi Arabia. A Retrospective study. Bioscience Biotechnology Research Communication. 2019; 12(2):
25. Lakke S, Foijer M, Dehner L, Krijnen W, Hobbelen H. The added value of therapist communication on the effect of physical therapy treatment in older adults; a systematic review and meta-analysis. Patient Education Counselling. 2019; 102(2):253-265.
26. Gutheil IA, Heyman JC. Communication between older people and their health care agents: Results of an intervention. Health & Social Work. 2005; 30(2):107-116.
27. Reynolds F. Communication and clinical effectiveness in Rehabilitation. Physical therapy. 2006; 86(3): 460.
28. Klein D, Nagji A. Assessment of communication skills in family medicine. Canadian Family Physician. 2015; 61(9):412-416.
29. Roberts LC, Whittle CT, Cleland J, Wald M. Measuring verbal communication in initial physical therapy encounters: Physical therapy. 2013; 93(4)479-491.
30. Schoeb V, Staffoni L, Keel S. Communication

skills in Physiotherapy Practice: how to integrate research evidence into e-learning teaching tools. Physiotherapy. 2015; 101: e1349-e1350.

31. Roberts L, Bucksey SJ. Communicating with Patients: What happens in Practise. Physical therapy. 2007; 87(5): 586-594.
32. Hall AM Ferreira PH, Maher CG, Latimer J, Ferreira ML. The influence of the therapist-patient relationship on treatment outcome in physical rehabilitation: A systematic review. 2010; 90181:1099-1110.
33. Amoudi M, Anabtawi R, Bzoor A, Keelani S, Hassan WA. The effectiveness of Positive Communication Skills in Reducing Pain during Physiotherapy Session: A quantitative result from Questionnaire surveys of Palestinian Orthopaedic Patients. Universal Journal of Public Health. 2017; 5(1): 17-24.
34. Parry RH. Communication during goal setting in physiotherapy treatment sessions. Clinical Rehabilitation. 2004; 18(6):668-682.
35. Tyson S, Turner G. Discharge and follow-up for people with stroke: what happens and why. Clin Rehab. 2000; 14: 381-92.
36. Babic S, Drasinac I, Muftic M, Smajovic M. Importance of communication of physiotherapist working with patients with Alzheimer disease. South Eastern Europe Health Science Journal. 2013; 3(2):135-141.
37. Fjellman-Wiklund A, Nordin E, Skelton DA, Lundin-Olsson L. Reach the person behind the Dementia-Physical Therapist Reflections and strategies when composing Physical Training. PLoS ONE 112:e0166686.
38. Martyr A, Nelis SM, Quinn C, Lamont RA et al. Living well with dementia: a systematic review and correlational meta-analysis off factors associated with quality of life, well-being and life satisfaction in people with dementia. 2018; 48(13):2130-2139.
39. Moore PM, Rivera Mercado S, Grez Artigues M, Lawrie TA. Communication skills training for healthcare professionals working with people who have cancer. Cochrane Database Syst Rev. 2013 Mar 28; 3: CD 003751.
40. Finset A, Heyn L, Ruland C. Patterns in clinicians' responses to patient emotion in cancer care. Patient Education and Counselling. 2013; 93(1):80-85.
41. Fellowes D, Wilkinson S, Moore P. Communication skills training for healthcare professionals working with cancer patients, their families and/or carers. Cochrane Database Syst Rev. 2004; 2: CD003751.
42. Uitterhoeve RJ, Bensing JM, Grol RP, Demulder PHM, Van AT. The effect of communication skills training on patient outcomes in cancer care: a systematic review of the literature. European Journal of Cancer Care. 2010; 12:442-457.
43. Chahal A, Chaudhuri P, Malhotra N, Qasheesh M, Shaphe A, Beg RA, Shah MN. Practise of therapeutic exercise, physical therapy, modalities and Pet therapy in negotiating with depression in adolescents, adults and elderly population: A narrative review. Bioscience Biotechnology Research Communications. 2019; 12(2):384-390.
44. Chahal A, Malhotra N. Screening in healthy individuals for risk of falls by employing various tools: A clinical study. Bioscience Biotechnology Research Communication. 2018; 11(2):224-230.
45. Chahal A, Multani NK, Rao HK. Impact of therapeutic Interventions in Patients of Osteoporosis. Indian Journal of Physiotherapy and Occupational Therapy-An International Journal. 2016; 10(2):61-65.
46. Chaudhuri P, Kiba NZ. Effectiveness of balance training program in improving the functional mobility and risk of fall in obese and osteoporotic patients. Bioscience Biotechnology Research Communication. 2019; 12(2): 449-453.
47. Malhotra N, Chahal A. The effectiveness of pelvic floor exercises on symptoms in females with stress urinary incontinence. Bioscience Biotechnology Research Communication. 2018; 11(4): 681-686.
48. Alhakami AM, Davis S, Qasheesh M, Shaphe A, Chahal A. Effect of McKenzie and stabilization exercises in reducing pain intensity and functional disability in individuals with nonspecific chronic low back pain: a systematic review. Journal of Physical Therapy Science. 2019; 3(7):590-597.
49. Malhotra N, Chahal A. Effect of pelvic floor exercise on non-specific lower back pain in post-partum women. Bioscience Biotechnology Research Communications. 2018; 11(3):469-475.
50. Anwer S, Ahmed H, Shaphe MA, Iqbal A, Khan AR. Effect of Trunk Stabilization using a Gym Ball with or without Electromyography- Biofeedback

in Patients with Chronic Low Back Pain: An Experimental Study. Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, Georg Thieme Verlag KG Stuttgart. 2016; 26(2):79-83.

51. Ahmed H, Iqbal A, Shaphe MA. Comparison of Trunk Stabilization Exercises Using a gym Ball and Conventional Back Care Exercise for Patients with Chronic Lower Back Pain. Middle East Journal of Rehabilitation and Health. 2016; 3(2):e37493.

Bridging the Gap between Patient and Physical Therapist: Emphasis on Good Communication Skills in Assessment and Rehabilitation to Improve the Overall Quality of Life

Aksh Chahal[1], Harbir Kaur Rao[2], Narinder Kaur Multani[3]

[1]Professor, MM Institute of Physiotherapy and Rehabilitation, [2]Professor, Department of General Medicine, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India, [3]Professor, Department of Physiotherapy, Punjabi University, Patiala, Punjab, India

Abstract

A mode of interaction between two individuals is "Communication", while the ability to perform an act with expertise is defined as "Skill". Thus, communication when used with skills in healthcare practise to render positive results towards patient's wellbeing, are categorised as "Good communication skills". These skills form the basis for collecting vast and relevant information from the patient which is later put to tabulation and finally reaching the goal of implementation of evident therapeutic interventions. Good communication skills executed by Physical therapist help in developing effective treatment protocols followed with their timely modifications. The moment a patient steps in to consult a therapist, the first visual contact between the therapist and patient should impart confidence to the patient which ease to develop a positive attitude towards healthy living. In the last few decades, extensive research have been done on aspects of developing, implementation and analysing productive communication skills in different countries. With research focussing on different parameters as basis for good communication skills, the author in the present article would like to brush up with the existing and incorporate new skills to be used for effective communication between patients of any age groups and therapist.

Keywords: *Skills, Communication, Patient, Doctor, Therapist.*

Introduction

A mode of interaction between two individuals is termed "Communication", while the ability to perform an act with expertise is defined as "Skill". Thus, communication when used with skills in healthcare profession to render positive results towards patient's wellbeing is summed as "Good communication skills". These communication skills form the basis for collecting vast information from the patient which are put to tabulation and finally reach the goal of implementation of therapeutic treatment[1], in addition patient adherence along with raised satisfaction level is also elevated. In rehabilitation and health science, good communication skills executed by Physical therapist[2] help in developing effective treatment strategies followed with its execution[3, 4]. As communication between a health care professional and patient influence the after effect of treatment following consultation[5], a therapist should develop and implement imperative communication skills as fundamental components in their assessment protocol and rehabilitation[6].The moment a patient steps in for consultation, the first visual contact should impart positive vibes to the patient towards improvement of his overall health and thus, develop positive attitude towards a healthy life[7]. Simultaneously, a healthy and interactive verbal communication between the two will enhance the already developed confidence to another level of productive expectations which is created through the therapist's clear, audible, bold and encouraging verbal commands[8]. Over the last few decades, vast research

Corresponding author:
Aksh Chahal
Professor, MM Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be University) Ambala, Haryana, India
E-mail: drakshchahal@gmail.com

have been done on various aspects like developing, implementation and analysing productive skills in communication via research performed in different countries. With these researches focussing on different parameters towards good communication, the author in the present article would like to discuss, less focussed strategies till date and elaborate on efficient and new communication skills in Physical therapy.

Skills for good communication:

1. Well mannerism
2. Clear speech
3. Gentle voice
4. Developing and maintaining positive attitude
5. Concise commands
6. Facial expressiveness
7. Confidence
8. Active listener
9. Maintaining eye contact
10. Encouraging orientation of self-posture and body language
11. Open minded
12. Respect to individual's privacy
13. Communication in patient's layman language
14. Able to create sense of humour

Significance of good communication skills by Physical therapist:

1. Therapist deal with infants and children.

A therapist should be polite in words, soft in handling and use easy understandable commands while treating infants and children[9, 10]. Individuals in this age group firstly, are unaware of health issues he/she are suffering. Secondly, children might develop a negative mind set and low morale due to inefficiency in comparison to peer group. So, a therapist should take great care in dealing with infants and children.

2. Therapist treating adolescent and youths.

Dealing with this age group requires therapist to be patient, soft in speech, active listener and communicative in patient's layman language. Therapist assessment with effective communication should go to the real depth of the problem being faced by the adolescent/youth. In one's life, adolescent stage is a critical stage as ideology and attitude developed during this stage governs thought patterns for rest of life. Adolescents and youth suffering from health issues make experience frustration and irritation due to incompetency with peer group which easily takes them on the path of depression[12]. While handling, patients of this age group a continuous eye contact[7] during conversation and treatment should be maintained to morally boost the patient's confidence. In addition, when handling these patients, extra comfort zone should be created to make them speak from within themselves, thus enabling them to develop positive attitude towards life and reduce the negative impact on psychological and physical health[11].

3. Therapist imparts health in middle aged and elderly population.

For a therapist to deal with this age group is a great challenge. Risk of falls and Osteoporosis[13, 14, 15] are commonly seen and actively treated by various therapeutic interventions. While commencing to treat patients of this age group, therapist must already be inculcated with well mannerism[1], polite in commandment, slow in action and respectful as elderly not only suffer from physical ailments, but they are greatly embarrassed psychologically, personally and face family and social difficulties. A regular eye contact[7] with elderly patients while communicating and treatment helps to develop faith in therapist which enhances cooperation from the patient while delivering in therapeutic interventions. As, in some cases where elderly population suffer from irreversible and progressively disorders like Alzheimer's diseases[16], Dementia[17, 18] and Cancer[19, 20, 21, 22] etc. Along with physical therapy treatment, special concern is paid towards treating urinary incontinence pharmacologically and therapeutically[23] with the aim to develop positive attitude towards health and life and reduce the negative psychological impressions which continuously confront in brain of these patients[11, 24, 25].

4. Therapist deal with conditions which are progressive in nature.

On knowing that one self's is suffering from any disease which is progressive and has no or residual impactful remedial success in nature, it is quite reasonable

for a individual to create clouds of demoralised, negative attitude towards all domains of life (i.e. personal, family, workplace and peer group).So, while dealing with patients of these stature, a therapist should be soft and polite in communication, open minded and more focus put on initiating healthy conversations where the patient express their views, lacking, regrets etc. which impart information to the therapist to bring decline of negative thoughts. Based on the patient's conversation, immediate and future implementation along with upgrading of rehabilitation treatments is focussed[2].

5. Physical therapist work in reducing impact of irreversible disorders.

Certain orthopaedic and neurological disorders are irreversible in nature. These disorders engrave the sufferer's mind to a vast extent. While dealing with such patients, a therapist should make use of effective skills like active listening and open mindedness etc which in return will initiate developing confidence and ultimately, a positive attitude towards life. At times when a patient is depressed or low in mood, a humorous trick or joke is incorporated to reduce impact of negative psychological thoughts. At any moment of time, different aspects of patient wellbeing are being handled by a therapist, so it will be wise to say that a therapist plays multi-dimensional role in improving the overall well-being of the patient.

6. Physical therapist has longer duration of contact with patient (days/weeks/months/years).

Therapist duration of contact with his/her patient might last from a few hours to years, such as in stroke[26]. Over the course of continued treatment, there develops a strong mental and emotional bonding between the two. This bonding is reflected in terms of discussing personal, family and social issues from the patient with the therapist. Patient suffering with short term impairment have different mind-set from patient suffering with long term disability. While treating patient with short term ailments the therapist should poses skills of active listening, direct questions, loud and clear transfer of command. Firstly, these patient should be are addressed towards maintenance of individuality and dignity. Gentle and soft speech to understand their mental turmoil and motivating the patient and reducing stress level by creating a joke/joyful humour as regular treatment should be performed at regular intervals as over the years patient tend to develop lack of mood and no interest in future life[11].Facial expressions via a smile, head nodding and frowning of eyebrows from the therapist during therapy session are helpful in bringing short and long term improvements[27].

7. Therapist continuously motivate patient for active participation in all components of a society.

As the therapist perform its duties by motivating the patient in all stage of treatment (early, middle or late), in addition to the previously discussed, developing mental confidence and creating positive body language are of prior most importance. Communicating with the patient in their language enables them to be more expressive, based on which a therapist will modulate techniques to develop optimistic attitude towards present and future life.

8. Therapist makes efforts in maintaining compliance during therapeutic interventions.

To achieve this goal, a therapist should be innovative to create ideas and techniques of assessment and treating patient. New concepts and therapeutic interventions help in keeping the patient's interest towards treatment intact which help to uphold the compliance from the patient's. Along with regular implementation of new concepts, a enthusiastic conversation with patient's comfortable language keeps the patient actively indulged in therapeutic sessions. To boost patient's confidence, a eye to eye contact[7] throughout the session is made along with focus on sitting and standing posture, are not overlooked as lack of interest and disinterest in life possibly develops a stooped posture which could be easily rectified manually if temporary in nature but, once permanent it leads to structural deformities of the spine which in return cause acute and latter chronic back pains which will have to be treated by different therapeutic exercises. [28, 29, 30, 31, 32]

9. Therapist enumerates prevention and precaution to patients.

It is important role of therapist to enumerate all possible prevention and precautions mandate for a patient safety and security. These components are usually discussed in the concluding phase of treatment session. During the beginning and middle phase of treatment session the patient is usually energetic and concentred towards the session. Secondly, conversation on prevention and precautions might hint the patient about conclusion of ongoing session. This might initiate

low interest in exercises being performed. Finally, while giving instructions, the therapist should be concise, clear and always maintain eye contact as it imparts confidence which ignites a positive feel in elimination of their current condition[7].

10. Therapist play active role in educating patient's family/relative/friends.

The role of therapist is not confined only till treating the patient. It also includes educating the patient's family members and relatives[11, 33] regarding the cause, progression and impact of the ongoing condition on patient's physiological, mental and physical status. In addition, prevention and precautions to be prioritised at home are also explained to the concerned parties. If possible, friends and peer group also should be rolled in for active participation for patient's faster psychological recovery which in return facilitate the physical revival and reduce the brunt of negative impressions from the brain.

Findings

A collective set of good communication skills are required in Physical therapist when working with patient of different age groups, patients with progressive/non progressive and reversible/non reversible conditions. In a nut shell, a Physical therapist should be well mannered, gentle speaking, confidant and active listener who always maintains an eye contact with his patient throughout session, encourage healthy conversation, respect to individuality and privacy.

Conclusion

Array of good communication skills when used by Physical therapist in assessing and rehabilitation, yield multi-dimensional benefits in the form of physical, physiological, and psychological wellbeing, hence improving the overall quality of life of their patient.

Conflict of Interest: NIL

Source of Funding: NIL

Ethical Clearance: Not applicable

References

52. Kron RW, Die DV, Webb G, Pill J, Elder C, Namara TMc, Manias E, McColl G. Perspectives from physiotherapy supervisors on student-patient communication. International Journal of Medical Research. 2012; 3:166-174.
53. Reynolds F. Communication and clinical effectiveness in Rehabilitation. Physical therapy. 2006; 86(3): 460.
54. Tyson S, Turner G. Discharge and follow-up for people with stroke: what happens and why. Clin Rehab. 2000; 14: 381-92.
55. Klein D, Nagji A. Assessment of communication skills in family medicine. Canadian Family Physician. 2015; 61(9):412-416.
56. Roberts LC, Whittle CT, Cleland J, Wald M. Measuring verbal communication in initial physical therapy encounters: Physical therapy. 2013; 93(4)479-491.
57. Schoeb V, Staffoni L, Keel S. Communication skills in Physiotherapy Practice: how to integrate research evidence into e-learning teaching tools. Physiotherapy. 2015; 101: e1349-e1350.
58. Roberts L, Bucksey SJ. Communicating with Patients: What happens in Practise. Physical therapy. 2007; 87(5): 586-594.
59. Hall AM, Ferreira PH, Maher CG, Latimer J, Ferreira ML. The influence of the therapist-patient relationship on treatment outcome in physical rehabilitation: A systematic review. 2010; 90181:1099-1110.
60. Meyer EC, Ritholz MD, Burns JP et al. Improving the quality of end-of-life case in the pediatric intensive care unit: Parent's priorities and recommendations. Pediatrics. 2006; 117:649-657.
61. Contro N, Larson J, Scofield S et al. Family perspectives on the quality of pediatric palliative care. Arch Pediatr Adolesc Med. 2002; 15(6):14-19.
62. Amoudi M, Anabtawi R, Bzoor A, Keelani S, Hassan WA. The effectiveness of Positive Communication Skills in Reducing Pain during Physiotherapy Session: A quantitative result from Questionnaire surveys of Palestinian Orthopaedic Patients. Universal Journal of Public Health. 2017; 5(1): 17-24.
63. Chahal A, Chaudhuri P, Malhotra N, Qasheesh M, Shaphe A, Beg RA, Shah MN. Practise of therapeutic exercise, physical therapy, modalities and Pet therapy in negotiating with depression in adolescents, adults and elderly population: A narrative review. Bioscience Biotechnology Research Communications. 2019; 12(2):384-390.

64. Chahal A, Malhotra N. Screeningin healthy individuals for risk of fallsby employing various tools: A clinicalstudy. Bioscience Biotechnology Research Communication. 2018; 11(2):224-230.

65. Chahal A, Multani NK, Rao HK. Impact of therapeutic Interventions in Patients of Osteoporosis. Indian Journal of Physiotherapy and Occupational Therapy-An International Journal. 2016; 10(2):61-65.

66. Chaudhuri P, Kiba NZ. Effectiveness of balance training program in improving the functional mobility and risk of fall in obese and osteoporotic patients. Bioscience Biotechnology Research Communication. 2019; 12(2): 449-453.

67. Babic S, Drasinac I, Muftic M, Smajovic M. Importance of communication of physiotherapist working with patients with Alzheimer disease. South Eastern Europe Health Science Journal. 2013; 3(2):135-141.

68. Fjellman-Wiklund A, Nordin E, Skelton DA, Lundin-Olsson L. Reach the person behind the Dementia-Physical Therapist Reflections and strategies when composing Physical Training. PLoS ONE 112:e0166686.

69. Martyr A, Nelis SM, Quinn C, Lamont RA et al. Living well with dementia: a systematic review and correlational meta-analysis off factors associated with quality of life, well-being and life satisfaction in people with dementia. 2018; 48(13):2130-2139.

70. Moore PM, Rivera Mercado S, Grez Artigues M, Lawrie TA. Communication skills training for healthcare professionals working with people who have cancer. Cochrane Database Syst Rev. 2013 Mar 28; 3: CD 003751.

71. Finset A, Heyn L, Ruland C. Patterns in clinicians'responses to patient emotion in cancer care. Patient Education and Counselling. 2013; 93(1):80-85.

72. Fellowes D, Wilkinson S, Moore P. Communication skills training for healthcare professionals working with cancer patients, their families and/or carers. Cochrane Database Syst Rev. 2004; 2: CD003751.

73. Uitterhoeve RJ, Bensing JM, Grol RP, Demulder PHM, Van AT. The effect of communication skills training on patient outcomes in cancer care: a systematic review of the literature. European Journal of Cancer Care. 2010; 12:442-457.

74. Malhotra N, Chahal A. The effectiveness of pelvic floor exercises on symptoms in females with stress urinary incontinence. Bioscience Biotechnology Research Communication. 2018; 11(4): 681-686.

75. Lakke S, Foijer M, Dehner L, Krijnen W, Hobbelen H. The added value of therapist communication on the effect of physical therapy treatment in older adults; a systematic review and meta-analysis. Patient Education Counselling. 2019;102(2):253-265.

76. Gutheil IA, Heyman JC. Communication between older people and their health care agents: Results of an intervention. Health & Social Work. 2005; 30(2):107-116.

77. Parry RH. Communication during goal setting in physiotherapy treatment sessions. Clinical Rehabilitation. 2004; 18(6):668-682.

78. Ambady N, Koo J, Rosenthal R, Winograd CH. Physical Therapists' Nonverbal Communication Predicts Geriatric Patients' Health Outcomes. Psychology and Aging. 2002; 17(3):443-452.

79. Alhakami AM, Davis S, Qasheesh M, Shaphe A, Chahal A. Effect of McKenzie and stabilization exercises in reducing pain intensity and functional disability in individuals with nonspecific chronic low back pain: a systematic review. Journal of Physical Therapy Science. 2019; 3(7):590-597.

80. Malhotra N, Chahal A. Effect of pelvic floor exercise on non-specific lower back pain in post-partum women. Bioscience Biotechnology Research Communications. 2018; 11(3):469-475.

81. Anwer S, Ahmed H, Shaphe MA, Iqbal A, Khan AR. Effect of Trunk Stabilization using a Gym Ball with or without Electromyography- Biofeedback in Patients with Chronic Low Back Pain: An Experimental Study. Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin, Georg Thieme Verlag KG Stuttgart. 2016; 26(2):79-83.

82. Ahmed H, Iqbal A, Shaphe MA. Comparison of Trunk Stabilization Exercises Using a gym Ball and Conventional Back Care Exercise for Patients with Chronic Lower Back Pain. Middle East Journal of Rehabilitation and Health. 2016; 3(2):e37493.

83. Amir I, Hashim A, Abu MS. Long Term Effectivenessof Ischaemic Compression TechniqueinCombination with Muscle Energy Technique on Managing Upper Trapezius

Myofascial Trigger Point Pain: An Experimental Study. Indian Journal of Physiotherapy and Occupational Therapy. 2016; 10(1):171-177.

84. Newton J, Billet S, Jolly B, Ockerby C. Lost in translation: Barriers to learning in health professional clinical education. Learning in Health and Social care. 2009; 8(4):315-327.

A Meta Analysis of Accuracy of Conventional and Digital Impressions of Implants

Anbarasu[1], Raghavendra Jayesh[2]

[1]Post Graduate Student, [2]Professor And Guide, Dept. of Prosthodontics and Crown & Bridge, Sree Balaji Dental College and Hospital, Velachery Main Road, Vgp Rajesh Nagar, Pallikaranai,Chennai,Tamil Nadu

Abstract

Application of computer-aided impression procedures are preferable to conventional impression procedures for Implant supported prosthesis. Data about the accuracy of the digital impression-making technologies in comparison to the conventional ones is scarce. This meta analysis is an attempt to decipher the preferred method of impression making of implant superstructures by analyzing data about these two impression making procedures.

Keywords: *Implants, conventional impressions, digital impressions, Implant accuracy, computer aided impression, intra oral scanner.*

Introduction

To fabricate a prosthetic framework on multiple implants, high-precision procedures are required for most of which is the impression. For almost every step in the procedure, either conventional or computer-aided approaches can be utilized.[1]

Conventional approach

A accurate impressions of tilted abutments is clinically arduous. Elastic recovery of the impression material may not withstand the strain induced during the removal of impression. There is no unanimous scientific agreement regarding which quantity and angulation of implants causes non- compensated impression material distortions, and when they must be splinted. Direct open-tray and indirect closed-tray impression are widely discussed in the literature.[2]

A systematic review reported that more studies confirm a higher impression accuracy (for four or more implants) using an open-tray impression technique than a closed-tray method (H. Lee, So, Hochstedler, &Ercoli, 2008). Polyether and polyvinylsiloxane were recommended as statistically the most accurate materials to make a implant impression (Wee, 2000).[2]

Computer-aided approach

Computer-aided approach in restorative dentistry started late 1980s advances in data acquisition, processing, and manufacturing nowadays, afford much faster and more accurate final outcomes. Intraoral scanners (IOS) available currently.[1]

Materials and Method

The Pubmed library was searched for articles, reviews and meta analysis from year 2013 to 2018 using the following search terms.

Articles that explicitly mention the variables considered for the study were obtained.

INCLUSION CRITERIA

In vitro studies, studies reporting on the accuracy of conventional impression, studies reporting on the accuracy of digital impression, experimental and control groups, Studies providing quantitative results, articles should be in English.

Exclusion Criteria

Studies without experimental and control groups, expert opinions or literature reviews, studies based on charts and questionnaire only, animal studies, studies without author response to inquiry for data clarification.

Data Extraction

Seven articles were short listed and following parameters were retrieved

- Mean linear distortion of conventional and digital impressions.
- Standard deviation (SD) of conventional and digital impressions.
- Confidence interval of conventional and digital impressions.

Meta Analysis

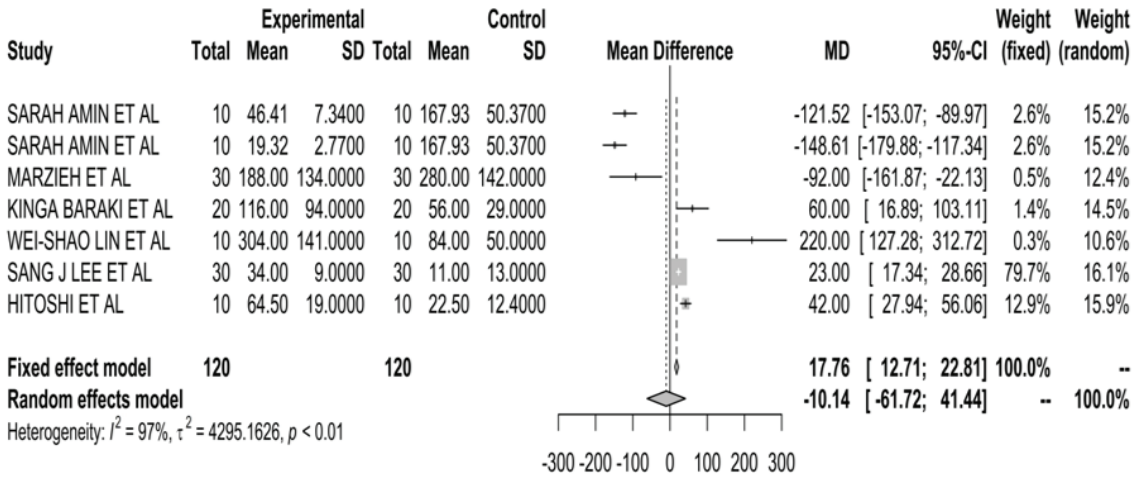
- Mean difference of the mean linear distortion was calculated for conventional impressions and digital impressions and compared using student T test at the confidence interval of 95%
- The data was presented as forest plot to aid incomparison of values

Meta analysis was done using R –3.5.1 statistical software

Data Extraction Table I

AUTHOR	IMPRESSION METHODOLOGY	IMPRESSION MATERIAL	SCANNING SYSTEM	IMPRESSION TECHNIQUE	N	MEAN	SD	CONFIDENCE INTERVAL		CONFIDENCE LEVEL	IMPLANT SYSTEM
								UPPER	LOWER		
SARAH AMIN ET AL	CONVENTIONAL	POLYETHER		SPLINTED OPEN TRAY	10	167.93	50.37	199.13	136.73	95%	STRAUMANN
	DIGITAL		CEREC OMNICAM		10	46.41	7.34	50.96	41.86	95%	STRAUMANN
	DIGITAL		3M TRUE DEFINTION		10	19.32	2.77	21.036	17.604	95%	STRAUMANN
MARZIEH ET AL	CONVENTIONAL	POLYVINYL SILOXANE		DIRECT OPEN TRAY	30	280	142	330.8	229.2	95%	NOBEL BIOCARE
	DIGITAL		TRIOS-3SHAPE		30	188	134	235.93	140.07	95%	NOBEL BIOCARE
KINGA BARAKI ET AL	CONVENTIONAL	POLYVINYL SILOXANE		DIRECT OPEN TRAY	20	56	29	68.7	43.3	95%	STRAUMANN
	DIGITAL		ITERO		20	116	94	157.18	74.82	95%	STRAUMANN
WEI-SHAO LIN ET AL	CONVENTIONAL	POLYVINYL SILOXANE		DIRECT OPEN TRAY	10	84	50	114.98	53.02	95%	STRAUMANN
	DIGITAL		ITERO		10	304	141	391.35	216.65	95%	STRAUMANN
SANG J LEE ET AL	CONVENTIONAL	POLYVINYL SILOXANE		CLOSED TRAY	30	34	9	37.22	30.78	95%	STRAUMANN
	DIGITAL		ITERO		30	11	13	15.652	6.348	95%	STRAUMANN
HITOSHI ET AL	CONVENTIONAL			DIRECT OPEN TRAY	10	22.5	12.4	31.4	13.7	95%	NOBEL BIOCARE
	DIGITAL		LAVA COS		10	64.5	19	78.1	51	95%	NOBEL BIOCARE

FOREST PLOT



FOREST PLOT - RESULTS

```
                              MD                  95%-CI %W(fi
xed) %W(random)
SARAH AMIN ET AL    -121.5200 [-153.0688;  -89.9712]
 2.6       15.2
SARAH AMIN ET AL    -148.6100 [-179.8762; -117.3438]
 2.6       15.2
MARZIEH ET AL        -92.0000 [-161.8657;  -22.1343]
 0.5       12.4
KINGA BARAKI ET AL    60.0000 [ 16.8875;  103.1125]
1.4       14.5
WEI-SHAO LIN ET AL   220.0000 [ 127.2769;  312.7231]
 0.3       10.6
SANG J LEE ET AL      23.0000 [  17.3421;   28.6579]
79.7       16.1
HITOSHI ET AL         42.0000 [  27.9379;   56.0621]
12.9       15.9

Number of studies combined: k = 7
                              MD               95%-CI     z
p-value
Fixed effect model     17.7578 [ 12.7059; 22.8097]  6.89 <
 0.0001
Random effects model -10.1403 [-61.7222; 41.4416] -0.39
 0.7000

Quantifying heterogeneity:
tau^2 = 4295.1626; H = 6.19 [5.08; 7.54]; I^2 = 97.4% [96
.1%; 98.2%]

Test of heterogeneity:
Q d.f.p-value
229.79    6 < 0.0001
Details on meta-analytical method:
- Inverse variance method
- DerSimonian-Laird estimator for tau^
```

The descriptive analysis revealed that splinted open tray impression technique has less inaccuracy than the direct non - splinted open tray technique. Of the scanning systems evaluated TRIOS 3 shape is better than the ITERO system followed by LAVA COS, CEREC OMNICAM and 3M True definition.[3] Polyether impression material is superior to polyvinylsiloxane impression material in terms of accuracy. Scan bodies from Nobel Biocare implant system result in better accuracy values compared to Straumann system.[7]

Amin et al(2016) reported that digital implant impressions were more accurate than the conventional direct splinted implant impressions. In vitro study by Papaspyridokos et al (2014) compared the accuracy of digital implant impressions using 3 shape scanner with conventional impression and showed that accuracy of digital impression was comparable to that of the conventional impression.[6]

Several recent studies by Howell et al(2013), Aliabdullah et al(2013) and Lin WS et al (2015) comparing digital vs conventional implant impressions have found a greater error using the digital approach. [5] Lin et al specifically examined the accuracy of models fabricated from conventional and iTero digital impressions and concluded that the digital pathway, with mean errors ranging from 158 to 328 μm, was significantly less accurate.[4]

Sang j lee et al (2015), ElliassonAotorp et al (2012) and Papaspyridakos et al (2016) have found equivalent accuracy between digital and analog impression techniques.[5] Abdel-Azim et al found equivalent error for full complete arch impressions when measuring the marginal fit of final prostheses fabricated using either analog technique or a complete CAD/CAM digital approach.[7] While Lee et al concluded that the accuracy of the digital method was equivalent to the conventional method when examining overall cast accuracy, they did find a statistically significant difference in vertical implant placement between the two approaches.[5] A recent study examining the accuracy of Straumann scan body with the TRIOS scanner found no difference when compared with two conventional impression approaches (papaspyridakos et al). However, the authors compared digitized analog casts to the digital impression–generated STL files and not actual fabricated casts.[6] The average 3D error for the conventional impression technique (56 μm) was found as per the study, to be within the clinically acceptable range and in agreement with previously published studies, which have reported errors ranging from 20 to 89 μm using similar measurement techniques. [5] Conversely, the digital impression technique resulted in an average 3D inter-implant error measurement of 116 μm, which was both in excess of the defined error limit of 60 μm and demonstrated a significantly greater error and variability than the conventional implant impression technique.[6]

Direct digitalization showed higher accuracy compared to the conventional impression making and indirect digitalization (Guth*et al.*, 2013).[7] Due to elastic properties of the impression materials, indirect digitization of the impression was not recommended. (DeLong *et al.*, 2001) the digitization of errors of the impressions was influenced by the shape and the interaction effect with the digitization source. (Quaas*et al.*, 2007; Rudolph *et al.*, 2007; Persson*et al.*, 2009) The digitization source with strong changes of curvature and smooth surface texture showed largest deviations due to high surface angles and light reflection from the digitization source to the object. (Persson*et al.*, 2008; Persson*et al.*, 2009)[3]

Marzieh et al (2018) concluded that digital impression has significantly less angular and linear distortion than

conventional impression. Digital impression of straight implants with internal connection was more accurate than that of the direct technique although the difference was not significant.[3]

The results of the present meta analysis and descriptive analysis show that 1. Statistically there is difference between conventional impressions and digital impressions in terms of accuracy. 2. The error for the digital impression technique was only slightly more than that of conventional impression. This may not be clinically highly significant.[2]

The accuracy values obtained from digital impressions has only a marginal difference from values of conventional impression. The results obtained are similar to the results of Hitoshi et al (2016) who stated that the results obtained in their study suggest that error of the optical impression was greater than that of conventional impression. Trends in digital dentistry are drastic, and a number of newly developed apparatuses may be provided in the near future. Further analyses must be conducted continuously. In the near future, the development of information technology should enable improvement in the accuracy of the optical impression with intraoral scanners.[5]

Scope for Further Studies

Although materials for making impression of the implants may not undergo drastic changes in composition/ techniques, considerable evolutionary enhancements in digital equipment for optical impressions have become an ongoing technical revolution. Hence, the inherent shortcomings of any developing technical system like intraoral scanners and implant systems will be overcome during this development. So, with improved equipments more studies can be done and increased data can be taken up for analysis.[7]

Conclusions

As per the results of the present meta analysis, the following conclusions can be drawn;

1. Accuracy of conventional impressions is marginally better than the accuracy of digitized impressions.

2. Splinted open tray technique resulted in lesser discrepancy than the direct open tray technique and closed tray technique.

3. Polyether yielded better impressions than polyvinylsiloxane.

4. Trios – 3shape was the best scanning system.

5. Nobel Biocare system was better than Straumann system

Conflict of Interest : Nil **SOURCE OF FUNDING :** SELF

References

1. Adell, R., Lekholm, U., Rockler, B et al. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg. 1981;10(6), 387-416.
2. Kim, Y., Oh, T. J., Misch, C. E., Wang, H. L et al. Occlusal considerations in implant therapy: clinical guidelines with biomechanical rationale. Clin Oral Implants Res.2005;16(1), 26-35.
3. KingaBasaki, HasanAlkumru, Grace De Souza et al. Accuracy of Digital vs Conventional Implant Impression Approach: A Three-Dimensional Comparative In Vitro Analysis. The International Journal of Oral & Maxillofacial Implants.2017;32(4), 792 -799.
4. Lee S. J, Gallucci, G. O et al. Digital vs. conventional implant impressions: efficiency outcomes. Clin Oral Implants Res.2013; 24(1), 111-115.
5. Priscilla Medina-Sotomayor, Agustin Pascual M, Isabel Camps A et al. Accuracy of four digital scanners according to scanning strategy in complete-arch impressions. PLoS ONE. 2018;13(9), 1-14
6. Sang J. Lee, Rebecca A. Betensky, Grace E. Gianneschi et al. Accuracy of Digital vs. Conventional Implant Impressions. Clin Oral Implants Res. 2015 June ; 26(6): 715–719.
7. Papaspyridakos, P., Gallucci, G. O., Chen, C. J et al.Digital versus conventional implant impressions for edentulous patients: accuracy outcomes. Clin Oral Implants Res. 2016 Apr;27(4):465-72.

Type of article: Review Article

An Analysis of Preparedness and The Impact of Floods in India

Ansuman Swain[1], Navya Vyas[2]

[1]BDS, MPH (3rd Semester), Prasanna School of Public Health, Manipal Academy of Higher Education, [2]BHMS, MPH, PhD (Pursuing)

Abstract

India is the most flood prone country in the world with instances of at least 15 major occurrences in the last decade. Apart from loss of lives and property, the country suffers huge economic, infrastructural as well as environmental damage on a yearly basis. In addition, several indirect and prolonged effects of floods affect the country as well. This is coupled with facilitating factors such as global warming and unplanned development in flood plains. Understanding the gravity of the situation, the government of India enacted the Disaster Management Act in 2005 subsequently forming the National Disaster Management Authority. This body has developed guidelines for flood mitigation at national, state as well as at regional levels. The country needs to develop effective flood mitigation system in order to reduce the periodic damage endured by the people and the state.

Key-words: *Flood mitigation; NDMA; Impact of floods; flood preparedness;*

Introduction

Human civilizations has been ravaged by natural disasters since time immemorial. They have been mentioned in fact and fiction alike and have shaped our history. The World Health Organization[1] has defined a natural disaster as "an act of nature of such magnitude as to create a catastrophic situation in which day-to-day patterns of life are suddenly disrupted and people are plunged into helplessness and suffering, and, as a result, need food, clothing, shelter, medical and nursing care and other necessities of life, and protection against unfavourable environmental factors and conditions." They account for the deaths of 90000 and affect about 160 million people every year[1]. According to Ritchie & Roser, like almost every other natural calamity, floods have seen an upsurge worldwide accounting for roughly 45% of all natural disasters during the decade of 2005-2014[2,3]. Floods are common around the world with India being the most flood prone country[4]. About one fifths of all global flood deaths occur in India[4]. Further, in the last decade from 1996 to 2005, the average annual flood damage in the country was 4745 crore rupees[5]. There have been at least 15 major flooding events in the last decade in the country and it is on a rising trend[6]. Floods cause great damage not only to lives, properties and infrastructure but also the healthcare system in a country. Moreover, there are risks of waterborne disease outbreaks after a flood, for instance the Cholera outbreak in the 1998 West Bengal floods[7]. Apart from the deleterious impact on health and healthcare, the country's economy, climate, agriculture and animal life takes a toll as well. Therefore, a multi-sectoral effort is required to mitigate and avert floods in India.

The country needs to scale-up efforts towards flood mitigation. This paper analyses the multi dimensional impact of floods on the country with instances from the past and emphasizes on the current flood mitigation and preparedness measures in the country. With a focus on the work of the National Disaster Management Authority (NDMA), it mentions a few global strategies envisaging the probable solutions to deal with the recurrent flood situation in the country.

The impact of floods in the Indian context

Floods have an immediate impact on lives, property, infrastructure and a long term impact like a dearth of safe

Corresponding Author:
Dr. Navya Vyas
[2]BHMS, MPH, PhD (Pursuing

drinking water, vector borne diseases, psychological ailments and an increased risk of epidemics. Likewise, the socioeconomic and environmental effects are profound as well. Damage to infrastructure, agriculture and transport sector directly and indirectly hampers the economy. Further, all these effects consequently affect the health of the affected population in the long run.

Impact on life and health

The health effects of floods are numerous. In a study done by FitzGerald, Clark, & Hou, the immediate impact of floods range from drowning, and injuries, to animal bites, allergies and worsening of existing injuries[8]. There has been a total of 105758 deaths in floods from 1953-2016 in India with highest number of deaths in Uttar Pradesh followed by Andhra Pradesh[9]. Some of the major floods to have affected the country include the Bihar flood of 1987 with 1399 deaths, Assam floods of 1998 affecting 47 lakh people, the Himalayan flash floods of 2012, the Uttarakhand flood of 2013 taking 1000 lives, and the floods in Kerala in 2019[6,10,11]. Apart from loss of lives and injuries, poisoning, impact on mental health, spread of infectious diseases, chemical & electrical contamination, carbon monoxide poisoning, disability and starvation are some of the long-term effects of floods[8]. Further, disruption of health services worsen the health system of the affected place. In addition, the lives and health of animals are adversely affected as well. The loss of infrastructure coupled with health ailments due to floods affect not only the health system but the socio-economy as well.

Socio-economic impact

In the last 65 years the country has suffered a loss of Rs 3,78,247.047 crore due to damage to property, livelihood, infrastructure and health pertaining to floods[9]. For instance, in 2015 India suffered a loss of Rs. 57,291.1 crore due to floods[9]. Further, sectors like agriculture, transport, tourism, livestock and animal husbandry endure irreplaceable damage in terms of economy as well. Damage to public property and houses due to floods in the period between 2013 and 2017 was worth Rs. 72.09 crore[9]. Furthermore, a total of 8,07,17,993 houses were destroyed on account of floods in the past 65 years[9]. What's alarming is that, the economic loss has increased over the years and has the highest figures in the last decade[9]. This increase can be partly attributed to the rapid urbanization and the relative incapability of flood management and drainage systems to cope up[9]. However, the impact of floods are not limited to health and socio-economy only.

Effect on the Environment

As much as natural events like storms, tsunamis and heavy rain exacerbate floods, the environmental aftermath is profound as well. Floods not only derange the ecology but also cause irreparable havoc to livestock and wildlife. For instance, the 1978 floods alone were responsible for the deaths of 2,39,174 cattle[9]. This not only affects sectors like agriculture and animal husbandry, but also has a long lasting economic impact on the people dependent on them. The flooding of forested areas result in innumerable loss of biodiversity, often ecologically valuable species that are difficult to get a count of. In addition, large quantities of water can affect farming habitats, often depriving farmlands of nutrients and accumulation of pollutants[12]. Apart from that, floods cause significant destruction of floodplains, vegetation and forest cover[12]. Thus, preparedness for floods is of substantial importance and requires a multi-sectoral approach to mitigate the deleterious impact of floods in India.

Analysis of preparedness against a disaster in India

The geographical location of India makes it climatically very sensitive, and the increasing usage of land area, climate change and the effect of global warming have made matters worse over the years[9]. A total of 40 million hectares of land (roughly 12% of the country's area by land) in the country is prone to floods[9]. Between 1953 and 2017, floods have occurred almost every year in India and has resulted in an economic loss of Rs. 3,78,247.047 crore and the destruction of 8,07,17,993 houses and property[9]. In addition, the magnitude of damage due to floods over the years have increased drastically as explained by the following figure.

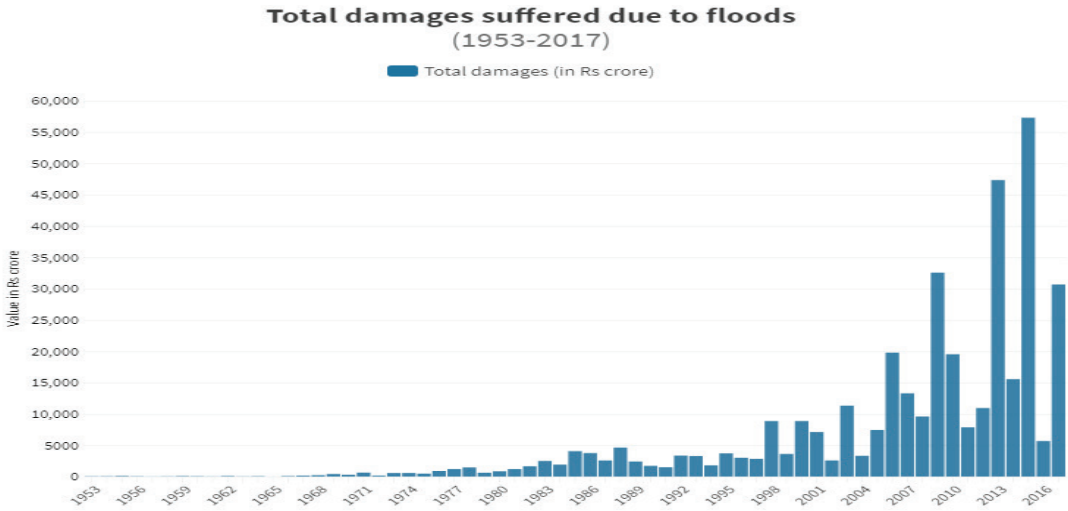


Figure 1. Total Damages suffered due to floods in India[9].

(Source: Available from https://www.indiatoday.in/india/story/loss-due-floods-india-people-killed-crop-houses-damaged-in-65-years-1591205-2019-08-27)

An increasing trend in total damage value caused by floods can be observed in the figure suggestive of firstly an increase in the frequency of the event, secondly, a relationship with population growth and lastly, the inefficiency of mitigation measures. Realising the gravity of the situation, the government of India enacted the Disaster Management Act which led to the onset of the NDMA in 2005[3].

The role of the NDMA in Flood Mitigation

Headed by the honourable Prime minister and State Disaster Management Authorities (SDMA), the NDMA aims to implement a holistic and integrated approach to disaster management in the country[3]. The authority agrees to the fact that increasing population, rapid urbanization, growing developmental and economic activities in the flood plains and global warming can be attributed to the unprecedented rise in the number of floods in the country[5]. Similarly, instances of flooding in urban area have also increased during the last decade largely due to improper urban planning and faulty drainage systems[5]. These statistics reveal that the system needs to upgrade the flood response system to mitigate the impact of periodic floods in the country. India not only lacks cutting edge technologies in flood forecasting and warning but also mitigation measures. In addition, these measures if at all active in some areas, don't cover all the river belts of the country. Furthermore, there is a dearth of awareness about floods and public participation. Despite the focus on planning activities, unplanned development of flood plains continue and pose a threat. Likewise, there is little documentation about the long term impact of floods and the way these were dealt with. Often this has resulted in poor infrastructural response, improper allocation of manpower and a dearth of strategic planning when required. As a result, the country has witnessed massive damage in the past not only in terms of lives and property, but also infrastructure and economy as stated in the previous sections[5]. Therefore, it is imperative to understand the need to address the deep rooted factors in flood mitigation and management.

The way foreword

The NDMA has prepared the executive summary guidelines to minimize damage due to floods[5]. The primary objectives of the guidelines are to improve forecasting and real time monitoring, strengthening emergency response capabilities and multi-sectoral involvement[5]. To effect the plan, the NDMA plans to set up a National Flood Management Institute (NFMI) at a strategic location in the country[5]. Further, a Flood Forecasting and Decision Support System (DSS) are planned to be set up as well[5]. In addition, the activities proposed to minimize flood risk and losses are to be implemented in 3 phases at the central as well as state levels[5]. Apart from that, the NDMA plans to regulate the unplanned developmental activities in the flood plains to say nothing of the strategic construction of dams,

reservoirs and other storages[5]. Additionally, a National Disaster response Force (NDRF) has been made by the government of India for prompt response to disasters[5]. The NDMA has acknowledged the fact that multi-sectoral collaboration is essential in this aspect and has partnered with the Meteorological department, the Central Water Commission, Remote sensing department, weather forecasting department at both the state and national levels[5]. Further, initiatives like the Calamities relief fund, Flood insurance, drainage improvement, catchment area afforestation, anti-erosion works, the National Flood Mitigation project and Medical preparedness strategies are also underway to strengthen the cause[5]. In spite of the above mentioned strategies, certain issues remain unaddressed. For instance, the ecological protection of the flood prone areas, insufficient funding allocations, frequent river erosions, infrastructural lack, biodiversity loss and lack of concrete relief & redemption strategies are some of them.

Although the NDMA has developed strategies to combat damage caused by floods in India, some grey areas still remain which need to be addressed. For instance, the people living close to the flood plains can be educated and trained about planned vegetation and retention ponds that help to retain water during flooding[13]. In addition, they can be edified with easy control measures such as usage of sandbags and inflatable tubes[13]. Certain blockade methods like construction of dikes, dams, diversion canals, bunds and weirs are few options that can be employed at strategic positions to mitigate the devastation caused by the water flow[13]. Some compelling evidences can be seen in the Dutch flood mitigation system, for instance the "Delta program"[14]. The program has resulted in the planning of canals within cities to minimise the risk of urban flooding[14]. Correspondingly, the Netherlands has developed national policies to tackle the issue of flooding and as a part of the Delta program, has developed multi-sectoral collaborative strategies for that matter[14]. Be that as it may, some of these strategies can be implemented in the Indian setting to help the cause. Likewise, some of the UN strategies such as the 'Sendai Framework' for disaster risk reduction can be implemented in the country as well.

The framework was adopted at the 3rd UN conference in Sendai, Japan in 2015[15]. Supported by the United Nations Disaster Risk Reduction (UNDRR), the framework aims to build on strategies to reduce disaster risk and subsequent loss due to the disaster. The framework emphasizes on 7 targets based on the ultimate goal of preventing new and reducing existing disaster risk through multi-dimensional approaches[15]. Additionally, it has 4 priority areas of action which are; understanding the disaster risk, strengthening disaster risk governance to manage disaster risk, investing in disaster risk reduction for resilience and enhancing disaster preparedness for effective response[15]. Further, it is based around several guiding principles that ensure a holistic and multi-sectoral support in the cause[15]. Thus the framework can be employed to device strategies to mitigate the risk of floods in the Indian context.

The government needs to tackle the perennial problem of frequent floods more effectively to reduce damages caused by the same. As explained in the Sendai framework, a multi-sectoral approach incorporating economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures need to be developed[15]. Moreover, an effective funding mechanism needs to be developed and planned for the cause both at the central as well as the state levels. Likewise, infrastructure development in terms of preparatory measures both at the state as well as national levels can be planned. Similarly, at the level of policymaking, actors and stakeholders need to be aware of the ground realities and incorporate members of the population prone to floods. In other words, progress needs to be made at every level of the country's functioning to mitigate the frequent losses that happen due to floods.

Conclusion

Floods have been ravaging India since long and the loss of lives, property and economy has been enormous. Correspondingly, there has been an increase in both the frequency and magnitude of floods in the last decade. The infrastructural, economic as well as ecological loss is also on a rising trend as well. Additionally, the lurking factors facilitating this upsurge like global warming, urbanisation and unplanned development of flood plains have increased over the years. Natural as well as human factors as stated before can be attributable to the increasing instances of floods. The substantial losses endured in the past also suggest that the country's flood mitigation measures need to be evaluated and sharpened up. Further, the lack of effective management and control strategies in the country has resulted in frequent degradation of economy and environment alike. India not only has a dearth of appropriate technologies but also strategies at the policymaking level to design efficient

intervention measures to tackle the problem. For these reasons and many more, the NDMA has designed the 'Executive summary guidelines', emphasizing on forecasting, real time monitoring, emergency response and multi-sectoral collaboration. In addition, it also plans to tackle the causative elements responsible for floods for instance, river erosion and unplanned development in the flood plains. However, many grey areas remain unaddressed which need to be effectively dealt with. The country can take ideas from the international platform for instance the Netherlands, which has developed effective flood mitigation measures. To put it in another way, the government can take ideas from others and try and incorporate some global strategies such as he Sendai framework for disaster risk reduction, in the local context. A multi-sectoral approach is required to deal with the issue of floods in the country. The NDMA guidelines although promising, face many challenges along the way.

Ethical Clearance: Not Applicable as this is a review article

Source of Funding: Self

Conflict of Interest: Nil

References

1. WHO. Natural events [Internet]. 2012 August 24[cited 2019 September 10]. Available from: https://www.who.int/environmental_health_emergencies/natural_events/en/
2. Ritchie, H., & Roser, M. Natural Disasters [Internet]. 2014, June 3 [cited 2019 September 10]. Available from: https://ourworldindata.org/natural-disasters
3. Committee on Earth Observation Satellites. Floods [Internet]. [cited 2019 September 11]. Available from: http://ceos.org/ourwork/workinggroups/disasters/floods/
4. National Health Portal Of India. Health impacts of flooding and risk management [Internet]. [cited 2019 September 11]. Available from: https://www.nhp.gov.in/health-impacts-of-flooding-and-risk-management_pg
5. NDMA. Floods [Internet]. [cited 2019 September 11]. Available from: https://ndma.gov.in/en/2013-05-03-08-06-02/disaster/natural-disaster/floods.html
6. 15 Worst Ever Floods in India Over Last Decade [Internet]. [cited 2019 September 11]. Available from: http://www.walkthroughindia.com/walkthroughs/15-worst-ever-floods-in-india-over-last-decade/
7. WHO. Flooding and communicable diseases fact sheet [Internet]. 2012 April 13 [cited 2019 September 11]. Available from: https://www.who.int/hac/techguidance/ems/flood_cds/en/
8. Du, W., FitzGerald, G. J., Clark, M., & Hou, X.-Y. Health impacts of floods [Internet]. 2010 [cited 2019 September 11]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/20586021
9. Rawat, M. When skies rained death & destruction: India suffered Rs 3,78,247.047 cr loss due to floods in 65 yrs [Internet]. 2019 August 28 [cited 2019 September 11]. Available from: https://www.indiatoday.in/india/story/loss-due-floods-india-people-killed-crop-houses-damaged-in-65-years-1591205-2019-08-27
10. Samudranil. Major floods in Indian history [Internet]. 2017 August 19 [cited 2019 September 11]. Available from: https://www.mapsofindia.com/my-india/india/major-floods-in-indian-history#
11. Kerala floods Update: Death toll rises to 85, more than 2.5 lakh people in relief camps [Internet]. 2019 August 12 [cited 2019 September 11]. Available from: https://www.indiatoday.in/india/story/kerala-floods-update-monsoon-rains-floods-death-toll-1579875-2019-08-12
12. Alberta Water Society. Environmental impact of flooding [Internet]. Available from: https://albertawater.com/what-are-the-consequences-of-flooding/environmental
13. IWA. Flood Control and Disaster Management [Internet]. [cited 2019 September 12]. Available from: https://www.iwapublishing.com/news/flood-control-and-disaster-management
14. 5 facts about Dutch flood risk management [Internet]. 2016 June 6 [cited 2019 September 12]. Available from: https://ehs.unu.edu/news/news/5-facts-about-dutch-flood-risk-management.html
15. UNISDR. Sendai Framework for Disaster Risk Reduction 2015 - 2030 [Internet]. 2015 [cited 2019 September 12]. Available from: https://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

Effect of Non- Surgical Periodontal Therapy on Plasma Homocysteine Levels in Patients with Chronic Periodontitis- A Prospective Study

Apurva A. Pisal[1], Keshava Abbayya[2], Girish Suragimath[3],Siddhartha Varma[4], Sameer A[5], Vishwajeet T. Kale[6]

[1]Senior Lecturer, [2]Reader,[3] Professor and Head of Department, [4]Reader, [5]Zope, MDS, Reader, Department of Periodontology, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed University, Karad, [6]Dental Surgeon, Sub District Hospital, Islampur

Abstract

Background: The aim of the study was to evaluate and correlate the effect of non surgical periodontal therapy on homocysteine levels in patients with chronic periodontitis.

Methods: Fifty participants were enrolled in the study *(n=50)* in the age range of 20-45 yrs. Each patient was examined using a mouth mirror and UNC-15 graduated periodontal probe. After recording the clinical parameters & indices (CAL, OHI-S, GI), venous blood was drawn from the antecubital vein and transferred to a vial and centrifuged to isolate the plasma, which was then sent for evaluation of plasma homocysteine level. Non-surgical therapy was performed which consisted of scaling and root planing (SRP). After 90 days, the patient was re-evaluated for clinical parameters and the readings were recorded again. Blood samples were sent for analysis of post treatment plasma homocysteine levels.

Results: The plasma Hcy level in periodontitis subjects during pre treatment was 20.7± 3.4 µmol/L which was significantly higher. Post therapy levels reduced to 14.7± 2.2 µmol/L. The OHI's and GI were also significantly reduced after post therapy.

Conclusion: An inflammatory condition like chronic periodontitis is significantly associated with elevated plasma homocysteine levels. However, no significant change was seen in the plasma homocysteine levels between males and females. Periodontal intervention shows statistically significant improvement in plasma homocysteine values.

***Keywords**: Chronic Periodontitis, Root planning, Scaling, Homocysteine, Plasma*

Introduction

Homocysteine (Hcy) is an amino acid and a breakdown product of protein metabolism. Homocysteine present in high concentrations has been linked to increased risk of cardiovascular diseases and strokes.[1,2] A positive correlation exists between the concentration of Hcy and bio-humoral parameters of inflammation, indicating an increase in Hcy levels during inflammatory conditions. [3]

Periodontal disease is an inflammatory condition and is the major cause of tooth loss in adults. Periodontitis is characterized by inflammation of gingiva, destruction of periodontal ligament, and alveolar bone resorption. Chronic periodontitis is also associated with increased circulating levels of CRP and IL-6.[4] Therefore, a similar association could exist between chronic periodontitis and plasma Hcy. Recently, a study showed a highly significant relationship between elevated plasma Hcy and periodontal disease.[5] Furthermore, both chronic periodontitis and raised plasma Hcy levels could act as independent risk factors for cardiovascular disease/ atherosclerosis. This new association could help in part by explaining how a chronic infection like periodontitis could be linked to cardiovascular disease through elevated plasma Hcy levels.

Several studies have shown that levels of various inflammatory biomarkers commonly associated with cardiovascular disease and periodontal disease are reduced following periodontal treatment.[6] With this background the current study was undertaken to assess the levels of plasma Hcy in periodontitis patients and to evaluate the effect of non surgical periodontal therapy on plasma Hcy levels among them.

Materials and Method

A total of 55 subjects suffering from moderate to severe periodontitis were selected for the study from outpatient section of Department of Periodontology, School of Dental Sciences, Karad. All the selected subjects were explained about the objective of the study and the nature and benefits of the clinical investigation and associated procedures. An informed consent was obtained from all participants before enrolling them. Institutional ethical clearance was obtained from Krishna Institute of Medical Sciences, Deemed University, Karad (KIMSDU/IEC/04/2014) before commencing the study. The study was conducted during the period from December 2015- September 2016.

Sample size estimation: The optimum sample size to ensure adequate power for this clinical study was calculated considering standard deviation of 8.27 and a precision of 0.5 i.e. 50% of mean. Based on the above values, it was found that 43 subjects should be studied. As the present study was a follow up study, the final sample size selected was 55 subjects.

Criteria for selection: Screening was conducted among systemically healthy, non- smoker subjects, age 20-45 years, who wilfully consented to attend follow- up visits. Subjects with less than 20 permanent teeth remaining, who had received either antibiotic, anti-inflammatory or vitamin supplementation therapy within 3 months or had undergone any periodontal therapy (surgical or non- surgical) within 6 months of baseline examination were excluded from the study. Systemic diseases and conditions such as cardiovascular disease (CVD), renal disease, rheumatoid arthritis, diabetes mellitus, nutritional deficiencies, pregnancy and lactation have the potential to influence systemic Hcy concentrations and hence, were excluded from the study. A structured proforma was designed to collect patient's personal and demographic data which also included periodontal parameters.

Periodontal parameters: Gingival Index (Loe and Sillness 1963), Oral Hygiene Index (Loe and Sillness) and clinical attachment level were recorded for each patient. Subjects included in the study group (n=50) suffered from moderate to severe chronic periodontitis and were classified based on the AAP classification as, moderate periodontitis = 3 or 4 mm CAL, severe periodontitis ≥ 5mm CAL.[7] Each subject underwent an initial full-mouth periodontal examination. The CAL was measured on six sites (mesio-buccal, midbuccal, disto-buccal, mesio-lingual, mid-lingual and disto-lingual) per tooth using a UNC-15 periodontal probe (UNC-15, Hu-Friedy, Chicago, IL, USA).

Sample collection and storage: Pre treatment venous blood samples about 5 ml were collected from median cubital vein. The collected blood samples were centrifuged immediately to extract plasma. The plasma was pipetted out and immediately transferred to a vial and stored till the time of Homocysteine estimation.

Homocysteine analysis: The collected plasma samples were then used for homocysteine analysis using Autopure® (Accurex Homocysteine kit) in EM 360 auto analyzer. The Siemens Diagnostics enzymatic test for the quantitative Homocysteine determination (HCY) is based on a series of enzymatic reactions, causing a decrease in absorbance value due to NADH oxidation to NAD+. HCY concentration in the sample is directly proportional to the quantity of NADH converted to NAD+ (ΔA_{340nm}).

Periodontal treatment: The subjects in the study received nonsurgical periodontal therapy, which included Scaling and root planing (SRP) along with oral hygiene instructions. The periodontal treatment was performed by the same clinician (A.P).

Recall visits: Each patient was recalled after 90 days for follow up examination. Out of 55 patients, 5 failed to follow up, therefore only 50 patients reported. The follow up visits included examination of periodontal parameters and evaluation of homocysteine levels.

Statistical Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS)-20 for windows (SPSS Inc., Chicago, IL, USA). The 'Wilcoxon' matched pairs test was used to test the hypothesis and significant difference in the level of Hcy, GI and OHI-s scores between pre-treatment and post-treatment. P-values

<0.05 were considered statistically significant.

Results

The demographic data of the study subjects is illustrated in Table 1. The degree of severity of gingival inflammation was evaluated by Gingival Index at baseline and 90 days after treatment. The baseline Gingival Index was 2.0 ± 0.27 which indicates severe gingival inflammation. Following treatment the Gingival Index value was 1.1 ± 0.22 resulting in decrease of 0.9 ± 0.05 post treatment. There was a significant improvement in the gingival condition following periodontal treatment with a p-value of <0.0001*. Similarly the oral hygiene index improved significantly after treatment with a p-value of <0.0001* **(**Table 2).

The baseline mean plasma Hcy value was 20.7± 3.4 µmol/L while the mean Hcy values after 90 days of follow up were 14.7± 2.2 µmol/L. Thus the treatment resulted in a significant reduction of 6.0±1.2µmol/L with a p-value of <0.01* (Table 3).

Hcy levels when compared based on gender revealed that there was no statistical significant difference found between Hcy levels of both males and females pre operatively and post operatively (Table 4). A correlation analysis was carried to confirm any relationship between Hcy and age which was suggestive of, no correlation between Hcy and age (p>0.05) (Table 5).

Table 1: General characteristics of the study population

Characteristic	**N**
Number of participants	50
Males	28
Females	22
Age in years	
≤ 30 years	06
31-39 years	25
40-45 years	19
Mean ± SD	37.6 ± 5.7

Table 2: Periodontal parameters at baseline and after 90 days of follow-up

Periodontal parameters	**Baseline**	**After 90 days of follow up**	**Mean Difference**	**P-value**
GI	2.0 ± 0.27	1.1 ± 0.22	0.9 ± 0.05	<0.0001*
OHI's	2.6 ± 0.5	1.6 ± 0.9	1.0 ± 0.5	<0.0001*

Table 3: Comparison of Hcy scores at baseline and after 90 days of follow-up

Biochemical Parameter	Mean	Mean Diff.	p-value
Baseline	20.7± 3.4		
After 90 days of follow up	14.7 ± 2.2	6.0± 1.2	<0.0001*

Table 4: Gender wise mean score of Hcy

HYC	**Pre**	**Post**	**Age (in years)**
Males	20.9	14.8	37.3
Females	20.5	14.6	38.04

Table 5: Age wise correlation scores of HYC

Variables	Hcy	Age
Hcy	1.0	-0.196
Age	-0.196	1.0

*p<0.05

Discussion

Hcy is a sulphur containing amino acid obtained during the metabolism of methionine. Dietary protein, methionine is the only known source of Hcy in the human body.[5] The average daily intake of methionine is about 2 grams. Methionine is liberated from dietary protein in the digestive system after meal ingestion. Blood acts as a transport media for free methionine in the body which is ultimately taken up by the cells. Animal dietary proteins contain twice as much as methionine unlike cereals, fruits and vegetables.[8,9]

Periodontitis affects the systemic health of an individual, and may contribute to CVD, coronary artery disease (CAD), diabetes mellitus, and preterm low-birth-weight infants as suggested by the current era of evidence-based medicine.[10-12] These novel risk factors include chronic infections and infection related biomarkers such as CRP, elevated Hcy levels etc.[13,14] Impaired Hcy metabolism has been implicated in CAD/ atherosclerosis, cerebrovascular disease, and peripheral vascular disease.[15]

Plasma homocysteine levels are increased in patients having cardiovascular disease as mentioned in numerous case-control studies.[16] Additionally various meta-analyses indicate that increased plasma homocysteine levels serves as a independent risk factor for atherosclerosis and vascular disease. A study also showed that, for every 5-µmol/L increase in serum homocysteine concentration, the risk of ischemic heart disease increased 20% to 30%.[17] Analysis of the data showed that after adjusting for known cardiovascular risk factors and regression dilution bias in the prospective studies, a 25% lower homocysteine level is associated with an 11% lower IHD risk and 19% lower stroke risk.[18]

The present study was undertaken to evaluate the effect of non-surgical periodontal therapy on plasma homocysteine levels. The study group chosen had a mean age of 37.6 yrs. Studies done by Chang et al 2002[19], Ferruci et al 2005 [20] have shown that a large percent of old (>65years) and very old persons are affected by a chronic mild pro-inflammatory state mediated through their nutritional deficiency which could be linked to HHcy, thus indicating that the total Hcy increases with age. Chronic periodontitis is also found to be age associated, and its prevalence and severity increases with age.

Framingham heart study cohorts has shown that total homocysteine concentration is higher in men and in post-menopausal women.[21] Robinson et al[22] showed that males had increased levels of homocysteine as compared to females, but in the present study it was found that there was no difference associated in homocysteine levels when compared between males and females.

The baseline plasma Hcy values in the current study were 20.7 ± 2.43 µmol/L, which is categorized as mild hyperhomocysteinemia and are similar to those obtained by Joseph et al in 2011.[5] Thus the mean values of Hcy obtained in the current study group show that chronic periodontitis could be a risk factor for CAD. Endothelial dysfunction is considered to be the first inflammatory change of the vascular endothelium leading to arteriosclerosis. The atherogenic and thrombogenic potentials of Hcy have been implicated in promoting endothelial dysfunction; however the exact mechanisms are not clearly understood.[23] Oxidation of low-density lipids, increased monocyte adhesion to the vessel wall, increased lipid uptake and retention, activation of the inflammatory pathway, stimulatory effects on smooth-muscle proliferation, thrombotic tendency mediated by activation of coagulation factors and platelet dysfunction could mediate the relationship between CAD and Hcy. Subjects with periodontitis have also been reported to have higher levels of endothelial dysfunction.[6]

The link between periodontal bacterial systemic exposure and atherosclerosis is biologically plausible. Periodontal pathogens especially P.gingivalis has been detected within inflamed atheromatous plaques and have molecular pathways to induce macrophage uptake of LDL cholesterol, leading to foam cell generation and atheroma progression.[24]

The results of the present study are in accordance with the study done by Bhardwaj S et al[25], which showed significantly higher levels of Plasma Hcy in chronic periodontitis subjects than healthy subjects. There was a significant reduction in plasma Hcy after periodontal treatment.

Thus, from the above discussion it is evident that the elevated levels of plasma homocysteine in chronic periodontitis patients can act as a marker for systemic inflammation. Moreover in patients with chronic periodontitis, periodontal treatment can be used to augment conventional homocysteine lowering therapies.

Conclusion

In the current study, subjects showed elevated plasma homocysteine levels which were reduced following interventional non-surgical periodontal therapy, this reduction was statistically significant. Periodontal therapy can be used to augment the traditional therapies used to improve the cardiovascular status. To enumerate the limitations of the present study the cofactors involved in homocysteine metabolism namely vitamin B6, B12 and serum folate were not assessed in the current study. Hence, large scale multicenter randomized controlled trials using heterogeneous populations are required to assess the correlation between periodontitis and inflammatory pathways.

Ethical Clearance: Taken from Krishna Institute of Medical Sciences, Deemed University, Karad (KIMSDU/IEC/04/2014) committee

Source of Funding: Self

Conflict of Interest: Nil

References

1. Jacobsen DW. Homocysteine and vitamins in cardiovascular disease. Clin Chem. 1998;44(8 Pt 2):1833-43.
2. Vasudevan DM, Sreekumari S. Text Book of Biochemistry 2005,4: 177-181.
3. Lopez-Olivo MA, Gonzalez-Lopez L, Garcia-Gonzalez A, Villa-Manzano AI, Cota-Sanchez AR, Salazar-Paramo M, et al. Factors associated with hyperhomocysteinaemia in Mexican patients with rheumatoid arthritis. Scand J Rheumatol.2006 ;35(2):112-6.
4. Bartold PM, Marshall RI, Haynes DR. Periodontitis and rheumatoid arthritis: a review. J Periodontol. 2005;76(11 Suppl):2066-74.
5. Rosamma J, Nath SG, Joseraj MG. Elevated plasma homocysteine levels in chronic periodontitis: A hospital-based case-control study. J Periodontol 2011;82:439-444.
6. Piconi S, Trabattoni D, Luraghi C, Perilli E, Borelli M, Pacei M, et al. Treatment of periodontal disease results in improvements in endothelial dysfunction and reduction of the carotid intima-media thickness. FASEB J 2009;23:1196–204.
7. Armitage GC. Development of a classification system for periodontal diseases and conditions. Ann Periodontol. 1999;4:1.
8. van der Griend R, Biesma DH, Banga JD. Hyperhomocysteinaemia as a cardiovascular risk factor: an update. Netherlands J Med. 2000;56(3):119-30.
9. West ES, Todd WR, Mascon HS, Van Bruggen JT. Textbook of biochemistry. Oxford and IBH Publishing; 1966.
10. Dye BA,Choudary K,Shea S,Papapanou PN. Serum antibodies to periodontal pathogens and markers of systemic inflammation .J Clin Periodontal 2005;32(12):1189-99.
11. Mustapha IZ, Debrey S, Oladubu M, Ugarte R. Markers of sysytemic bacterial exposure in periodontal disease and cardiovascular disease risk: review and meta-analysis. J Periodontol 2007;78(12):2289-302.
12. Sandros J, Papapanou PN, Nannkark U, Dahlen G. Porphyromonasgingivalis invades pocket epithelium in vitro. J Periodontol Res 1994;29(1):62-9.
13. Fruchart JC, Nierman MC, Stroes ES, Kastelein JJ, Duriez P. New risk factors for atherosclerosis and patient assessment. Circulation. 2004;15:109(23 Suppl 1):III 5-9.
14. Ridker PM, Hennekens CH, Buring JE, Rifai N. C-reactive protein and other markers of inflammation in the prediction of cardiovascular disease in women. N Engl J Med. 2000;23:342(12):836-43.
15. Tang L, Mamotte CD, Van Bockxmeer FM, Taylor RR. The effect of homocysteine on DNA synthesis in cultured human vascular smooth muscle. Atherosclerosis. 1998 Jan;136(1):169-73.
16. The Homocysteine Studies Collaboration. Homocysteine and risk of ischemic heart disease and stroke. A meta-analysis. JAMA 2002; 288:2015-22.
17. Wald DS, Law M, Morris JK. Homocysteine and cardiovascular disease: Evidence on causality from a meta-analysis. BMJ 2002;325:1202.

18. The Homocysteine Studies Collaboration. Homocysteine and risk of ischemic heart disease and stroke. A meta-analysis. JAMA 2002; 288:2015-22.
19. Chang CL, Marra G, Chauhan DP, Ha HT, Chang DK, Ricciardiello L, et al. Oxidative stress inactivates the human DNA mismatch repair system. Am J Physiol Cell Physiol. 2002;283(1):C148-54.
20. *Ferrucci L*, *Corsi* A, *Lauretani F*. *The origins of age-related proinflammatory state*. *Blood*. *2005*;*105:2294*–9.
21. Liu S, Manson JE, Stampfer MJ. Whole grain consumption andrisk of ischemic stroke in women: a prospective study. JAMA 2000; 284:1534–40.
22. Robinson K, Arheart K, Refsum H, Brattström L, Boers G, Ueland P, et al. Low circulating folate and vitamin B6 concentrations: risk factors for stroke, peripheral vascular disease, and coronary artery disease. European COMAC Group. Circulation. 1998;10;97(5):437-43.
23. Higashi Y, Goto C, Jitsuiki D, Umemura T, Nishioka K, Hidaka T, et al. Periodontal infection is associated with endothelial dysfunction in healthy subjects and hypertensive patients. Hypertension 2008:51:446–53.
24. Pussinen PJ, Jousilahti P, Alfthan G, Palosuo T, Asikainen S, Salomaa V. Antibodies to periodontal pathogens are associated with coronary heart disease. Arterioscler Thromb Vasc Biol. 2003 Jul 1;23(7):1250-4.
25. Bhardwaj S, Prabhuji MLV, Karthikeyan BV. Effect of non-surgical periodontal therapy on plasma homocysteine levels in Indian population with chronic periodontitis: a pilot study. J Clin Periodontol 2015;42:221–7.

Assessing Health Literacy among Health Science Students in a Coastal Town of Southern India – A Cross-Sectional Study

Arathi P Rao[1], Kumar Sumit[2], Soundharya M[3], Mariam Sophia[3], Shradha Kumari Sikaria[3], Karen Lobo[3], Yara Shireesha[3]

[1]Assistant Professor- Senior Scale, Coordinator- MPH Program, [2]Assistant Professor, [3]MPH Student, Department of Health Policy, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, India

Abstract

Background: Health literacy refers to the knowledge and competencies of persons to meet the complex demands of health in modern society**.** Healthcare professionals play an essential role in helping patients to obtain and understand health information. It is important to assess the health literacy of students of health science professions as they can contribute to enhancing the health literacy of the communities in the future. **Objective:** The study aimed to measure the levels of health literacy among students attending different health-related courses in a university situated in the coastal town of southern India using the HLS-EU-Q16 (Health Literacy Survey-European Union). **Methods:** A cross-sectional study using a self-administered health literacy survey in google forms questionnaire was conducted among 812 students enrolled among various health-related courses of which 770 students were taken for final analysis. The index scores were recoded into four health literacy categories as follows (according to thresholds established by the HLS-EU consortium): excellent (>42-50); sufficient (>33-42); problematic (>25-33); and inadequate (0-25). **Key Results:** The overall average health literacy score was 31.3 ± 4.4, which indicates that health literacy among the students was limited. The average health literacy score of the students of the medical college, dental college, and allied health sciences (AHS) was 32.8, 32.4 and 30.7, respectively, indicating sufficient health literacy among the different courses individually. **Conclusion:** The level of health literacy gives important leads to initiate curricula and educational activities, including cross-disciplinary courses.

Keywords: *Health Literacy, Medical students, Dental students, Allied Health Sciences students, Health literacy tool*

Introduction

Health literacy (HL) is defined as the necessary capabilities to make well-informed health-related decisions. Health literate means placing one's health and that of one's family and community into context, understanding which factors are influencing it, and knowing how to address them. An individual with a sufficient level of HL can take responsibility for one's health as well as one's family health and community health.[1] The World Health Organization (WHO) defines HL as the personal, cognitive and social skills determining the ability of people to gain access to, understand and use the information to promote and maintain good health.[2] As patient's decision-making is a crucial element of patient-centric health care, insight into patient's HL might help healthcare professionals to organize their care accordingly.[3]

The role of HL in health care professionals makes it an important focus as it helps in understanding the challenges people face when attempting to find and use health care services. The concept of HL was originally used in the United States and Canada; however, it is now being used internationally, not only clinically, but also within the public health context.[4] HL has been an essential

Corresponding Author
Dr. Arathi P Rao,
Coordinator-MPH Program, Department of Health Policy, Prasanna School of Public Health,
Manipal Academy of Higher Education,
Manipal 576104, Phone: 9008418848,
e-mail id: arathi.anil@manipal.edu

focus in public health research in the past decades as it is necessary for making appropriate decisions in everyday life in a way to promote and maintain good health. Many international studies have revealed that limited health literacy affects large parts of the population in terms of adverse health outcomes and higher healthcare costs.[1]

HL is a relatively new concept in India. The health science students will be the flag bearers of health literacy dissemination in the years to come since, they play an important role in educating individuals, particularly about the remarkable subjects that require information, such as medication management and planning preventive measures. It is a tough task to demarcate general literacy and health literacy in India. The current study aims to assess the health literacy level among health science students by using HLS-EU-Q16 (Health literacy Survey-European Union).

Methodology

Study Design and tool

A cross-sectional study was conducted involving undergraduate students from medical, dental, and allied health science courses at a tertiary level college in southern India. A short form (HLS-EU-Q16), comprising 16 items, was used through a self-administered questionnaire. The tool was chosen since it measures comprehensive health literacy. Further, these 16 items of the questionnaire focus on the three HL domain which includes health care, disease prevention, and health promotion.

Sampling

The sample size of 854 was calculated (CI=95%, d=5%) based on the anticipated prevalence of 50% health literacy among students of health sciences, out of which 812 was achieved. Probability proportional to size (PPS) was adopted to select participants from the various health science courses like medical, dental and AHS. For a valid index score generation, at least 13 items of the 16-item questionnaire must have been answered. Therefore, scores could not be calculated for 42 respondents, and they were excluded from further analysis, resulting in 770 students finally.

Data collection.

The institutional ethical committee clearance was obtained (IEC number 134/2019). Informed consent was obtained from all participants.

Prior permission was obtained from the heads of the institutions, and data was collected during the free hours of the students using a self- administered questionnaire via google forms that were sent to class group mail ids. The surveyors explained the purpose of the study, and the students were assured of anonymity. All questions about HL were required to be answered.

Statistical Analysis

The data were entered, cleaned & coded using 'Excel.' Data analysis was performed using the 'R studio.' The 16 items have four responses (very easy, easy, difficult, and very difficult). The 'don't know' option was included resulting in five responses for each item. All responses were given a numerical score as follows: 0- don't know; 1- very difficult; 2- fairly difficult; 3- fairly easy and 4- very easy. Mean scores were calculated for all items on the scale and then converted to an index score according to the recommendations of the HLS-EU consortium.[5] The index scores were recoded into four health literacy categories as follows; excellent (>42-50), sufficient (>33-42), problematic (>25-33), and inadequate (0-25).

Results

The overall mean HL score was 31.3(SD 4.4). The mean HL score of the medical college was 32.8 (SD 7.9) the dental college was 32.4(SD 8.1), and AHS was 30.7(SD 7.3). Table 1 shows the mean scores of HL among the health science students and indicating that the HL level among the students was limited as they had problematic HL scores.

According to the index score, the percentage of students showing an excellent score was less than those showing a low score across different streams.

The index score among the various streams has been represented in the bar graph, as shown in Figure 1 below, with a significant percentage of students showing scores falling in the problematic and sufficient range.

The index score among dental and AHS students showed an increase from the 1st years to the 3rd years in the excellent scoring category, showing a better performance among students in higher classes. Since only 2nd-year medical students participated in the study, year-wise conclusions could not be drawn among them (See table 2).

Concerning the percentage distributions on the difficulty-easiness scale, 41.2% of the study participants found it very easy to understand the doctor's or pharmacist's instructions on taking medications. 13.5% found it very difficult to find information regarding the management of mental issues. 7% did not know how to identify health warnings due to behavior such as smoking, low physical activity and drinking too much.

Table 1: Institute wise health literacy score

Institute	Mean	Standard Deviation
Overall	31.32	4.40
Medical	32.78	7.9
Dental	32.52	8.1
Allied Health Sciences	30.57	7.3

Table 2: Year-wise Index Score among dental and allied health students

Institute	Inadequate n(%)	Problematic n(%)	Sufficient n(%)	Excellent n(%)
Dental 1	11(25.6%)	14(32.6%)	16(37.2%)	2(4.7%)
Dental 2	11(21.2%)	16(30.8%)	18(34.6%)	7(13.5%)
Dental 3	4 (14.3%)	9(32.1%)	11(39.3%)	4(14.3%)
AHS 1	54(28.7%)	75(39.9%)	56(29.8%)	3(1.6%)
AHS 2	24(24.5%)	37(37.8%)	31(31.6%)	6(6.1%)
AHS 3	34(15.5%)	77(35.0%)	89(40.5%)	20(9.1%)

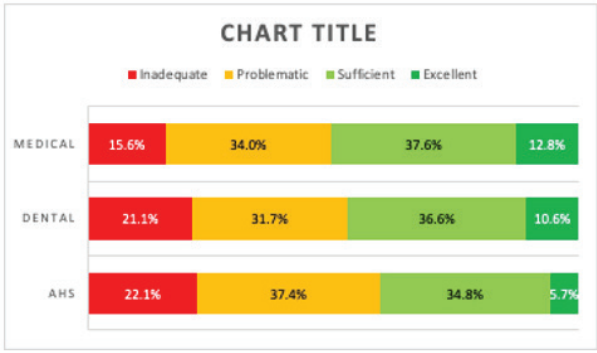


Figure 1: Graphical representation of the index scores

Discussion

The current study indicates that 7.8% of the students have excellent HL, 35.6% have sufficient HL and 35.8% of the students have problematic HL and 20.8% have inadequate HL. These findings are comparable with the findings of the study conducted by Evans AY et al, among students in a university in Ghana, where the students had 12.4% excellent HL, 33% sufficient, 34.2% problematic and 20.4% inadequate HL.[6]

Another study conducted among the general population of Catalan, 84.6% showed sufficient HL, 10.3% inadequate HL, and 5.1% problematic HL. This is higher than the findings of our study. This can be attributed to the 100% literacy rate of Catalan.[7]

In Europe, limited HL was found in 47.6% of a sample among the general population with a mean score of 33.8. The findings of the present study indicate that 56.6% of the students had limited HL with a mean score of 31.32.[8]

In another study among attendees of outpatient clinics at a University hospital in Egypt, it was seen that 34.3% had inadequate HL.[9] The inadequate HL level is less (20.8%) in the current study, which indicates the HL levels are among the health science students.

In a similar study conducted among schoolteachers in Colombo, 61.2% of them belonged to the sufficient HL and only 1% belonged to the inadequate HL.[10] which is in contrast to our study where only 35.6% had sufficient HL. This is due to the usage of the health-promoting school concept among the schools in Colombo where teachers are trained in HL to impart HL to the students.[10] This suggests that HL concept should be ingrained in the curricula of Health sciences institutions which can further contribute to enhancing the HL levels of the

health science students.[11]

The current study shows a significant difference in levels of HL among different health science institutions and across the academic years in each of these institutions. The mean HL scores among the dental and AHS students were significantly higher among senior students compared to the junior students. The medical and dental students had a higher percentage of excellent HL levels when compared to AHS students. This is in coherence with a study conducted among health professional students, where the medical students recorded the highest scores in comparison to the other AHS courses.[12] and also with a study conducted by LOU Peng Yu et al., which stated that because of its disciplinary nature and good executive ability, medical specialty scored significantly higher in health literacy.[13] Most university-based health literacy studies have demonstrated increasing health literacy with an increase in academic level,[14-17] which is consistent with the findings of our study.

Among the various items of HLS EU 16, our study participants found it difficult to access information on managing mental health problems (Item 8). However, they did not find it difficult to decide if they needed a second opinion (Item 5). In the study conducted by Evans AY et al, the students found it difficult to access information for managing mental health problems as well as deciding if they needed a second opinion.[6]

Conclusion

This study is the first of its kind in India to describe comprehensive health literacy among undergraduate university students using an internationally validated instrument. The overall HL was inadequate among the students across various health science courses. The medical students had higher levels of HL among all the health science students. It was also found that the HL levels were higher as they progressed in their academic years. It was found that countries having better general literacy had higher HL levels. This shows that general literacy can influence HL. Incorporation of the HL concept in the curricula across various health science courses will make them more equipped to make better decisions regarding their future community health practices. Mental health is one of the most neglected public health issues in India. More access to mental health information, especially for health science students cannot be overemphasized.

Recommendations

HL component should be included in the curriculum for health science students, especially dental sciences and AHS. Measures have to be taken to enhance general literacy thereby increasing the HL level of the population. Initiatives should be taken by public health sectors to increase the availability of information about mental health and related services, consequently increasing the mental health literacy levels.

Acknowledgment: The authors would like to thank Dr. Prakash Narayanan Vasudevan Potty for his insights with the analytical work for this study. They would also like to thank Dr. Sabu K.M. for providing them with the necessary permission required to conduct the study, from the allied health science institution. The authors would also like to thank Dr. Navya C for her contributions during the data collection process.

Conflicts of Interest: Nil

Source of Funding: Nil

Ethical Clearance: The ethical clearance was obtained from Kasturba Hospital Institutional Ethical Committee (KH-IEC), IEC number 134/2019.

References

1. Sørensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, Brand H. Health literacy and public health: a systematic review and integration of definitions and models. BMC public health. 2012 Dec;12(1):80.
2. World Health Organisation. Health literacy and Health Promotion. https://www.who.int/healthpromotion/health-literacy/en/
3. Storms H, Claes N, Aertgeerts B, Van den Broucke S. Measuring health literacy among low literate people: an exploratory feasibility study with the HLS-EU questionnaire. BMC public health. 2017 Dec;17(1):475.
4. Pleasant A, Kuruvilla S. A tale of two health literacies: public health and clinical approaches to health literacy. Health promotion international. 2008 Jun 1;23(2):152-9.
5. Pelikan JM, Röthlin F, Ganahl K. Comparative report on health literacy in eight EU member states. The European health literacy survey HLS-EU. 2012.

6. Evans AY, Anthony E, Gabriel G. Comprehensive Health Literacy Among Undergraduates: A Ghanaian University-Based Cross-Sectional Study. HLRP: Health Literacy Research and Practice. 2019 Oct 14;3(4):e227-37.

7. Garcia-Codina O, Juvinyà-Canal D, Amil-Bujan P, Bertran-Noguer C, González-Mestre MA, Masachs-Fatjo E, Santaeugènia SJ, Magrinyà-Rull P, Saltó-Cerezuela E. Determinants of health literacy in the general population: results of the Catalan health survey. BMC public health. 2019 Dec 1;19(1):1122.

8. Sørensen K, Pelikan JM, Röthlin F, Ganahl K, Slonska Z, Doyle G, Fullam J, Kondilis B, Agrafiotis D, Uiters E, Falcon M. Health literacy in Europe: comparative results of the European health literacy survey (HLS-EU). European journal of public health. 2015 Dec 1;25(6):1053-8.

9. Almaleh R, Helmy Y, Farhat E, Hasan H, Abdelhafez A. Assessment of health literacy among outpatient clinics attendees at Ain Shams University Hospitals, Egypt: a cross-sectional study. Public health. 2017 Oct 1;151:137-45.

10. Denuwara HM, Gunawardena NS. Level of health literacy and factors associated with it among school teachers in an education zone in Colombo, Sri Lanka. BMC public health. 2017 Dec;17(1):631.

11. St Leger L. Schools, health literacy and public health: possibilities and challenges. Health promotion international. 2001 Jun 1;16(2):197-205.

12. Mullan J, Burns P, Weston K, McLennan P, Rich W, Crowther S, Mansfield K, Dixon R, Moselen E, Osborne R. Health literacy amongst health professional university students: a study using the Health Literacy Questionnaire. Education Sciences. 2017 Jun;7(2):54.

13. PengYu LO, Sheng LU, Jin ZH. Analysis on health literacy status and influence factors of three college students. In2019 4th International Conference on Social Sciences and Economic Development (ICSSED 2019) 2019 May. Atlantis Press.

14. Zhang Y, Zhang F, Hu P, Huang W, Lu L, Bai R, Sharma M, Zhao Y. Exploring health literacy in medical university students of Chongqing, China: a cross-sectional study. PloS one. 2016 Apr 6;11(4):e0152547

15. Wang W, Hou Y, Hu N, Zhang D, Tao J, Man Y, Wang A, Li L, Bi Y. A cross-sectional study on health-related knowledge and its predictors among Chinese vocational college students. BMJ open. 2014 Oct 1;4(10):e005182

16. Hansen HR, Shneyderman Y, Belcastro PA. Investigating the association of health literacy with health knowledge and health behavior outcomes in a sample of urban community college undergraduates. American Journal of Health Education. 2015 Sep 3;46(5):274-82.

17. Elsborg L, Krossdal F, Kayser L. Health literacy among Danish university students enrolled in health-related study programmes. Scandinavian journal of public health. 2017 Dec;45(8):831-8.

Evaluation of Perception on Intra-Oral Scanning and Alginate Impression among Orthodontic Patients in Chennai

Arathi M[1], Arvind Sivakumar[2]

[1]Post graduate Student, [2]Senior Lecturer, Department of Orthodontics, Saveetha Dental College, Saveetha Institute of Medical And Technical Sciences, Chennai, India

Abstract

Background: Most of the treatment modalities in dentistry are based on obtaining study models. The study models are of two types, namely, conventional study models made of gypsum products and digital models

Aim: To evaluate patient's perception on intra-oral scanning and alginate impression in Chennai population.

Methodology: 20 subjects were selected from the Department of Orthodontics, Saveetha Dental College and Hospital, Chennai. Conventional impression was made using alginate and intra-oral scanning was done for the same patient after 5 days. The patients were asked to fill a questionnaire comprising of 12 questions.

Results: Majority of the participants reported that alginate impression had more gag reflex and made the mouth dry. Participants preferred alginate impressions in terms of maximum mouth opening. The overall discomfort was equal for both techniques. Intra-oral scanning consumed more time than alginate impressions. Thus the overall preference rate was equal for both intra-oral scan and alginate impression.

Conclusion: Orthodontic patients in Chennai reported equal preference for intra-oral scan and alginate impression.

Keywords- *Intra-oral scan, alginate impression, conventional impression, patient perception, digital scan*

Introduction

Most of the treatment modalities in dentistry are based on obtaining study models. Study models are the accurate replica of the intraoral structures of the patient that helps in diagnosis and treatment planning even in the absence of the patients. These study models are of two types, namely, conventional study models made of gypsum products and digital models. Conventional study models are obtained by making impressions of the dental arch using various impression materials. The digital models are obtained by either directly or indirectly. Indirect method is by laser or cone-beam computed tomography scanning of plaster models or alginate impressions. Direct method is by scanning the dentition with an intra-oral scanner.[3,5,12-14]

Computer-aided design and manufacturing (CAD-CAM) system, was introduced in the field of orthodontics in the 1990s[1].Even though it was introduced earlier, its use is being gradually increasing only in the recent times for diagnosis, treatment-planning and documentation of treatment results.[13,15-17] The first digital intraoral scanner was introduced by Mormann and Brandestini in the 1980s, and was further developed as a powerful tool for Chairside Economical Restoration of Esthetic Ceramics (CEREC).[2,19,20]

Intra-oral scanning has many advantages over conventional study models from a clinician's perspective. The advantages are that the time required for pouring the cast is minimised, reduced physical storage space, no chances of wear of the models, and no changes

Corresponding author:
Dr. Arvind Sivakumar
Senior Lecturer, Department of Orthodontics,
Saveetha Dental College, Saveetha Institute Of Medical And Technical Sciences, Chennai, India.
arvind.sivakumar@gmail.com
+91 8220552400

with respect to variations in environmental factors [1,4,18,11]. Moreover, scanned images make it easier for the clinicians to communicate the case with their fellow colleagues or technicians.[1,4] Treatment planning and Kesling's set up has become less time consuming with the use of virtual models. Literature reviews report that the measurements made in the intra-oral scanned images and conventional study models are clinically reliable and valid.[2,3]

Even though the clinicians find this new technology advantageous, the advantages from patient's perspective are questionable. Patient's perception on intra-oral scanning can vary among different population, as the attitude or mentality of the people depends on their nature of living and cultural diversity. Therefore, the present study was aimed to evaluate the perception on intra-oral scanning and alginate impression among the orthodontic patients in Chennai.

Material and Methodology

Patient selection

20 subjects (9 males and 11 females) were selected for the study from our department.

Inclusion criteria

- Age group- 15 to 30 years
- Patients with no previous experience on impression making.
- Orthodontic patients before the start of the orthodontic treatment.

Exclusion criteria

- Patients with restricted mouth opening.
- Patient with deep carious lesions.
- Patients with active periodontal disease.
- Patients with temporomandibular disorders.

Study design

Alginate impression making

Maxillary and mandibular tray of appropriate size was selected. Patient was explained about the procedure. Alginate was mixed according to the manufacturer's instructions and the impression was made. Care was taken not to overload the tray with alginate in order to prevent gag reflex. Impressions were made by well experienced clinician, so that good orthodontic diagnostic impressions were made in a single attempt without the need to repeat the impressions.

Intra-oral scanning

Intra-oral scanning was done after 5 days of making alginate impression. Before starting the intra-oral scanning, the procedure was explained to the patient. Intra-oral scanning was done by an experienced clinician using Trios, 3Shape intra-oral scanner. After the completion of the scan, a questionnaire comprising of 12 questions were given to the patient.

Questionnaire

The questionnaire comprised of 12 questions were given as print outs. The questionnaire was designed in such a way that it evaluated both the preference and perception of the patients on impression technique. 6 questions assessed the preference of the patient while 5 questions assessed the perception of gag reflex, pain, discomfort, time consumption etc. The perception and acceptability was assessed by a 5 unit rating scale, i.e., strongly disagree, disagree, neutral, agree and strongly agree. One of the questions was repeated to make sure that the patients fill the questionnaire after carefully reading the questions.

Statistical analysis

Statistical analysis was done using IBM SPSS Statistics Software Version 20.0 for Windows.

Results

Tables 1 and 2 represent the frequency percentage for the questions that assessed patient preference and perception respectively. It was observed that all the questions were answered by all the subjects.

Table 1: Frequency percentage for questions that assessed patient preference

Questions	Alginate impression (%)	Intra-oral scanning (%)
Which impression technique do you feel is comfortable?	55	45
Which impression technique do you feel has minimum gagging reflex?	0	100
Which impression technique has more breathing difficulty?	85	15
Which impression technique do you prefer in terms of maximum mouth opening?	65	35
Which impression technique do you think is more time consuming?	10	90
Which impression technique do you think has more gag reflex?	100	0
Which impression technique do you prefer/suggest in case of a friends' need for impression making?	50	50

Table 2: Frequency percentage for questions that assessed patient perception and acceptability

Questions	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Intra-oral scanning is more comfortable than alginate impression.	15	30	55	0	0
Intra-oral scanning is a painless procedure compared to alginate impression.	10	30	60	0	0
Alginate impression has a burning sensation compared to intra-oral scanning.	5	10	30	50	5
Alginate impression makes your mouth dry compared to intra-oral scanning.	0	45	30	20	5
Intra-oral scanning is a less time consuming procedure than alginate impression	0	0	40	45	15

Discussion

The present study was targeted towards the young orthodontic patients in Chennai who had no previous experience with any type of impressions in order to prevent skewing of the data with any previous experience. Patients with restricted mouth opening, TMJ disorders, active periodontal disease and deep carious lesions were excluded since these factors can cause pain and discomfort while taking impressions or scanning and skew the result. Intra-oral scanning was done 5 days after taking alginate impression in order to reduce the chair side time for that particular day and continuously opening the mouth wide can lead to pain and discomfort.

The questionnaire comprised of questions to identify both preference and perception of the patients on alginate impression and intraoral scanning. 6 questions assessed the preference and 5 questions assessed perception. One of the questions was repeated to make sure the participants read the questions carefully before answering. It was noted that all the subjects responded correctly to the repeated question. The questions were focused on gag reflex, breathing difficulty, comfort, burning sensation, mouth dryness, and time consumption of both alginate impression and intra-oral scanning.

Results of the present study shows that patients who had more gag reflex while making alginate impressions preferred intra-oral scanning while those who did not have gag reflex while making alginate impressions preferred the conventional alginate impressions. Most of all the patients had the same opinion that intra-oral scanning was a more time consuming procedure than alginate impressions. Majority of the patients experienced dryness of the mouth after making alginate impressions. When maximum mouth opening was considered patients preferred alginate impression. This may be because patient had to open the wide while scanning the most distal aspects of the oral cavity. When the overall comfort and preference was assessed, both alginate impressions and intra-oral scanning were at the same level.

Studies by Burzynski et al[6], Burhadt et al[5], Mangano et al[7],Yuzbasioglu et al[8], Sfondrini et al[9], Vasudavan et al[10] reported that orthodontic patients preferred intra-oral scanning than conventional impression techniques. Burzynski et al[6] and Burhadt et al[5] also reported that the eventhough intra-oral scanning consumed more time than conventional impression techniques, patients preferred digital impressions. All the studies report that most of the patients experienced gag reflex during alginate impression. The overall dsicomfort level was the same for both the techniques. The results of the present study correlated with the results of the previous studies in terms of perception of the patient on alginate impressions and intra-oral scanning. Whereas, when preference was considered, the results of the present study differed from that of the previous studies. The participants of the present study had equal level of preference for both the techniques. Since the sample size of the present study was limited, future studies on the perception of intraoral scan and alginate impressions among orthodontic patients in Chennai, with a large sample size is required.

Conclusion

We found that the orthodontic patients in Chennai had equal preference for intra-oral scanning and alginate impression. As the intra-oral scanning technology continues to advance, the time consumed for the technique will decrease and the tip size will reduce. This might lead to greater acceptance of intra-oral scanning by the patients.

Ethical Clearance: The study was approved by the Institution Review Board, Saveetha Dental College and Hosiptals, Saveetha University, Chennai.

Source of Funding: Self

References

1. Jacob HB, Wyatt GD, Buschang PH. Reliability and validity of intraoral and extraoral scanners. Progress in orthodontics. 2015 Dec 1;16(1):38.
2. TOMITA Y, UECHI J, KONNO M, SASAMOTO S, IIJIMA M, MIZOGUCHI I. Accuracy of digital models generated by conventional impression/ plaster-model methods and intraoral scanning. Dental materials journal. 2018 Apr 17:2017-8.
3. Kirschneck C, Kamuf B, Putsch C, Chhatwani S, Bizhang M, Danesh G. Conformity, reliability and validity of digital dental models created by clinical intraoral scanning and extraoral plaster model digitization workflows. Computers in biology and medicine. 2018 Sep 1;100:114-22.
4. Anusavice KJ, Shen C, Rawls HR. Phillips' science of dental materials. Elsevier Health Sciences; 2013.
5. Burhardt L, Livas C, Kerdijk W, van der Meer WJ, Ren Y. Treatment comfort, time perception, and

preference for conventional and digital impression techniques: A comparative study in young patients. American Journal of Orthodontics and Dentofacial Orthopedics. 2016 Aug 1;150(2):261-7.

6. Burzynski JA, Firestone AR, Beck FM, Fields HW, Deguchi T. Comparison of digital intraoral scanners and alginate impressions: Time and patient satisfaction. American Journal of Orthodontics and Dentofacial Orthopedics. 2018 Apr 1;153(4):534-41.
7. Mangano A, Beretta M, Luongo G, Mangano C, Mangano F. Suppl-1, M8: Conventional Vs Digital Impressions: Acceptability, Treatment Comfort and Stress Among Young Orthodontic Patients. The open dentistry journal. 2018;12:118.
8. Yuzbasioglu E, Kurt H, Turunc R, Bilir H. Comparison of digital and conventional impression techniques: evaluation of patients' perception, treatment comfort, effectiveness and clinical outcomes. BMC oral health. 2014 Dec;14(1):10.
9. Sfondrini MF, Gandini P, Malfatto M, Di Corato F, Trovati F, Scribante A. Computerized Casts for Orthodontic Purpose Using Powder-Free Intraoral Scanners: Accuracy, Execution Time, and Patient Feedback. BioMed research international. 2018;2018.
10. Vasudavan S, Sullivan SR, Sonis AL. Comparison of intraoral 3D scanning and conventional impressions for fabrication of orthodontic retainers. Journal of clinical orthodontics: JCO. 2010 Aug;44(8):495.
11. McGuinness NJ, Stephens CD. Storage of orthodontic study models in hospital units in the UK. British journal of orthodontics. 1992 Aug 1;19(3):227-32.
12. Jacob HB, Wyatt GD, Buschang PH. Reliability and validity of intraoral and extraoral scanners. Progress in orthodontics. 2015 Dec 1;16(1):38.
13. Lippold C, Kirschneck C, Schreiber K, Abukiress S, Tahvildari A, Moiseenko T, Danesh G. Methodological accuracy of digital and manual model analysis in orthodontics–A retrospective clinical study. Computers in biology and medicine. 2015 Jul 1;62:103-9.
14. Koretsi V, Kirschbauer C, Proff P, Kirschneck C. Reliability and intra-examiner agreement of orthodontic model analysis with a digital caliper on plaster and printed dental models. Clinical oral investigations. 2018 Dec 11:1-0.
15. Rheude B, Lionel Sadowsky P, Ferriera A, Jacobson A. An evaluation of the use of digital study models in orthodontic diagnosis and treatment planning. The Angle Orthodontist. 2005 May;75(3):300-4.
16. Grünheid T, McCarthy SD, Larson BE. Clinical use of a direct chairside oral scanner: an assessment of accuracy, time, and patient acceptance. American Journal of Orthodontics and Dentofacial Orthopedics. 2014 Nov 1;146(5):673-82.
17. Peluso MJ, Josell SD, Levine SW, Lorei BJ. Digital models: an introduction. InSeminars in Orthodontics 2004 Sep 1 (Vol. 10, No. 3, pp. 226-238). WB Saunders.
18. Sweeney WT, Taylor DF. Dimensional changes in dental stone and plaster. Journal of dental research. 1950 Dec;29(6):749-55.
19. Brandestini M, Moermann WH, inventors; Moermann Werner H, assignee. Method and apparatus for the three-dimensional registration and display of prepared teeth. United States patent US 4,837,732. 1989 Jun 6.
20. Otto T, Schneider D. Long-term clinical results of chairside Cerec CAD/CAM inlays and onlays: a case series. Int J Prosthodont. 2008 Jan 1;21(1): 53-9.

Knowledge, Attitude and Practice of Dentists Towards Provision of Dental Care to Pregnant Women

Aroonika S. Bedre[1], Subash Sharma[2]

[1]Graduate Student, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Poonamallee High Road, Chennai, Assistant Professor, Department of Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University

Abstract

Aim : The objective of this study was to evaluate the knowledge, attitude and practice of dentists towards provision of dental care to pregnant women.

Material and Method: A multiple choice questionnaire was self-administered to dentists in Chennai. The collected data was statistically analysed.

Results: Although majority of the dentists were well informed about the management of pregnant patients, dilemmatic attitudes were seen regarding dental radiographs, local anaesthesia and prenatal fluoride supplementation.

Conclusion: This demonstrates the need to broaden the knowledge of dental surgeons via CDE programs and workshops.

Keywords: *Oral health, pregnancy, dentists, knowledge, drugs, radiographs.*

Introduction

Pregnancy begins when the embryo becomes implanted into the endometrial lining of a woman's uterus. In humans, it lasts for approximately nine months. It is divided into 3 trimesters[1]. The gestation period is characterised by both physiological and emotional changes. The hormonal transformations may bring out oral changes, requiring greater assistance from dentists [2-5]. Common symptoms such as gastro-intestinal reflux, nausea and vomiting result in an acidic oral environment that promotes demineralization of tooth enamel and the growth of dental caries causing pathogens [6-9]. Rising levels of oestrogen and progesterone produce an inflammatory response that predisposes women to gingival manifestations like gingivitis, periodontitis, gingival hyperplasia and pyogenic granuloma [6,8]. In fact, pregnancy gingivitis is recognized as the most common oral manifestation in pregnant women [10-12]. Moreover, the increased susceptibility to infections and reduced ability to repair soft tissue caused by hormonal fluctuations increases the risk of developing periodontitis [13]. Untreated periodontitis results in loss of alveolar bone, supporting structures and ultimately in tooth loss [14]. Oral disease during pregnancy could lead to complications beyond the oral cavity. Periodontal disease, has been linked to preeclampsia (pregnancy hypertension) gestational diabetes, preterm birth, low birth weight and still births [15-24].

Pregnancy is a normal physiological phase in a woman's lifetime and warrants the routine preventive and emergency oral health care provided to other members of the general population [25]. The provision of dental treatment during pregnancy is not only safe, it is also an important aspect of antenatal care and is advised by the American Congress of Obstetricians and Gynecologists and the American Academies of Periodontology and Pediatrics [26-31].

Aroonika S. Bedre
Corresponding author:
Graduate student, Saveetha Dental College,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, 162, Poonamallee High Road
Chennai - 600077, E-mail: aroonika.bedre@gmail.com
Telephone number: 8807040124

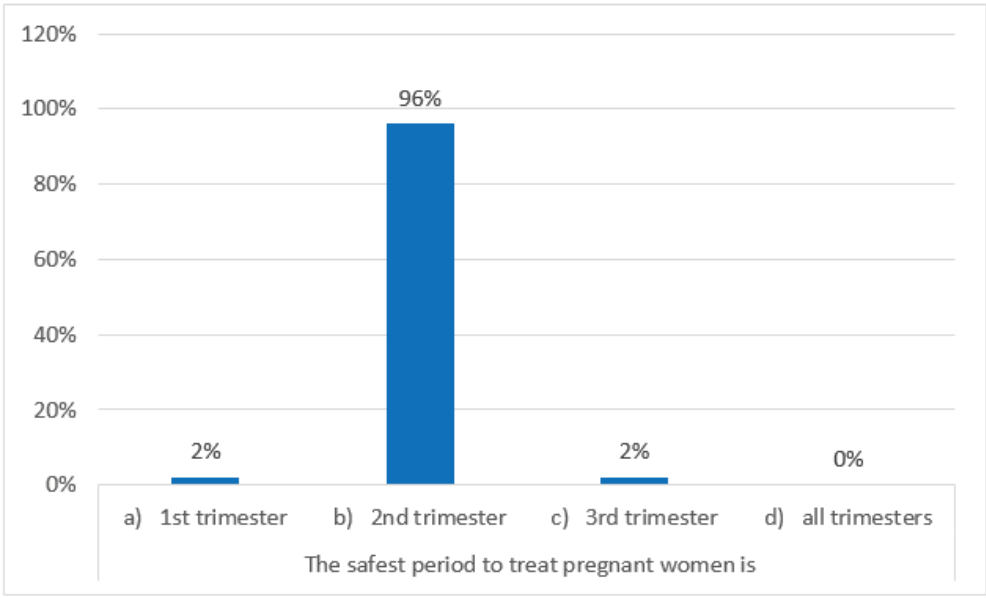
Comprehensive oral examination of pregnant patient is recommended to diagnose disease processes that need immediate treatment to prevent self-medication with unsafe over the counter medications for pain relief [32]. In a study it was found that general dentists with low/moderate knowledge were less likely to provide comprehensive care for the pregnant patient [33]. Efforts to promote oral health of pregnant woman have increased in the recent years due to identified link between maternal transmission of bacterial and early childhood caries [34]. In addition, poor maternal oral health has also been linked to adverse pregnancy outcomes [32, 34, 35]. Nutritional intake of pregnant woman can also be affected due to poor oral health which in turn can impair the supply of nutrients necessary for fetal growth and survival [32].

Most pregnant patients are generally healthy and hence dental treatment need not be denied solely because they are pregnant [32,36]. There is concern among dentists that dental procedures that cause bacteremia may lead to uterine infections, spontaneous abortions or preterm labor. However, there is no evidence that dental procedure induced bacteremias increases the woman's risk of experiencing fetal loss or preterm labor or delivery [37]. Inspite of this, practitioners may hesitate to treat pregnant patients for the fear of injuring either the mother or the unborn child [32,37,38]. This may be due to lack of preparation and the knowledge required, which may aggravate the oral condition of the patient and bring harm to both mother and baby [39, 40]. This reluctance is attributed, to deficiencies in the training of undergraduate dental surgeons [41]. Curricular studies of US and Canadian dental schools suggest changes towards a more interdisciplinary curriculum in collaboration with other professions' health schools, is desirable [42].

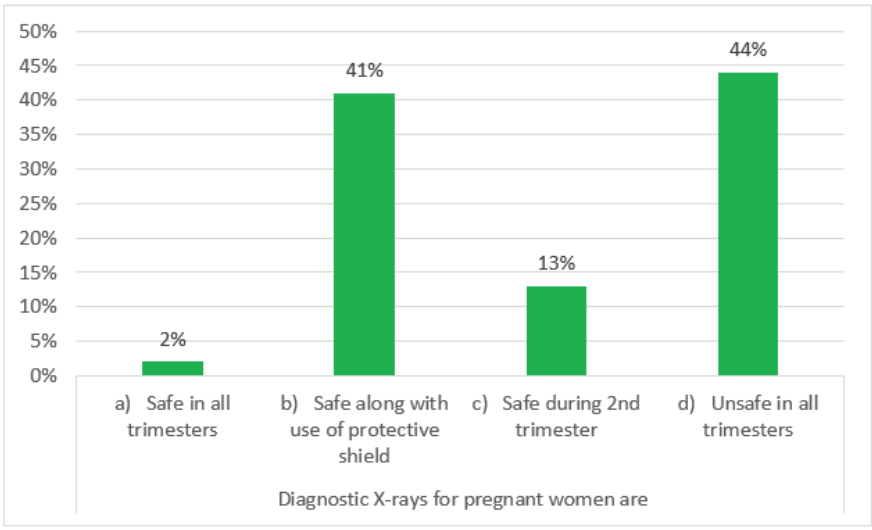
Materials and Method

A cross-sectional survey was conducted among dentists in Chennai in December 2017. The survey instrument was a structured, self-administered multiple choice questionnaire which was developed in consultation with oral medicine specialist to improve its content validity. The study included a random convenience sample comprising of 200 participants. The questionnaire had 20 questions in total, regarding drug administration, infection consequences, oral findings, treatment aspects, and radiation exposure with respect to pregnant patients. Data was collected and statistically analysed using Chi-square test.

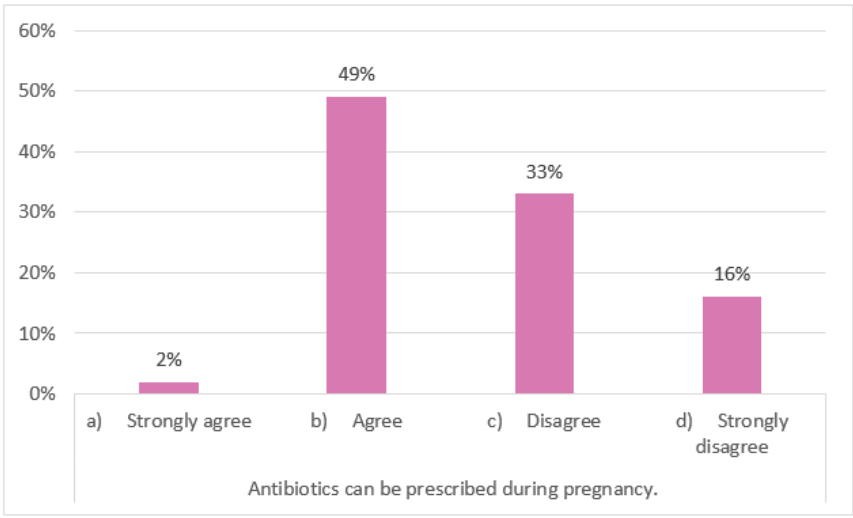
Results



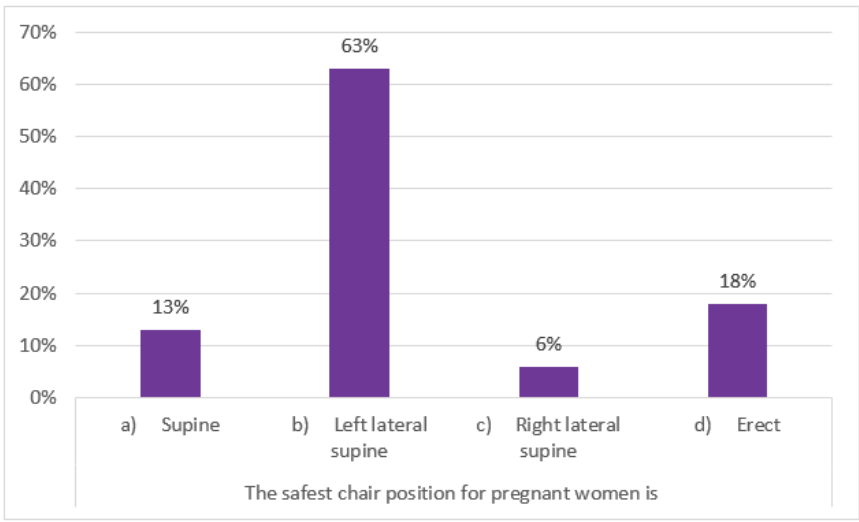
Graph 1: Safest period to treat pregnant women



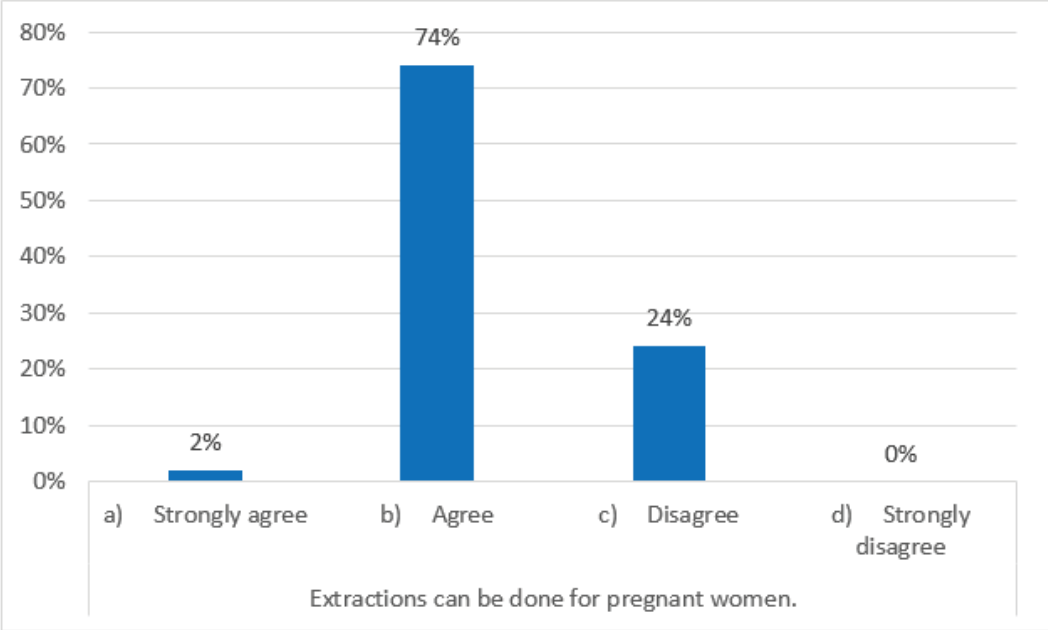
Graph 2: Diagnostic X-rays for pregnant women



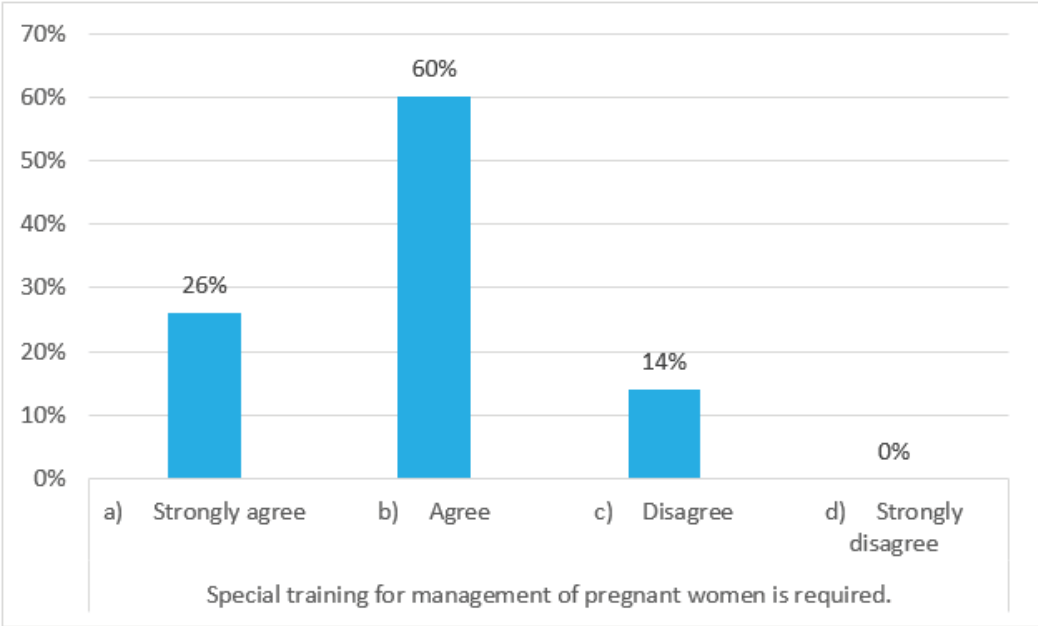
Graph 3: Prescription of antibiotics during pregnancy



Graph 4: Safest chair position for pregnant women



Graph 5: Whether extractions can be done for pregnant women



Graph 6: Whether special training for management of pregnant women is required

Discussion

Most of the study participants (91%) were aware of the fact that the most common oral manifestation in pregnant women is gingival disease. Similar results were obtained in several other studies too [43]. The increase of the level of progesterone in the gingiva increases the synthesis of prostaglandins, being the probable explanation for the intensification of gingival inflammation [44]. Majority of the dentists (96%) knew that the 2nd trimester was the safest period to treat pregnant women (graph 1). During the second trimester organogenesis is completed and hence is the safest period for providing dental care. Though there is no risk to the fetus during the third trimester the pregnant woman may experience discomfort due to the increased size of the

uterus [43]. Dental radiographs can be taken during all the trimesters of pregnancy if standard radiation hygiene practices like use of lead apron and thyroid collar are followed [45]. Estimated fetal exposure from a single dental radiograph is 0.0001 rad. Therefore, it would take 50,000 examinations to reach the cumulative 5-rad dose limit [46]. In our study, 44% of the members considered dental radiography unsafe in all trimesters, 41% of them considered it safe along with use of protective shield, and 13% of them considered it safe during 2nd trimester (graph 2). The results were similar to other studies as well [43,47].

Food and drug administration (FDA) has classified drugs into five categories. Drugs in category a and b are safe for use, whereas those in category c may be used only if the benefits outweigh the risks. Drugs in category d are avoided with some exceptional circumstances, while those in category x are strictly avoided [48]. Most antibiotics permitted by the dentist belongs to category b of FDA classification with exemption of gentamycin and doxycycline both of which fits in to class d. Penicillins and cephalosporins which are beta-lactum ring derived antibiotics are the first choice for orofacial infections [49]. 49% of the participants agreed that antibiotics can be prescribed during pregnancy, while 33% of them disagreed and 16% of them strongly disagreed (graph 3). Regarding the use of antibiotics, 80% of the dentists said they would prescribe amoxicillin for pregnant women, while 11% said cephalosporin. Similar results were seen in several other surveys [43]. Acetaminophen is the most common and safest analgesic used in pregnancy and is categorized in group b by the FDA classification.[50] Most of the participants (74%) were aware of the fact that acetaminophen is the safest analgesic for pregnant women. Anaesthetics such as lidocaine and prilocaine are categorized in class b of the FDA classification. The concentration of epinephrine in a local aesthetic used in dentistry is considered safe provided a check is kept on the proper aspiration technique and the amount injected [51]. In our study, regarding the use of anesthetic, 50% said they would administer lidocaine without adrenaline for pregnant women, while 38% said they would administer lidocaine with adrenaline. Similarly, results from several studies suggest that dentists avoid the use of vasoconstrictors in pregnant women [52]. Regarding inhalation sedation with nitrous oxide, 66% of the participants in our study disagreed with the fact that it is advisable for pregnant women, while 21% agreed with the fact. Nitrous oxide is not listed in the FDA classification as its use during pregnancy is still controversial. It is best to avoid nitrous oxide during first trimester [53]. Regarding inhalation sedation with midazolam oxide, 68% disagreed with the fact that it is advisable for pregnant women, while 18% agreed with the fact. Benzodiazepines are contraindicated during pregnancy, as they could have a teratogenic power [52].

During treatment, the patient should not be placed in the supine position because of the possibility of supine hypotensive syndrome and deep venous thrombosis. If supine hypotension develops, rolling the patient on to her left side affords return of circulation to heart by moving the uterus off the vena cava [43]. 63% of the participants knew that the left lateral supine position is the safest chair position for pregnant women, while 18% of them said erect position was the safest (graph 4). 58% disagreed that prenatal fluoride supplementation (for pregnant women) reduces risk of caries in children, while 34% agreed. Although fluoride is a known substance that prevents tooth decay, fluoride supplements are not necessary for pregnant women because its benefits are proven only in the postnatal stage [43]. It's safe to perform elective procedures i.e. Root canal, extraction, restorations during the 2nd and 3rd trimesters [48]. 74% agreed that extractions can be done for pregnant women, while 24% disagreed (graph 5). 76% of the study participants agreed that root canal treatment can be done for pregnant women and 18% of them strongly agreed. 55% of the dentists disagreed that periapical surgeries can be done for pregnant women, while 36% agreed. 71% of the people agreed that amalgam restorations can be done for pregnant women, while 23% disagreed. 60% agreed and 26% strongly agreed that special training is required for management of pregnant women (graph 6). Similarly, in a study by Praveena Tandradi participants claimed to have "just a little" information and were interested to attend CDE programs [43].

Conclusion

Majority of the dentists in our study were well informed about the dental management of pregnant women. Nevertheless, dilemmatic attitudes were seen in relation to few aspects such as dental radiographs, local anaesthesia administration and prenatal fluoride supplementation. This demonstrates the need to broaden the knowledge of dental surgeons regarding dental care of pregnant women via changes in dental curriculum, CDE programs and workshops.

No conflict of Interest

Ethical Clearance: Taken from Institutional Ethical Clearance Committee

Source of Funding: Self

References

1. Njane Peter Mwangi. (2011) knowledge, attitude and practice of dentists in offering dental treatment to expectant women. BDS from university of Nairobi.
2. Hemalatha, V.T., Manigandan, T., Sarumathi, T., Aarthi Nisha, V, Amudhan, A. Dental considerations in pregnancy - a critical review on the oral care. Journal of clinical and diagnostic research. 2013; 7, 948-953.
3. Lopez, B.C., Perez, M.G., Soriano, Y.J. Dental considerations in pregnancy and menopause. Journal of clinical and experimental dentistry. 2011; 3: 135–144.
4. Mascarenhas, P., Gapski, R., Al-Shammari, K. And Wang, H.L. Influence of sex hormones on the periodontium. Journal of clinical periodontology. 2003; 30: 671–681.
5. Steinberg B.J., Hilton I.V., Iida H. and Samelson R. Oral Health and Dental Care During Pregnancy. Dental Clinics of North America. 2013; 57: 195-210.
6. Naidu GM, Ram KC, Kopuri RK, Prasad SE, Prasad D, et al. Is dental treatment safe in pregnancy? A dentist's opinion survey in South India. J Orofac Res. 2013; 3: 233-239.
7. Turner M, Aziz SR Management of the pregnant oral and maxillofacial surgery patient. J Oral Maxillofac Surg. 2002; 60: 1479-1488.
8. Kloetzel MK, Huebner CE, Milgrom P Referrals for dental care during pregnancy. J midwifery womens health; 2011: 56: 110-117.
9. Shamsi M, Hidarnia A, Niknami S, Rafiee M, Zareban I, Et Al. The effect of educational program on increasing oral health behavior among pregnant women: applying health belief model. Health education & health promotion. 2014; 1: 21-36.
10. Silk H, Douglass AB, Douglass JM, Silk L. Oral health during pregnancy. Am fam physician 2008; 77: 1139-1144.
11. Barak S, Oettinger-Barak O, Oettinger M, Machtei EE, Peled M, et al. Common oral manifestations during pregnancy: a review. Obstet Gynecol Surv. 2003; 58: 624-628.
12. Steinberg BJ. Women's oral health issues. J dent educ. 1999; 63: 271-275.
13. Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: an analysis of information collected by the pregnancy risk assessment monitoring system. J am dent assoc. 2001; 132: 1009-1016.
14. Laine M. Effect of pregnancy on periodontal and dental health. Acta odontol scand. 2002; 60: 257-264.
15. Rashidi Maybodi F, Haerian-Ardakani A, Vaziri F, Khabbazian A, Mohammadi-Asl S. CPITN changes during pregnancy and maternal demographic factors 'impact on periodontal health. Iran j reprod med. 2015;13: 107-112.
16. Han YW et al. Oral health and adverse pregnancy outcomes-what's next? J dent res. 2011; 90: 289-293.
17. Clothier B, Stringer M, Jeffcoat MK. Periodontal disease and pregnancy outcomes: exposure, risk and intervention. Best pract res clin obstet gynaecol. 2007; 21: 451-466.
18. Xiong X, Buekens P, Fraser Wd, Beck J, Offenbacher S. Periodontal disease and adverse pregnancy outcomes: a systematic review. 2006;113: 135-143.
19. Dasanayake AP, Gennaro S, Hendricks-Muñoz Kd, Chhun N. Maternal periodontal disease, pregnancy and neonatal outcomes. Mcn am j matern child nurs. 2008; 33: 45-49.
20. Hemalatha VT, Manigandan T, Sarumathi T, Nisha VA, Amudhan A. Dental considerations in pregnancy-a critical review on the oral care. J clin diagn res. 2013; 7: 948-953.
19. Ruma M, Boggess K, Moss K, Jared H, Murtha A, et al. Maternal periodontal disease, systemic inflammation and risk for preeclampsia. Am j obstet gynecol. 2008; 198: 389.
22. Morgan MA, Crall J, Goldenberg RL, Schulkin J. Oral health during pregnancy. J matern fetal neonatal med. 2009; 22: 733-739.
23. Boggess KA, Edelstein BL. Oral health in women during preconception and pregnancy: implications

for birth outcomes and infant oral health. Matern child health j. 2006; 10: 169-174.

24. López NJ, Smith PC, Gutierrez J. Periodontal therapy may reduce the risk of preterm low birth weight in women with periodontal disease: a randomized controlled trial. J periodontal. 2002; 73: 911-924.
25. Radha G, Sood P. Oral care during pregnancy: dentist's knowledge, attitude and behaviour in treating pregnant patients at dental clinics of Bengaluru, India. Journal of pierre fauchard academy (India section). 2013; 27:135-141.
26. George A, Shamim S, Johnson M, Dahlen H, Ajwani S, et al. How do dental and prenatal care practitioners perceive dental care during pregnancy? Current evidence and implications. Birth. 2012; 39: 238-247.
27. American academy of pediatric dentistry (2011) guideline on perinatal oral health care. Chicago, illinois: american academy of pediatric dentistry.
28. Kumar J, Samelson R. Oral health care during pregnancy and early childhood: practice guidelines. Albany 2011.
29. California dental association foundation. Oral health care during pregnancy and early childhood: evidence-based guidelines for health professionals. J calif dent assoc. 2010; 28: 391-403.
30. Achtari MD, Georgakopoulou EA, Afentoulide N. Dental care throughout pregnancy: what a dentist must know. Oral health dent manag. 2012; 11: 169-176.
31. The american academy of pediatrics and the american college of obstetricians and gynecologists (2007) guidelines for perinatal care 6: 123-124.
32. Amini H, Casamassimo PS. Prenatal dental care: a review. Gen dent 2010; 58:176-80.
33. Da Costa EP, Lee JY, Rozier RG, Zeldin L. Dental care for pregnant women .an assessment of north carolina general dentists. J am dent assoc 2010; 141:986-94.
34. Huebner CE, Milgrom P, Conrad D, Lee RS. Providing dental care to pregnant patients. A survey of oregon general dentists. J am dent assoc 2009; 140:211-22.
35. Wrzosek T, Einarson A. Dental care during pregnancy. Can fam physician 2009; 55:598 9.
36. Giglio JA, Lanni SM, Laskin DM, Giglion W. Oral health care for the pregnant patient. J can dent assoc 2009; 75:43-8.
37. Michalowicz BS, Diangelis AJ, Novak MJ, Buchanan W, Papapanou PN, Mitchell DA, et al. Examining the safety of dental treatment in pregnant women. J am dent assoc 2008; 139:685-95.
38. Dellinger TM, Livingston HM. Pregnancy: physiologic changes and consideration for dental patients. Dent clin n am 2006; 50:677-97.
39. Kloetzel M.K., Huebner C.E. and Milgrom P. Referrals for dental care during pregnancy. Journal of midwifery & women's health. 2011; 56: 110-117.
40. Silk H., Douglass A.B., Douglass J.M. and Silk L. Oral health during pregnancy. American family physician.2008; 77; 1139-1144.
41. Moimaz S.A.S., Garbin C.A.S., Lolli L.F., Dossi A.P. and Nayme J.G.R. Dental students' perception of aging. Revista de odontologia da unesp 2010;39: 227-231.
42. Haden N.K., Hendricson W.D., Kassebaum D.K., Ranney R.R., Weinstein G., Anderson E.L. and Valachovic R.W. Curriculum change in dental education, 2003–09. Journal of dental education 2010; 74: 539–557.
43. Tantradi P, Madanshetty P. Knowledge of dental interns about management of dental needs of pregnant patients. J educ ethics dent 2013; 3:76-80.
44. Pirie M., Cooke I., Linden G. and Irwin C. Dental manifestations of pregnancy. Obstetrics & gynecology 2007; 9: 21–26.
45. Ra'ed Al-Sadhan, Abdullatif Al-Manee. Dentist's opinion toward treatment of treatment of pregnant patients. The saudi dental journal. 2008; 2:24–30.
46. Toppenberg KS, Hill DA, Miller DP. Safety of radiographic imaging during pregnancy. Am fam physician. 1999 apr 1;59(7):1813–8.
47. Ashok et al, Patients perception on dental radiographs: a questionnaire-based study. International journal of orofacial biology. 2017; 1:28-31.
48. Mustafa Naseem et al. Oral health challenges in pregnant women: recommendations for dental care professionals. The Saudi Journal for Dental Research. 2016; 7: 138-146
49. Suresh L, Radfar L. Pregnancy and lactation. Oral

surg oral med oral pathol oral radiol endod 2004; 97:672-82.

50. Grahame-Smith DG, Aronson JK. Oxford textbook of clinical pharmacology and drug therapy, 1992.
51. Malamed SF. Local Anesthesia. J calif dent assoc 1998; 26:657–60.
52. Fernanda et al. Dentists' knowledge of oral health during pregnancy: a review of the last 10 years' publications. community dental health. 2015; 32: 1–6
53. Clark MS, Brunick A. Handbook of nitrous oxide and oxygen sedation. Elsevier health sciences; 2007.

HIV/AIDS – Related Knowledge and Attitudes Amongst Medical, Dental and Nursing Students of Saveetha University, Chennai

Aroonika S. Bedre[1], Gheena S[2]

[1]Graduate Student, [2]Reader, Dept. of Oral Pathology, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai

Abstract

Aim: This study is aimed at assessing the HIV/AIDS - related knowledge and attitudes amongst medical, dental and nursing students of Saveetha University, Chennai. With increasing number of people having HIV/AIDS, students of medicine and health allied science should have sufficient knowledge about the transmission of the disease, and their attitude should meet professional expectations.

Materials and Method: A self-administered questionnaire was devised and a cross sectional study was conducted on 300 students in toto i.e. 100 medical students, 100 dental students and 100 nursing students. Data recorded was subjected to statistical analysis and appropriate conclusions were drawn.

Results: A small number of students in the medical fraternity had inadequate knowledge and misconceptions about HIV and harboured negative attitude towards HIV patients.

Conclusion: The findings from our study suggest that in order to instil a professional, ethical and empathetic approach towards AIDS patients, awareness and training programs are essential.

Keywords*: Knowledge, attitude, HIV/AIDS patients, medical students, dental students, nursing students.*

Introduction

AIDS is a serious medical condition caused by HIV. The patient's immune system becomes too weak to fight off infection, resulting in serious complications that ultimately prove fatal. The first case of HIV was recognized in the U.S. in 1981.[1] In 2009, India was estimated to have the third highest number of HIV infections in the world, with about 2.4 million people currently living with HIV/AIDS. However, according to United Nations 2011 AIDS report, there has been a 50% decline in the number of new HIV infections in the last 10 years in India. [2]

Corresponding author:
Aroonika S. Bedre
Graduate Student, Saveetha Dental College,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, 162, Poonamallee High Road,
Chennai – 600077. E-mail: aroonika.bedre@gmail.com
Telephone number: 8807040124

In 1988, the WHO has stated that all dentists should treat HIV patients.[3] Despite these recommendations, ignorance of the risk of HIV transmission during dental procedures has led many dentists to refuse and/ or become reluctant to treat these patients. [4-6] This is particularly significant in developing countries like India where these patients do not receive professional treatment owing to financial barriers. [7]

Students of medicine and health allied sciences play an important role in the delivery of health care to HIV/ AIDS individuals and are therefore of special interest and importance in this respect. With increasing number of people having HIV/AIDS, students of medicine and health allied science should have sufficient knowledge about the transmission of the disease, and their attitude should meet professional expectations. Thus a cross sectional study was conducted to assess HIV/AIDS – related knowledge and attitudes amongst these students.

Materials and Method

The cross sectional study was conducted in Saveetha University, Chennai during April 2015 after receiving approval from the Review Board of Saveetha Dental College. The study included a random convenience sample comprising of 150 participants. ie. 75 from the medical, dental and nursing sectors each. These students were either third year students, fourth year students or interns. Their knowledge about AIDS and attitude towards HIV patients was assessed by a structured, self -administered questionnaire. Knowledge based questions covered various aspects such as causative agent, pathogenecity, transmission, prevention and treatment of AIDS patients. (Table 1) Attitude based questions tested students' empathy, neutrality and indifference towards AIDS patients. Data was collected and analyzed.

Results

- 97.3% of all the students were aware that AIDS stands for Acquired Immuno Deficiency syndrome and 96.5% knew that its causative agent is Human Immuno deficiency Virus.

- 90% of the students knew the difference between AIDS and HIV.

- 57.7% of them agreed that AIDS is less communicable than Hepatitis B.

- 43% of them knew that the virus is icosahedral in shape.

- 88.3% were aware that gp 140 and 41 are the transmembrane glycoproteins present in the envelope of the virus.

- 71% of the members knew that the virus binds to CD4 and chemokine receptors on the host cell.

- 46.7% were aware of the classification of HIV based on CD4+ cell counts i.e. .

- 54.8% of them agreed that there is no phase during which all the viruses are in the form of proviral DNA when the host cells remain uninfected.

- 77.3% of the study population were aware of the fact that HIV infected patients can remain asymptomatic for months or years.

- 97% of the study members agreed that sexual contact, blood transfusion, sharing needles/ syringes and mother to child are the modes of HIV transmission.

- 83.68% of the students knew that mosquito bites, saliva, sweat, tears, social contact (casual kissing, hugging, sharing utensils and clothes), toilet seats, coughing and sneezing are not responsible for HIV transmission.

- 94.5% of the study participants knew that ELISA and Western blot are the preliminary and confirmatory tests for AIDS.

- 79.3% of the people knew that one cannot protect themselves by being vaccinated against AIDS.

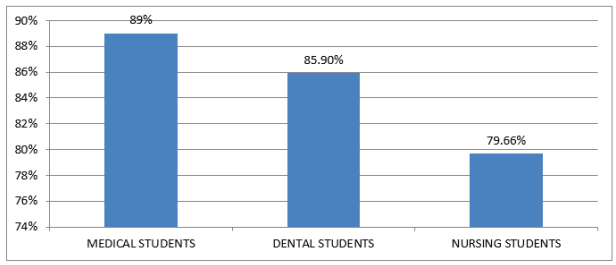
- 88.2% of the students agreed that abstinence, fidelity and condom usage can lower risk of AIDS

- 88.2% were aware that barrier technique includes wearing double gloves, surgical cap, protective eye wear and disposable gowns.

- 34.6% of the people agreed that heat sterilization does not kill HIV.

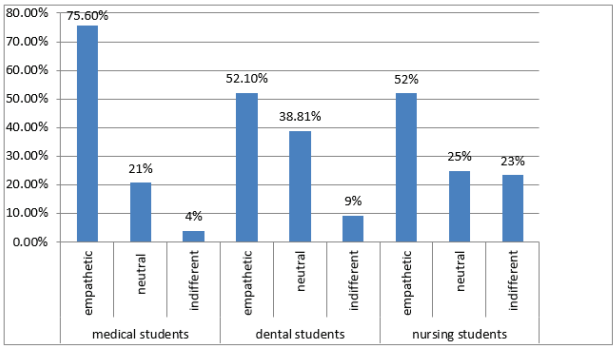
- 77.5% of the study participants knew that reverse transcriptase inhibitors and anti-viral drugs are the most widely available HIV medication.

- 75.8% of the study population were aware that there are specialized clinics for treatment of HIV patients.



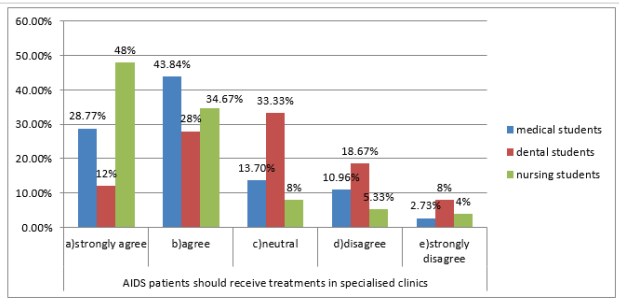
Graph 1: Over all knowledge levels.

- 84.85% of all the students gave the correct response to knowledge based questions. 89%, 85.8% and 79.7% of medical, dental and nursing students respectively gave the correct response to knowledge based questions.



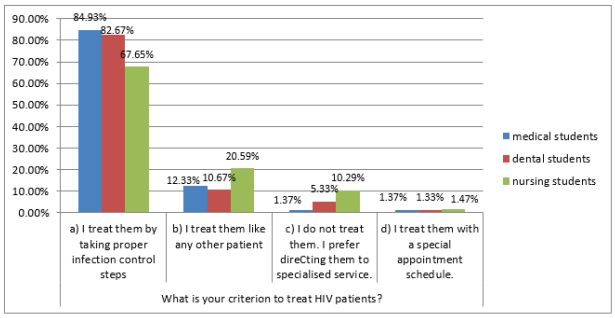
Graph 2: Over all kinds of attitude.

- 59.90 of all students showed empathetic attitudes. 75.6%, 52.10 and 52% of medical, dental and nursing students respectively showed empathy towards HIV patients. 21%, 38.81% and 25% of the same groups showed a neutral attitude. While the rest remained indifferent.



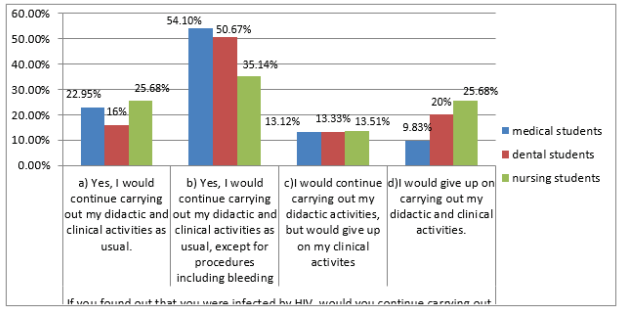
Graph 3: Student's response to whether AIDS patients should receive treatments in specialized clinics.

- And 65% of the study participants felt that these patients require treatment in specialized clinics.



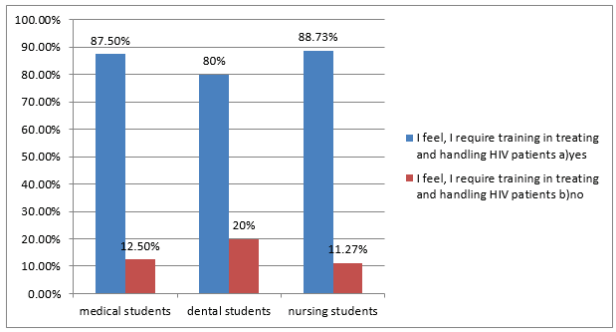
Graph 4: Students' criterion to treat HIV patients.

- 78.4% of the entire group responded that they will treat AIDS patients with proper infection control steps.



Graph 5: Students' response to whether they would carry out their health care duties if they were found to be infected with AIDS.

- 46.6% of the participants altogether claimed that they would continue carrying out their didactic and clinical activities as usual, except for procedures including bleeding, if they contract AIDS themselves.



Graph 6: Students who felt they required/ didn't require training in handling AIDS patients.

- 85.4% of the total students felt that they require training in treating HIV patients.

Discussion

In our study majority of the participants were aware of the full form of AIDS, its causative agent, the difference between AIDS and HIV, the transmembrane glycoproteins on the virus, the host receptors, the latency period, modes that help in HIV transmission. They were also aware of the preliminary and confirmatory tests for AIDS. They agreed that abstinence, fidelity and condom usage can lower risk of contracting AIDS. And were cognizant of the barrier techniques that should be adopted by health professionals and the presence of specialized clinics for treatment of HIV patients. They also knew that reverse transcriptase inhibitors and anti-viral drugs are the most widely available medication and that there is no vaccination. Only a minority of our study participants were aware of the shape of the virus, the classification of AIDS based on CD4 count, and that

heat sterilization cannot kill the virus.

A commendable majority (84.5%) of all the students gave the correct response to knowledge based questions. Medical students seemed to have the most knowledge compared to dental and nursing students (graph 1). Although our results show satisfactory levels of knowledge, considerate number of students had misconceptions regarding the transmission of AIDS. Medical students were also the most empathetic, as with knowledge comes empathy (graph 2). Most of the students across all specialties felt that patients require treatment in specialized clinics (graph 3). They agreed that they would take proper infection control steps to treat them (graph 4). Majority of the people mentioned that if they contracted AIDS themselves, they would continue their professional activities but would give up on procedures involving bleeding (graph 5). Also, a large number of the participants felt the need to undergo training in treating AIDS patients (graph 6).

Various similar studies have been conducted worldwide, and wide differences in results have been obtained. According to studies conducted by Jain et al and Shan et al, in Udaipur and Bhopal respectively, over all knowledge levels were found to be satisfactory.[8,9] Excellent knowledge levels of 78.8% and 82.1% were obtained in studies among Indian and Iranian dental students conducted by Ashish Aggarwal and Sadeghi respectively. [10] According to Hidayathulla et al, overall knowledge and attitudes of dental students in Bangalore was moderately adequate to adequate. [11]

According to Daneil M, lack of knowledge about transmission of HIV was observed among the healthcare professionals in private and government hospitals in India. His study had identified serious knowledge gaps among medical practitioners leading to refusal of treatment to persons living with HIV. [12] According to Abhimanyu et al, from Bhubaneshwar and Anjum et al from Karachi low knowledge and attitude scores were found. [13,14] In a study by V. D. Thenarasu among dental students, interns had more knowledge and awareness compared to final year students. [15]

According to McCartan, there are reports of reluctance by dentists to treat patients, including denial of treatment. [16] A study on medical students conducted by Mohsin et al, has shown certain misconceptions regarding transmission of AIDS. [17] According to Azodo CC willingness to treat AIDS patients among dental students appeared to be related to their knowledge of the disease, and understanding the modes of its transmission.[18]

Although there is considerable research on AIDS, uncertainty towards HIV positive patients and refusal to treat them still persists along with the fear and possibility that an HIV positive professional might be prevented from practising his profession. Our participants have good knowledge about AIDS and also empathise HIV patients. Increased knowledge of issues concerning HIV has led to increased willingness to treat these patients.

Conclusion

A small number of students in the medical fraternity had inadequate knowledge and misconceptions about HIV and harboured negative attitude towards HIV patients. These findings suggest that awareness and training programs are essential in order to instil a professional, ethical and empathetic approach towards AIDS patients.

No Conflict of Interest

Ethical Clearance

Taken from Institutional Ethical Clearance Committee

Source of Funding: Self

References

1. MS Gottlieb. Pneumocystis pneumonia, Los Angeles. MMWR.Centers for Disease Control and Prevention. 1981;(30):250-2.
2. UNAIDS report on the global AIDS epidemic, 2010. At: www.unaids.org/globalreport/documents/20101123_ GlobalReport_full_en.pdf. Accessed: October 5, 2011.
3. Oliveira ER, Narendran S, Falcao A. Brazilian dental students' knowledge and attitudes towards HIV infection. AIDS Care 2002;14(4):569-76.
4. Hu SW, Lai HR, Liao PH. Comparing dental students' knowledge of and attitudes toward hepatitis B virus, hepatitis C virus, and HIV-infected patients in Taiwan. AIDS Patient Care STDS 2004;18(10):587-93.
5. Seacat JP, Inglehart MR. Education about treating patients with HIV infections/AIDS: the student perspective. J Dent Educ 2003;67(6):630-40.

6. Bennett ME, Weyant RJ, Wallisch JM, Green G. Dentists' attitudes toward the treatment of HIV-positive patients. J Am Dent Assoc 1995;126(4):509-14.
7. Horizons Program. Measuring stigma: an example—developing a stigma index in India. At: www.popcouncil. org/Horizons/ORToolkit/toolkit/ stigmadevindex1.htm. Accessed: October 5, 2011.
8. Jain M, Mathur A, Kumar S, Dagli RJ, Prabu D, Kulkarni S. Knowledge and attitude among dental students of Udaipur, India towards HIV/AIDS. J Oral Health Community Dent 2008;2(2):30-5.
9. Shan V, Shethwala ND, Bala DV. Knowledge, attitude, and health behavior of dental students towards HIV patients. Health Line 2011;2(1):58-60
10 Rankin KV, Jones DL, Reeds TD. Attitudes of dental practitioners and dental students towards AIDS patients and infection control. Am J Dent 1993;(6):22-6.
11. Hidayathulla Shaikh et al. Knowledge and attitudes of undergraduate dental students in the Oxford dental college and hospitals and research centre, Bangalore towards patients with HIV/AIDS. JIADS 2011; 2(1):1-5.
12. Daniel M Aids in India: Denial and disaster. Harvard International Review. 2003;(25) 9-10.
13. Abhimanyu SC. Knowledge and attitudes related to HIV/AIDS among medical and allied health sciences students. Indian Journal of Community Health. 2013; 23 (2): 96-8.
14. Anjum Q, Siddiqui H, Ahmed Y, Rizvi SR, Usman Y. Knowledge of students regarding Hepatitis and HIV/AIDS of a private medical university in Karachi. J Pak Med Assoc 2005; 55: 285-8.
15. Vinish Dharma Thenarasu, Dr. M.P.Santhosh Kumar, Knowledge of AIDS/HIV and attitudes of dental students towards AIDS/HIV patients. Int. J. Pharm. Sci. Rev. Res., May - June 2017; Article No. 12, 44(1), 43-48
16. McCartan BE and Samaranayake LP Oral care of HIV infected patients: the knowledge and attitudes of Irish dentists. Journal of the Irish dental Association. 1991; 37(2), 41-43.
17. Mohsin S, Nayak S, Mandaviya V. Medical students' knowledge and attitudes related to HIV/AIDS. National Journal of Community medicine.2010;1(2):146- 149
18. Azodo CC, Ehigiator O, Oboro HO, Ehizele AO, Umoh A, et al. Nigerian dental students' willingness to treat HIV-positive patients. J Dent Educ 2010;74(4):446-52.

Stress, Obesity and Quality of Life in Adolescents

Arun Kumar[1], Chitwan Bhasin[2], Udai Prakash Verma[3]

[1]Assistant Professor, [2] M.A. Student, Psychology, [3]Research Scholar, Department of Psychology, Gurukula Kangri Vishwavidyalaya, Haridwar, Uttarakhand, India

Abstract

Stress and obesity has emerged as a major problem in society. According to "The Economic Times" report, India is second largest in the case of obese children in the world[1].The present study is an attempt to investigate the obesity, stress and quality of life in adolescents. For this sample of 60 (thirty each) obese and non-obese adolescents in the age range on 13 to 17 years were included in the study through purposive sampling technique from district Haridwar. WHOQOL-BREF and the Student Stress Scale were used to measure the quality of life and stress of adolescents. Critical analysis of the data revels that significant differences were found in stress and quality of life in obese and non-obese adolescents.

Keywords: *Obesity, Stress, Quality of life, Adolescents*

Introduction

Obesity is a global public health challenge that not only increases the number of chronic disease like diabetes, cardiovascular disease and cancer (Foss and Dyrstad, 2011) but also stress, depression and many more mental health disorder[2]. If a person is 20 percent more than normal body weight then he is called fat. This normal body weight is taken into account with height, age, gender and construction. According to the WHO (2000), criteria, BMI of 25 kg/m or more and less than 30 kg/m indicates overweight, and BMI of 30 kg/m or more obesity[3].

Stress is the body's emotional and physical response to the danger of the risk mainly in the environment. In psychological terms, the body is being ready to "fight or flight". According to Koch and his associates (2008), Stress in the family increases the risk of obesity in children[4]. Further Foss and Dyrstad (2011), in the finding of research describe that stress is a cause of obesity[2]. Eating behavior of people suffering from stress or anxiety is eating behaviors similar to obese (Nishitani and Sakakibara, 2005)[5]. Stress increases the secretion of glucocorticoids, which stimulates food and increases insulin. This gives rise to obesity (Dallman, 2010)[6]. In stress, the person either consumes more food and increases the weight, or eats lesser which result in decrease in weight. Comfort food leads to abdominal obesity. "Comfort foods" help in reducing severe stress, which later causes obesity (Dallman *et al.*, 2005)[7]. High level of stress changes the eating pattern and increases consumption of highly palatable (HP) foods (Sinha and Jastreboff, 2013)[8]. The condition of obese children is worsened due to general health, psychosocial functioning, and specific health disorders (Halfon *et al.*,2013)[9]. Binge eating disorder (BED), body image, self-esteem, mood disorders, and social and family factors help in increasing obesity in different ways (Talen and Mann, 2009)[10].

According to the World Health Organization (WHO), quality of life is defined as ―the individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals. It can be expected that obesity has a bad effect on the quality of life (Lahteenkorva *et al.*, 1995)[11]. In adolescence, poor physical quality of life is associated with obesity (Swallen *et al.*, 2005)[12]. Obesity has a negative effect on the physical and psychosocial aspects of the quality of life (Kushner and Foster, 2000)[13].

Corresponding Author:
Dr. Arun Kumar
Assistant Professor, Department of Psychology
Gurukula Kangri Vishwavidyalaya
Haridwar, Uttarakhand (India)
Email: arunk@gkv.ac.in

The following factors contribute to increasing obesity - genetic factors, dietary intake, physical activity, environmental and socioeconomic factors, eating disorders, and social influences (Manna and Jain, 2015)[14]. Low social class category women are more likely to have obesity than those of high social class category (Moore *et al.*, 1962)[15]. Obesity affects physical, mental health and health related quality of life directly - indirectly (Dixon, 2010)[16]. Fat children have to face more mental problems (Sawyer *et al.*,2006)[17]. Thus in the present investigation an attempt is made to investigate difference in the level of stress and quality of life in obese and non-obese adolescents.

Objectives

The main objectives are:

1. To study the level of stress in obese and non-obese adolescents.

2. To study the level of quality of life in obese and non-obese adolescents.

3. To find out the difference in the level of stress and quality of life of obese and non-obese adolescents.

Hypothesis

The main hypotheses have been formulated are:

1. There will be significant difference in the level of stress of obese and non-obese adolescents.

2. There will be significant difference in the level of quality of life of obese and non-obese adolescents.

Method

Sample

For this study, samples of 60 (thirty each) obese and non-obese adolescents in the range of 13 to 17 years were undertaken. The participants were selected without any bias through purposive sampling technique from district Haridwar.

Tools

The Student Stress Scale (Bhatia and Pathak, 1999)[18]

WHOQOL-BREF(World Health Organization, 1996)[19]

Procedures

Every participant was seated comfortably and informal consent was taken for participation in the study. All two tests were administered individually and instructions for the test clearly delivered to each participant. Responses to Student Stress Scale and WHOQOL-BREF were noted down. The tests were administered strictly according to their prescribed manual instructions. Participants were assured that their results and the information obtained would be kept confidential and used for research purpose only.

Statistical Techniques and Analysis of Data

The necessary data for each of the test that was used in the study was collected and scrutinized; scores were tabulated for finding out the nature of test scores of all variables. Mean, median, standard division and *t*-test were conducted.

Results and Discussion

The present study has been undertaken to assess the stress and quality of life among obese and non-obese adolescence. The data was collected from district Haridwar (Uttarakhand). The data has been organized and described to yield the statistics namely mean and standard deviation to study the general nature of the data sample for the variables of stress and quality of life.

Table-I: Mean, standard deviation, standard error mean and *t*-value of Stress of obese and non-obese adolescence.

Variable	Group	N	Mean	S.D.	t-value
Academic Stress	Non-obese	30	15.98	3.745	1.092NS
	Obese	30	16.90	2.695	

Cont... **Table-I: Mean, standard deviation, standard error mean and *t*-value of Stress of obese and non-obese adolescence.**

Financial Stress	Non-obese	30	11.77	3.245	2.163*
	Obese	30	13.57	3.202	
Vocational Stress	Non-obese	30	15.03	3.605	0.492NS
	Obese	30	14.63	2.606	
Family Stress	Non-obese	30	13.17	4.136	1.246NS
	Obese	30	14.43	3.730	
Social Stress	Non-obese	30	12.43	3.839	2.242*
	Obese	30	14.73	4.102	
Emotional Stress	Non-obese	30	13.70	3.415	2.149*
	Obese	30	15.67	3.670	
Total Stress	Non-obese	30	81.80	11.86	2.497**
	Obese	30	89.90	13.22	

NS not significant, * significant at level of 0.05, ** significant at level of 0.01

Table-I shows that mean score and standard deviation of stress of obese and non-obese adolescents. This shows no significant difference in the academic stress, vocational stress and family stress of obese and non-obese adolescents but financial stress, social stress, emotional stress and total stress have significant difference of obese and non-obese adolescents. So hypothesis-1 is partially accepted and shows that there is significant difference in level of financial stress, social stress, emotional stress and total stress of obese and non-obese adolescents. Study of Scott *et al.* (2008), supports present study. Obesity significantly associated with mood disorder, major depressive disorder, anxiety disorder, and most strongly with some individual anxiety disorders such as post-traumatic stress disorder[20].

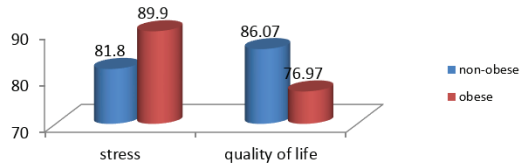
Table-II: Mean, standard deviation, standard error mean and *t*-value of Quality of life of obese and non-obese adolescence.

Variable	**Group**	**N**	**Mean**	**S.D.**	**t-value**
Physical	Non-obese	30	24.87	4.918	1.422NS
	Obese	30	23.03	5.068	
Psychological	Non-obese	30	21.50	3.130	2.338*
	Obese	30	19.07	4.152	
Social	Non-obese	30	10.03	2.198	3.315**
	Obese	30	7.63	2.684	
Environmental	Non-obese	30	29.67	4.294	1.967*
	Obese	30	27.23	5.224	
Total Quality of life	Non-obese	30	86.07	12.225	2.587**
	Obese	30	76.97	14.896	

NS not significant * significant at level of 0.05 ** significant at level of 0.01

Table-II shows that mean score and standard deviation of quality of life of obese and non-obese adolescents. This shows no significant difference in the physical level of obese and non-obese adolescents but psychological, social, environmental and total quality of life has significant difference of obese and non-obese adolescents. So hypothesis-2 is partially accepted and shows that there is significant difference in level of psychological, social, environmental and total quality of life of obese and non-obese adolescents. Study of Kushner and Foster (2000) supports present study. Obesity has a negative effect on the physical and psychosocial aspects of the quality of life[21].

Bar Diagram-I
Bar diagram of the mean score of Stress and Quality of life in obese and non-obese adolescence.



Bar diagram shows that mean score of stress is high in obese adolescents but mean score of quality of life is high in non-obese adolescents which mean that obese adolescents feel more stress than non-obese. Also, the level of quality of life is not good compared to non-obese.

Conclusion

In the present research comparative study on obese and non-obese adolescents on stress and quality of life have been conducted. Results show that there are significant differences have been found in the stress and quality of life of obese and non-obese adolescents. Study of (Halfon *et al.*, 2013) and (Dixon, 2010) supports present study. According to Halfon's study, Obese children have increased odds of worse reported general health, psychosocial functioning, and specific health disorders[9]; According to Dixon, obesity has a clearly measurable impact on physical and mental health, health related quality of life, and generates considerable direct and indirect costs[16]. There is a positive correlation between stress and obesity index in male children (Kim *et al.*, 2001)[21]. Studies have shown that weight increases due to excessive stress in men. Stress induced eating behavior may be a cause of obesity (Torres and Nowson, 2007)[22].

Ethical Clearance- (N/A)

Source of funding- (Self)

Conflict of Interest - (nil).

References

1. https://economictimes.indiatimes.com/news/politics-and-nation/india-has-second-highest-obese-children-in-world study/articleshow/59128246.cms
2. Foss B, Dyrstad SM. Stress in obesity: Cause or consequence? Medical Hypotheses. 2011; 77(1),7-10.
3. World Health OrganizationObesity: preventing and managing the global epidemic. Part I. The problem of overweight andobesity. 2000; WHO Technical Report Series No. 894, WHO: Geneva, 5–15.
4. Koch FS, Anneli Sepa A, Ludvigsson J. Psychological Stress and Obesity. The Journal of Pediatrics. 2008; 153(6):839-844.
5. Nishitani N, Sakakibara H. Relationship of obesity to job stress and eating behavior in male Japanese workers. Int J Obesity. 2005; 30(3):528–533.
6. Dallman MF. Stress-induced obesity and the emotional nervous system. Trends in Endocrinology & Metabolism. 2010; 21(3):159-165.
7. Dallman MF, Pecoraro NC, E. la Fleur S.Chronic stress and comfort foods: self-medication and abdominal obesity. Brain, Behavior, and Immunity. 2005; 19(4):275-280.
8. Sinha R, Jastreboff AM. Stress as a Common Risk Factor for Obesity and Addiction. Biological Psychiatry. 2013; 73(9):827-835.
9. Halfon N, Larson K, Slusser W. Associations Between Obesity and Comorbid Mental Health, Developmental, and Physical Health Conditions in a Nationally Representative Sample of US Children Aged 10 to 17. Academic Pediatrics. 2013; 13(1):6-13.
10. Talen MR, Mann MM. Obesity and Mental Health, Primary Care: Clinics in Office Practice. 2009; 36(2):287-305.
11. Lahteenkorva SS, Stunkard A, Rissanen A. Psychosocial factors and quality of life in obesity. Int J Obes Relat Metab Disord. 1995;19(Suppl. 6):S1–S5
12. Swallen KC, Reither EC, Haas SA, Meier AM. Overweight, Obesity, and Health-Related Quality of Life Among Adolescents: The National

Longitudinal Study of Adolescent Health. Pediatrics. 2005; 115(2):340-347.

13. Kushner RF, Foster GD. Obesity and quality of life. Nutrition. 2000; 16(10):947-952.
14. Manna P, Jain SK. Obesity, Oxidative Stress, Adipose Tissue Dysfunction, and the Associated Health Risks: Causes and Therapeutic Strategies. Metab Syndr Relat Disord. 2015;13(10):423-44.
15. Moore ME, Stunkard A, Srole L.Obesity, Social Class, and Mental Illness. JAMA. 1962; 181(11):962-966.
16. Dixon JB. The effect of obesity on health outcomes. Molecular and Cellular Endocrinology. 2010; 316(2):104-108.
17. Sawyer MG, Lewis LM, Guy S, Wake M, Canterford L, Carlin JB. Is There a Relationship Between Overweight and Obesity and Mental Health Problems in 4- to 5-Year-Old Australian Children? Ambulatory Pediatrics. 2006; 6(6):306-311.
18. Bhatia T, Pathak A. Manual for student stress scale. Prakhar psychological testing and research centre. Jalaun; 1999
19. WHOQOL-Brief-Field trial version. Program on mental health. World Health Organization, Geneva; 1996
20. Scott KM, Bruffaerts R, Simon GE, Alonso J, Angermeyer M, de Girolamo G, Demyttenaere K, Gasquet I, Haro JM, Karam E, Kessler RC, Levinson D, Medina Mora ME, Oakley Browne MA, Ormel J, Villa JP, Uda H, Von Korff M. Obesity and mental disorders in the general population: results from the world mental health surveys. International Journal of Obesity. 2008; 32(1):192–200.
21. Kim EK, Park TS, Kim KK.A Study on the Obesity and Stress of Elementary School Children in the Kangnung Area. Korean J Community Nutr. 2001; 6(5):715-725.
22. Torres SJ, Nowson CA. Relationship between stress, eating behavior, and obesity. Nutrition. 2007; 23(11–12):887-894.

Smartphone Vs DSLR Dental Photography among Orthodontists

Arya S Prasad[1], Arvind Sivakumar[2]

[1]Postgraduate Student, [2]Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences,, Saveetha University

Abstract

Introduction: Smartphone photography has come a long way in terms of technological advances in sensor quality, resolution, and lens sophistication, giving much improved image quality over the last few years. Smartphones being relatively compact and lighter than a Digital SLR camera hence the younger generation dentists prefer it over the conventional cameras. We did a survey to assess the perception of quality of images taken using smartphone and DSLR (Digital Single Lens Reflex) intra oral cameras. The aim of this study is to compare the quality of intraoral images taken using mobile phones with DSLR cameras.

Materials and Methods: 20 intra oral images of subjects were taken using DSLR (Canon 700D) and 2 renowned smartphones (iPhone 7 plus and Oppo R7 plus). A questionnaire was prepared and sent through social sources to general dentists and specialists. The questions included in the survey are based on the knowledge, attitude and practice in the usefulness of mobile phones compared to DSLRs for taking intra oral images.

Results: The primary outcome measure of this study was to assess the orthodontist's perception towards the various image characteristics of intra oral photographs taken using digital SLR camera, iPhone 7 plus and Oppo R7 plus.

Conclusion: So, from this study we can conclude that there were no statistically significant results found. In the coming years smartphone cameras can really give a tough challenge to bulky cumbersome DSLRs.

Keywords: *Mobile dental photography, smartphone dental photography, DSLR (Digital Single Lens Reflex), iPhone 7 plus, Oppo R7 plus.*

Introduction

Clinical photography in dentistry is mainly used for documentation, evaluation of craniofacial and dental relationship, assessment of soft tissue profile, smile analysis, medicolegal purposes, evaluation and monitoring of treatment progress etc. [(1) (2) (3)] A Digital Single Lens Reflex, or DSLR is necessary for high-quality images of both extraoral and intraoral structures. [(4)] The DSLR camera with a high-quality lens is considered to be the ideal choice for dental photography, as it is capable of taking portraits as well as close up or macro images of the dentition, by through-the-lens viewing and metering, precise focusing and accurate framing [(5)] A full set of clinical photographs must be taken before any treatment is started as it is an invaluable record detailing the original clinical situation. These should be a mandatory record for each and every patient before we diagnose and design the treatment plan, even if the treatment is only extraction of teeth to intercept the developing malocclusion. Clinical photographs allow us to record the relationship of the teeth and jaws to the

Corresponding Author:
Arvind Sivakumar
Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Saveetha Dental College Saveetha Institute of Medical and Technical Sciences, Saveetha University, 162, Poonamallee High Road , Chennai-600077, Tamil Nadu,India
Email : arvind.sivakumar@gmail.com
Telephone Number: +91 8220552400

facial structures.[5]

Digital photography can have several influences on dental practice: Photos can educate patients and improve patient acceptance and improve patients' confidence following treatment. The dental treatment is subject to change, can be recorded in detail by means of photography. Intraoral pictures can provide improved documentation and the option of checking particular conditions over longer periods of time.

In today's smartphone generation, mobile dental photography has become one of the fastest and easy ways to record or document cases. Smartphones, as it is very aptly named in the way that it can turn an amateur into a professional photographer. Nowadays many professional photographers are ditching their heavy, sophisticated DSLRs in favour of more compact, lightweight, handy smartphones. [6] [7] It is quite common nowadays to see people clicking pictures using their phones to take photos, leaving their expensive DSLRs at home. [8] A DSLR has a camera body with some fantastic technology but nowadays cell phone photography has raised its standards to a considerable extent to compete with a DSLR setup, and yet is light and easy to operate. The image sensors have come a long way & are capable of capturing pictures of more than 10 MP (megapixel).

Nowadays its quite common to take portrait shots and other face photographs with smartphone camera which produces good quality photographs with adequate recording of the details. Smartphone cameras are viable alternative to heavy DSLR cameras in taking intraoral and extraoral photographs.[9] Hence in this study, we wanted to compare the quality of photographs obtained with smartphones and compare them with gold standard DSLR.

Materials and Method

This cross sectional questionnaire study was conducted by using intraoral pictures of 20 random subjects who reported to our hospital for treatment were taken using Canon 700D (Canon India Pvt. Ltd., Gurgaon, India) and two renowned mobile phones iPhone 7 plus and Oppo R7 plus which has got a good camera. Intraoral photos of each subjects were taken thrice using three cameras and were sorted into three groups: in group 1 – photos were taken using DSLR (Canon 700D), in group 2 – photos were taken using iPhone 7 plus, in group 3 – photos were taken using Oppo R7 plus. All the photos were taken by one author to avoid inter operator bias. The operator had good experience with the usage of all three cameras and had undergone specific training and standardisation for using all the three cameras for taking the intra oral pictures on ten patients before the study was started.

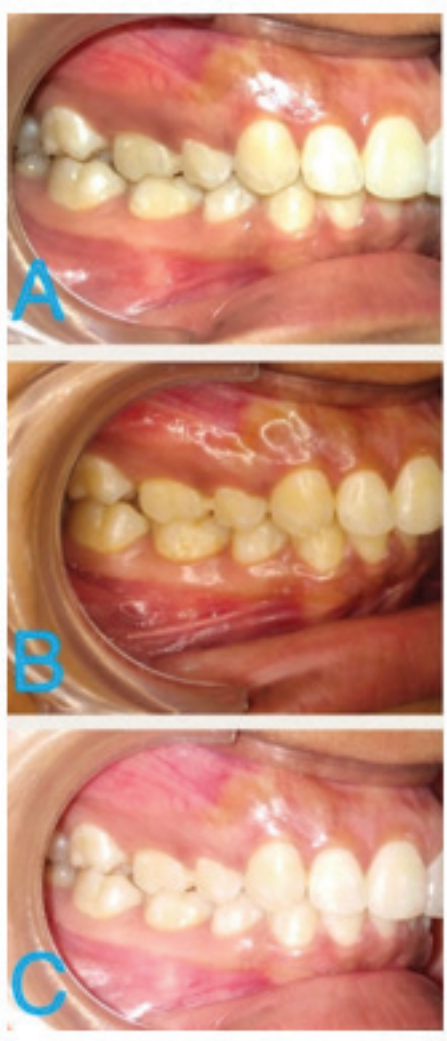


Figure 1: Intraoral images taken using iPhone , DSLR, and Oppo R7

The photos with Canon 700D DSLR were taken with following settings: ISO between 400-600, shutter speed of 30-40, f 20-22 at 30 mm zoom used with ring flash (Meike FC-100). While using iPhone 7 and Oppo R7 the photos were taken using auto mode with flash kept on.

The intraoral images taken in each subject includes the frontal intraoral image in centric occlusion with all the teeth focused from incisor to molars, right side in occlusion and left side in occlusion. The right and left side occlusion was taken with the camera pointing almost perpendicular to the buccal surface of molars &

premolars. Three intra oral images were taken for the twenty subjects using three different cameras to obtain a total of 180 images. This resulted in sixty images per group. All the images taken were cropped in uniformity by using Adobe photoshop software (CS6) to the size of 4 X 6 inches (Figure 1). All the patient images which lacked in clarity, improper lighting and camera positioning & any form of distortion were removed from the study. Finally, the best set of ten photographs out of frontal, right and left occlusion were chosen for the questionnaire survey.

The questionnaires were created using google survey. Each set of the selected photographs, were arranged in individual slides containing 3 photos (same photo taken using the three different cameras) & the examiners were asked to choose the best photograph based on the image quality. These questionnaires were mailed to 80 orthodontists through google survey link.

Results

Out of the 80 google survey links sent to orthodontists, 55 orthodontists responded to the survey. The survey results of the 55 orthodontists was as follows: 38% orthodontists liked photos taken using DSLR photography, 34% liked photos taken using iPhone 7 plus and 28% liked photos taken using Oppo r7 plus (Table 1) (Figure 2).

Table 1: Results of the Survey

S.No.	Intra oral images taken using	Response (n=55)
1	DSLR (Canon 700 D)	38%
2	iPhone 7 plus	34%
3	Oppo R7 plus	28%

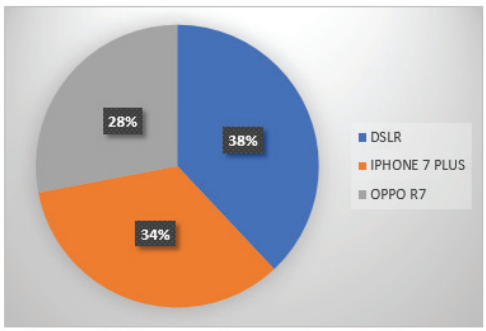


Figure 2: Overall results of survey

Discussion

The purpose of this study was to assess the perception of orthodontists towards intraoral pictures taken using DSLR and two popular phones in the market which have good cameras. In this study we have taken one high end smartphone and a midrange smartphone to assess the quality of images produced with both the phones and compare them with the SLR cameras which are currently the gold standard in intra oral photography. Also, we have evaluated whether the quality of images produced using these smart phone cameras were adequate enough for using it to take pictures in intraoral photography.

The characteristics of the photographs are affected by many factors including different operators, camera settings, room lightings and various other factors. As the image characteristics varies according to the operators, the present study used a single operator. The settings were standardised among all the photographs. The operator had already undergone a phase of standardisation were the settings of the camera were altered to find the best settings for each camera.

In a DSLR camera the inbuilt flash of the DSLR camera is placed away from the lens (on top of the lens) and hence the light from the flash gets obstructed from the presence of the protruding lens and the flash does not light up the area covered up by the lower part of the lens. This is the reason why ring flash is used for intra oral photography to produce light which is unobstructed by the lens and adequately lights up all parts of the images.[10] The characteristic of the light produced by a ring flash is precise and therefore shadow-free illumination of the object without shadowing effect of the lens, whereas in a smartphone camera the lens is not protruding outside and the flash is right next to the lens and hence there is almost zero obstruction of the light from the flash.

Smartphone cameras has really come of age from less than 1 MP to more than 20 MP , from simple CCD (charged couple device) to latest CMOS (Complementary metal–oxide–semiconductor) sensors which are far more accurate and more sensitive.[11]

Smartphones has evolved rapidly in terms of advancement and technology.[12] [13] [14] Smartphones are a part of our day to day life and because of their compactness, ease of carrying around , requires less expertise and versatility of use. They are always present within our arms reach, whereas DSLRs are cumbersome to carry, bulky, technique sensitive and requires a

lot of training. Till now there is no doubt that DSLR cameras is the gold standard in dental photography. [15] A smartphone camera is very simple to use and even an amateur photographer can produce excellent photographs due to the smartness of the phone. Other advantage is its instant access of digital images to the operator, optimal choice of illuminating the object of interest which spares us from costly accessory equipment for like ring flashes; technical data of each photograph are automatically recorded, which makes its adequate reproduction possible; possibility of copying, fast printing, and sending by electronic mail to any part of the world; possibility of fast reviewing and removing of spotted errors as well as the possibility of instant deleting and repeating shooting procedures until till desired results are obtained .

iPhone 7 plus photographs have really given a tough competition to DSLR photographs in intraoral dental photography. Smartphone cameras can be used alternatively for intra oral dental photography. Utilization of mobile dental photography can help in the treatment planning and patient consultation that is organized and more user friendly for both the dentist and easily understandable by the patients.

Conclusion

The application of smart phone photography in dental practice is simple, fast and very useful in documentation of clinical procedures, help in education of patients and for clinical investigations, thus enhancing many benefits to dentists and as well as patients. To overcome the bad reputation of smartphones in producing low quality pictures mobile phone manufacturers try to counteract these shortcomings mainly through clever programming of the camera software parameters, as they cannot overcome such physical limitations. So many smartphone companies have started creating *add on flash lights attachments and Macro lenses* for mobile phones and making it much lighter, easier and quicker to use setup for dental photography. Mobile Photography is certainly here to stay and will advance further in the future and digital dental photography is an exceptional tool for communication and documentation. Many shortcomings will be overcome in coming years. And so mobile phone manufacturers try to counteract these shortcomings mainly through clever programming of the camera software parameters. Smartphone dental photography will advance further in the future.

Ethical Clearance - Taken from scientific review board, Saveetha Dental College and Hospital, Chennai, Tamil Nadu

Source of Funding - Self

Conflict of Interest - Nil

Reference

1. Sreesan NS, Purushothaman B, Rahul CS, Shafanath T, Fawaz V. Clinical Photography in Orthodontics. Int J Oral Health Med Res 2016;3(2):71-75.
2. Anna Kataoka, MS, MBA. Digital Photography for Orthodontic Treatment Planning .Journal-Spring-2016-Kataoka-EyeSpecial-CII.pdf [Internet]. [cited 2018 Jul 29].
3. Sridharan S, Samantha C. Comparison of perception of smile by orthodontists and other specialty dentists: A questionnaire study. Int J Orthod Rehabil 2016;7:92-6
4. Bauer Seminars, (2016) Camera recommendation October 2016.pdf [Internet]. [cited 2018 Jul 29].
5. Jonathan Sandler Alison Murray. Clinical Photography in an Orthodontic Practice Environment – Part 1.Ortho Update 2010; 3: 75–80
6. Dr. Akash Akinwar , (2018) Mobile Dental Photography for Dental Documentation | Dental Management 2018 | Conferenceseries Ltd [Internet]. [cited 2018 Jul 29].
7. Samawi ~ Shadi, 2017. There's Something About MDP (Mobile Dental Photography)!. [Online]. The Orthodontic Notefile. 2017.
8. ePHOTOzine Ltd MP. (2016) Smartphone Cameras Vs DSLRs - Which Is Better? [Internet].
9. Spindel. iPhone dental photography? [Internet]. [cited 2019 Dec 27].
10. Sandler J, Murray A. Digital Photography in Orthodontics. Vol. 28. 2001. 197 p.
11. Li X, Ortiz PJ, Browne J, Franklin D, Oliver JY, Geyer R, et al. Smartphone Evolution and Reuse: Establishing a More Sustainable Model. In: 2010 39th International Conference on Parallel Processing Workshops. 2010. p. 476–84.
12. Reddy SP, Kashyap B, Sudhakar S, Guru JR, Nalini P. Evaluation of dental photography among dental professionals. J Educ Ethics Dent. 2014 Jan 1;4(1):4.

13. Todd Gilenwater. Evolution of the Smartphone | 2017-02-15 | Microwave Journal [Internet]. [cited 2018 Jul 24].
14. Sharland MR. An Update on Digital Photography for the General Dental Practitioner. Dent Update [Internet]. 2008 Jul 2;35(6):398–404.
15. Mobile Or DSLR For Dental Photography | Best Camera For Dentist [Internet]. 2015 [cited 2018 Jul 29].

Critical Overview of Adolescent Suicides in India; A Public Health Concern

Ashwin Mathew[1], Suja M.K[2], V. Priya[3]

[1]PhD Scholar, [2]Associate Professor, [3]Assistant Professor Department of Social Work, Amrita School of Engineering, Coimbatore, Amrita Vishwa Vidyapeetham, India

Abstract

Suicide is the second most leading cause of death among the 15-29 age group (adolescent). The World Health Organization statistics indicate that 8, 00,000 people suicide annually. The National Crime Records Bureau records indicates that suicidal deaths in 2014 is 15.8% more than 2004, 17% of the suicides worldwide happens in India. Suicides is a contingency that affects the victim's family community and nation at large and has a long lasting effect on the people left behind. The adolescents often don't get help when needed which leads to suicides. Sustainable Development Goals 3 intents to promote healthy lives and promote wellbeing for all.

Aim: To understand; 1) the percentage increase of suicide in India, difference between male and female suicides, 2) identify states with maximum number of suicides, 3)identify states with maximum number of student suicides, 4) Major Causes for suicide among adolescent male, female and transgender and to study 5) Major means adopted for suicides in India, 6) Understand the significance promoting wellness addressing adolescent suicides. . Results: there is significant increase in number of suicides form 2013 to 2016 and it affects the nation's economy. The states with maximum number of adolescent suicides are 1) Maharastra, 2) Tamil Nadu, 3) West Bengal, 4) Madhya Pradesh and 5) Karnataka. The major Causes for suicides among adolescents male, female and transgender were identified. The most common means adopted for suicide among adolescents have been identified and listed. Conclusion: The adolescent and student suicides in the nation are increasing rapidly causing serious economic burden to the nation. Hence a comprehensive suicide prevention plan must be developed, the policy should individually target the states with highest number of adolescent and student suicides, access to the most prominent means of suicides must be limited. A national suicide prevention help line and community based access points could be created to provide mental health first aid to the vulnerable adolescents and students.

***Key Words**: Adolescent Suicides, Student Suicides, Economic Burden of Suicides, Suicide Prevention Policy, Adolescent Wellness, Adolescent Suicides in India, Suicides in Indian States.*

Introduction

WHO recognizes suicides as a public health priority and plans to increase the awareness regarding suicide and suicide attempts and intents to make suicide prevention as global public health priority. The Sustainable Development Goals (SDGs) 3 is to ensure healthy lives and promote wellbeing for all. (1) The WHO statistics indicate that 8, 00,000 people attempt suicide and many more attempt suicide suicides. Suicide is the second most leading reason cause of death among the age group 15-29 age group (adolescent), 79% of the suicide worldwide happens in lower middle income country and hence India is at greater risk. (2) The National Crime Records Bureau reports indicate that the suicides rate has increased 15.8% from 2004 to 2014(3), this significantly impairs the nation's development the government and parents of the adolescents spend considerable amount of

Corresponding Author:
Ashwin Mathew, PhD Scholar,
Department of Social Work, Amrita School of Engineering, Amrita Vishwa Vidyapeetham, Amritanagar, Ettimadai, Coimbatore, Tamil Nadu 641112, India
Email: ashwinmathew.alberts@gmail.com
Ph : 7012291028

money in their upbringing.

Suicide mental health problems and depression has high correlation especially in developed nations. Suicide occurs impulsively at crisis situations as the victim is not able to deal with the life stress in situations such as; financial problems, relationship issues and chronic diseases. The most significant factor for suicide is a previous suicide attempt. The crucial aspect in suicide risk reduction is to identify the Causes for suicide and address them and to limit access to the means of suicides. (4)

Research studies indicate that; indicate that suicide victims and inpatients showed similarly high rates of affective disorders. The suicide victims with family history of affective disorders and suicidal tenancies are more vulnerable to suicide. Four significant risk factors identified are 1) Bipolar Disorders, 2) Affective disorders with comorbidity, 3) Lack of previous mental health treatment and 4) availability of fire arms which accounted for 81.9% of cases. (4) Prevention programs including Peer Educators (PEs) have been found useful in helping young people in school especially the adolescents going through heavy psychological burden. The results indicate that that the mindfulness and Support, Appreciate, Listen, Team (SALT) using Peer Educators (PE) have enhanced the PEs broad emotional intelligence and PEs expressed increased ownership of life, taking action and seeking support when needed. Research studies also suggest that future research should be carried out in developing nations to understand the knowledge regarding suicides especially in the adolescent age group (5). WHO further emphasizes that India develop a comprehensive suicide prevention plan and integrate it with the mental health act to contain the growing threat of adolescent suicides. (1)

Method

This study is based on the secondary data available from the official government websites. The adolescent suicides related data from 2013 to 2016 has been used in the study. The basic statistical analysis was done using Microsoft Excel 2013.

The rationale behind this study is to understand 1) National adolescent suicide rate and difference between male and female suicides, 2) States with highest number of suicides, 3) States with highest number of student suicides and rate of student suicides, 4) Major Causes for adolescent suicides 5) Major means adopted by adolescent suicides and 6) Understand the significance promoting wellness addressing adolescent suicides. The researcher would also attempt to identify future research areas and try to lay down a comprehensive suicide policy guidelines keeping in mind the recommendations of WHO and UNICEF and relevant research studies.[16]

Results

1) TOTAL SUICIDES AMONG 15-29 AGE GROUP (ADOLESCENT) IN INDIA; YEARS 2013, 2014 & 2015.(6), (7) (8), (9)

The number of suicide in 2013 is 46,368, in 2014 it has raised to 54,100. The percentage increase of suicides form 2013 to 2014 is a whopping 16.675 % which is a matter of concern when we compare this data with the National Crime Records Bureau report stating that "suicidal deaths of 2014 is 15.4% higher than that of 2004", we can understand the rapid increase in adolescent suicide in India which is a public health concern. The increasing number of suicides is a threat to the nations GDP, it's estimated that death of one adolescent between the 15-29 years cost approximately 70 lakhs. The economic loss in 2014 alone would account to 70 lakhs × 54100 adolescent suicides which equals to 378.7 billion rupee, this significantly affect the nation's economic progress and the public health initiatives.

MALE AND FEMALE SUICIDES AMONG THE ADOLESCENT AGE GROUP IN INDIA; YEARS 2013, 2014 AND 2015. (6), (7) (8), (9)

There is significant difference between male and female suicides. The number of male suicides is significantly higher than that of the female suicides. The difference between male and female suicide in 2013 is 7,064 suicides, in 2014 the difference between male and female suicides is 9,950 suicides, and in 2015 the difference between male and female suicides is 9,435 suicides.

2) SUICIDE RATE AMONGST ADOLECENS IN INDIA 2013-2015(6), (7) (8), (9); STATES WITH HIGHEST NUMBER OF SUICIDES.

The states with highest number of suicides in 2013, 2014& 2015 are 1) Maharashtra, 2) Tamil Nadu, 3) West Bengal, 4) Madhya Pradesh, 5) Karnataka and 6) Andra Pradesh. Specific strategies must be formed to address suicides in these states as they contribute to the majority of the adolescent suicides in India.

3) TOTAL NUMBER OF STUDENT SUICIDES IN INDIA 2013-2016[10],[11],[12],[13]; STATES WITH HIGHEST NUMBER OF SUICIDES.

The states with maximum number of student suicides in India in the years 2013, 2014, 2015 and 2016 are; 1) Maharashtra, 2) Tamil Nadu, 3) West Bengal, 4) Madhya Pradesh, 5) Karnataka,6) Chhattisgarh , 7) Andra Pradesh.

The percentage increase in student suicide from 2013 to 2016 is an alarming18.31%. The government and parents spend a lot of time and effort in developing the career and character of a student and hence the rapid increase in student suicides significantly affects our nation's developmental gains.

4) Causes FOR SUICIDE AMONGST ADOLESCENT AGE GROUP IN INDIA 2013 & 2015; MALE, FEMALE & TRANSGENDER.[16][17]

Male

Figure No. 1, Causes for Suicide amongst Adolescent Age Group in India 2013 & 2015; Male (Suicide rate in percentage) [14][15]

The most common Causes for suicide among male in 2014 and 2015 are: 1) Other Causes, 2) Other Family Problems, 3) Causes not known, 4) Illnesses, 5) other prolonged illnesses, 6) love affairs, 7) Insanity/ Mental Illnesses, 8) Failure in examination, 9) Marriage related issues , 10) Unemployment, 11) Drug Abuse/ Addiction

Female

The Figure no. 2, Causes for Suicide amongst Adolescent Age Group In India 2013 & 2015; Female Illustrates that:-

The most common Causes for death among adolescent female in India in 2014 and 2015 are; 1) Other Family problems, 2) Other Causes, 3) Marriage related issues, 4) Illnesses, 5) Causes not known , 6) Other Prolonged Illness , 7)Love affairs , 8) Dowry Related Issues , 9) Insanity/ Mental Illness, 10) Examination Failures.

Trasgender

The Figure No. 3, Causes for Suicide amongst Adolescent Age Group in India 2013 & 2015; Transgender illustrates that:-

The most common Causes for adolescent transgender suicides in 2014 and 2015 are; 1) Other Causes , 2) Illnesses, 3) Other Prolonged illness, 4) Suspected/ illicit relation, 5) Professional/ Career Problem, 6) Other family problem, 7) Insanity/ Mental illnesses:- , 8) Drug Abuse Addiction , 9) Causes not known.

5) MEANS OF SUICIDE ADOPTED BY ADOLESCENT AGE GROUP IN INDIA; MALE, FEMALE AND TRANSGENDER IN 2013 AND 2015.[14][15]

Male

The Figure No.4, Means of Suicide Adopted By Adolescent Age Group in India 2013 & 2015; Male illustrates that:-

The most common means adopted by adolescent male in 2013 and 2015 in India are; 1) Hanging, 2) Poisoning , 3) consumption of insecticides, 4) fire/self-immobilization, 5) consumption of other poison, 6) other means , 7) drowning, 8) coming under running trains, 9) jumping , 10)overdose of sleeping pills.

Female

The Figure No. 5, Means of Suicide Adopted By Adolescent Age Group in India 2013 & 2015; Female illustrates that :-

The most common means adopted by women in the adolescent age group for suicide in the years 2013 and 2014 are 1) Hanging, 2) Poisoning, 3) consumption of other poison, 4) fire self-immobilization, 5) consumption of other poison, 6) other means 7) drowning, 8) coming under running vehicles/ trains, 9) Jumping and 10) over dose of sleeping pills.

Transgender

The Figure No. 6, Means of Suicide Adopted By Adolescent Age Group in India 2015; Transgender illustrates that :-

The most common Causes for suicide among transgender suicides in India are; 1) by fire/ self-immobilization, 2) by hanging, 3) Jumping and 4) jumping of moving trains/ vehicles.

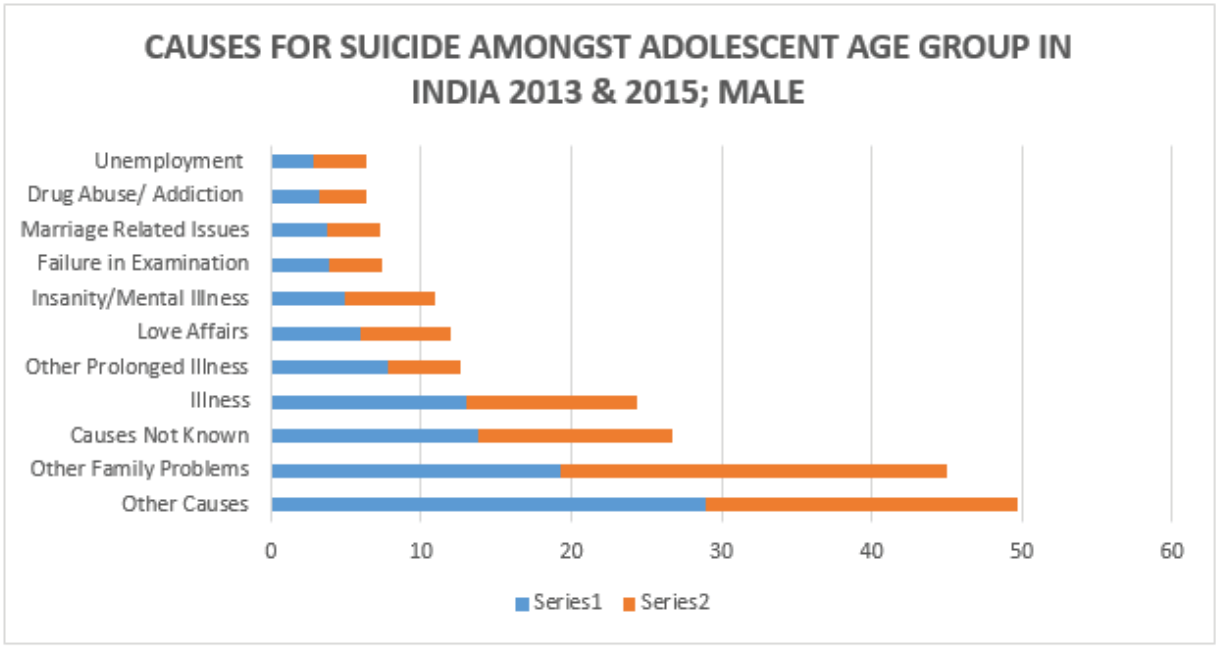


Figure No. 1, Causes for Suicide amongst Adolescent Age Group in India 2013 & 2015; Male (Suicide rate in percentage) [16][17]

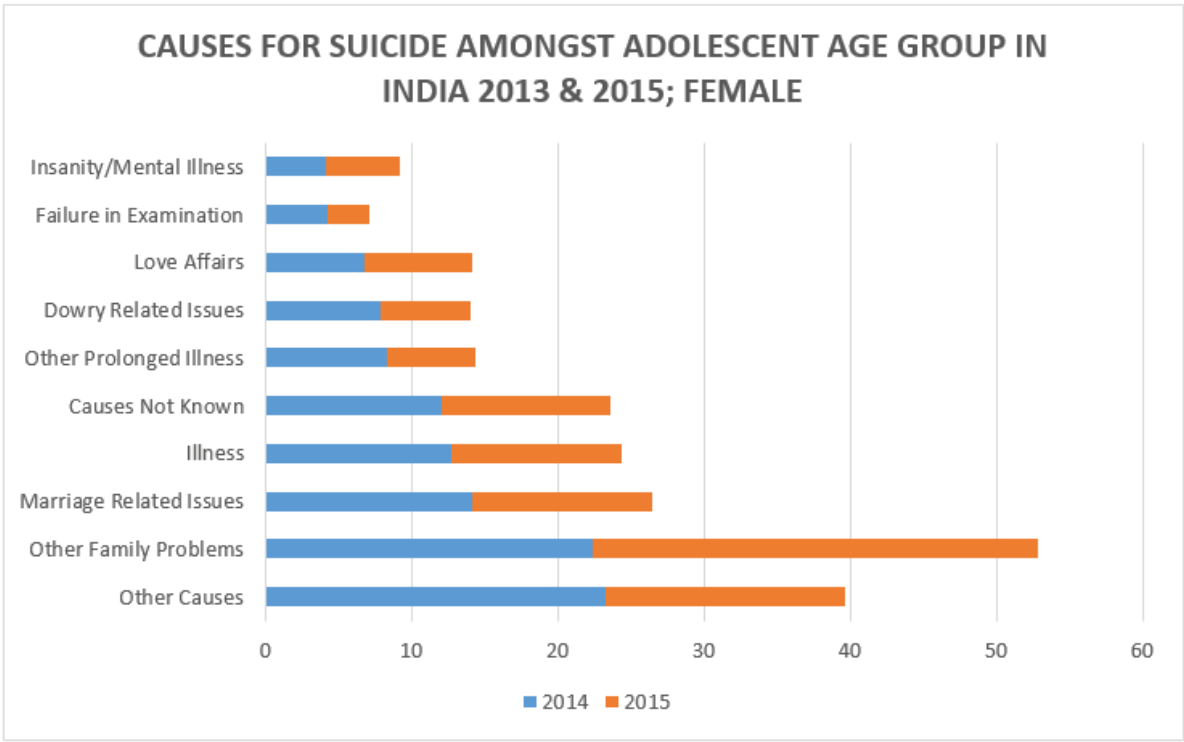


Figure No. 2, causes for Suicide amongst Adolescent Age Group in India 2013 & 2015; Female (Suicide rate in percentage) [16] [17]

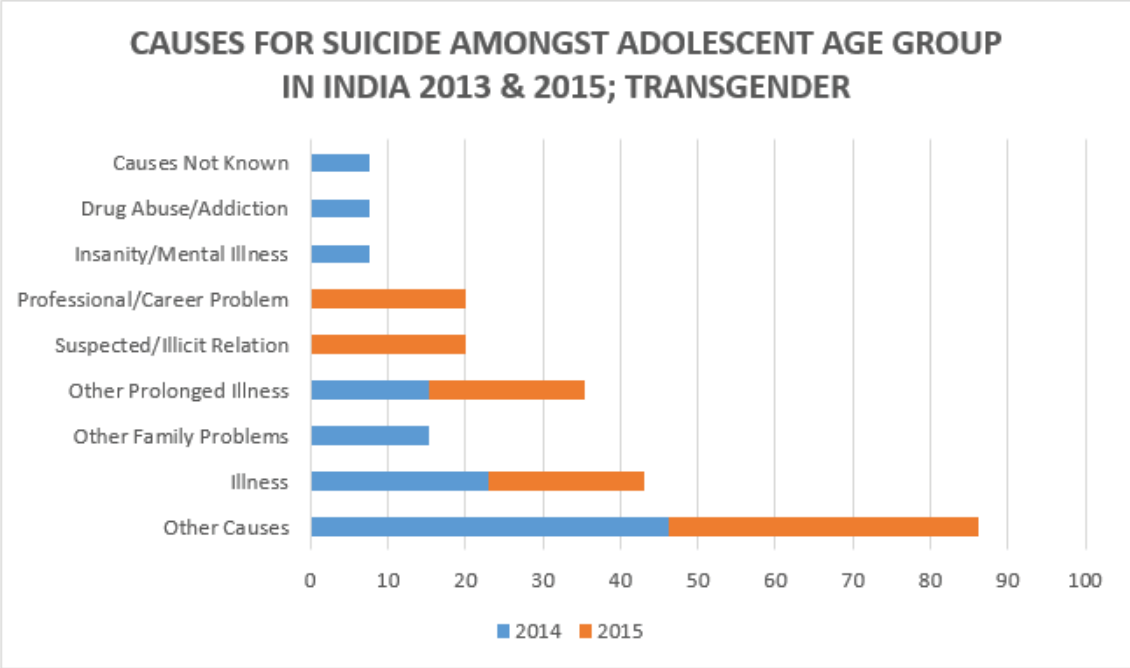


Figure No. 3, Causes for Suicide amongst Adolescent Age Group in India 2013 & 2015; Transgender (Suicide rate in percentage) [16][17]

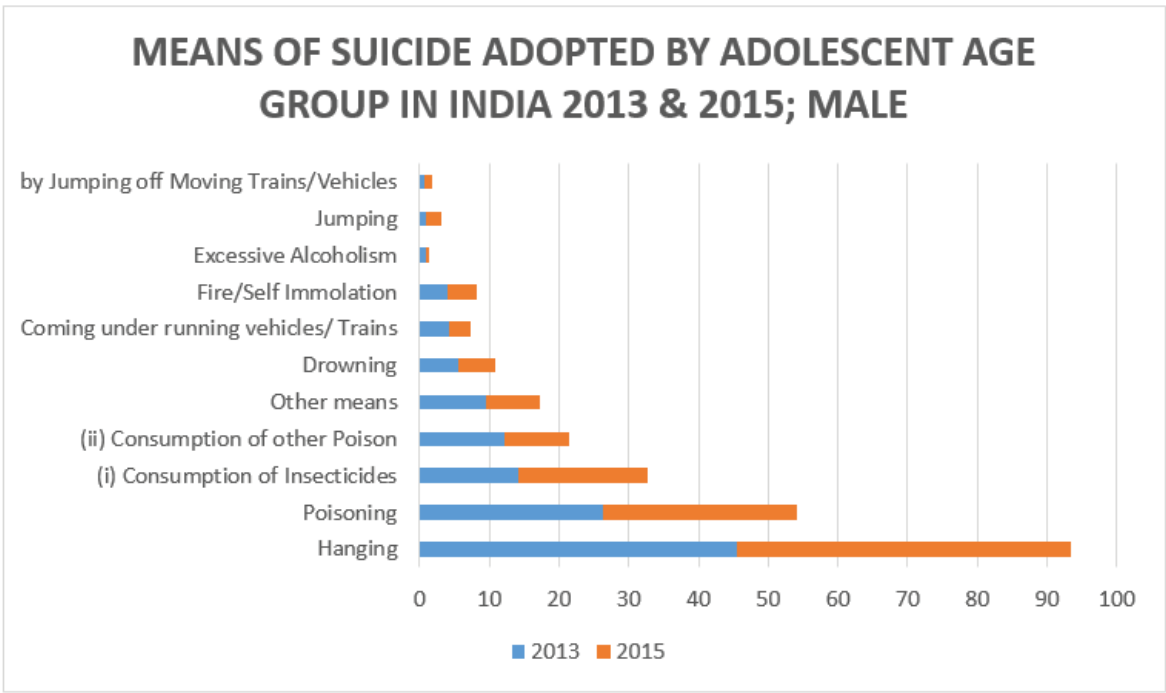


Figure No.4, Means of Suicide Adopted By Adolescent Age Group in India 2013 & 2015; Male (Suicide rate in percentage) [14] [15]

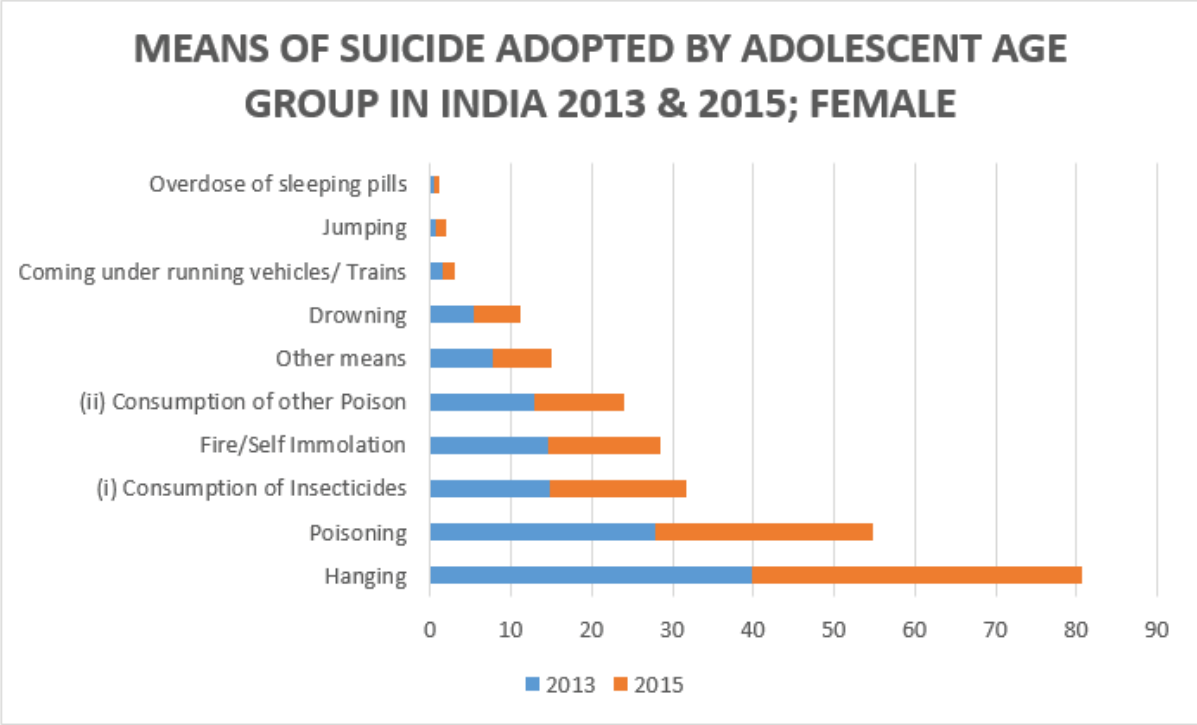


Figure No. 5, Means of Suicide Adopted By Adolescent Age Group in India 2013 & 2015; Female (Suicide rate in percentage) (14)(15)

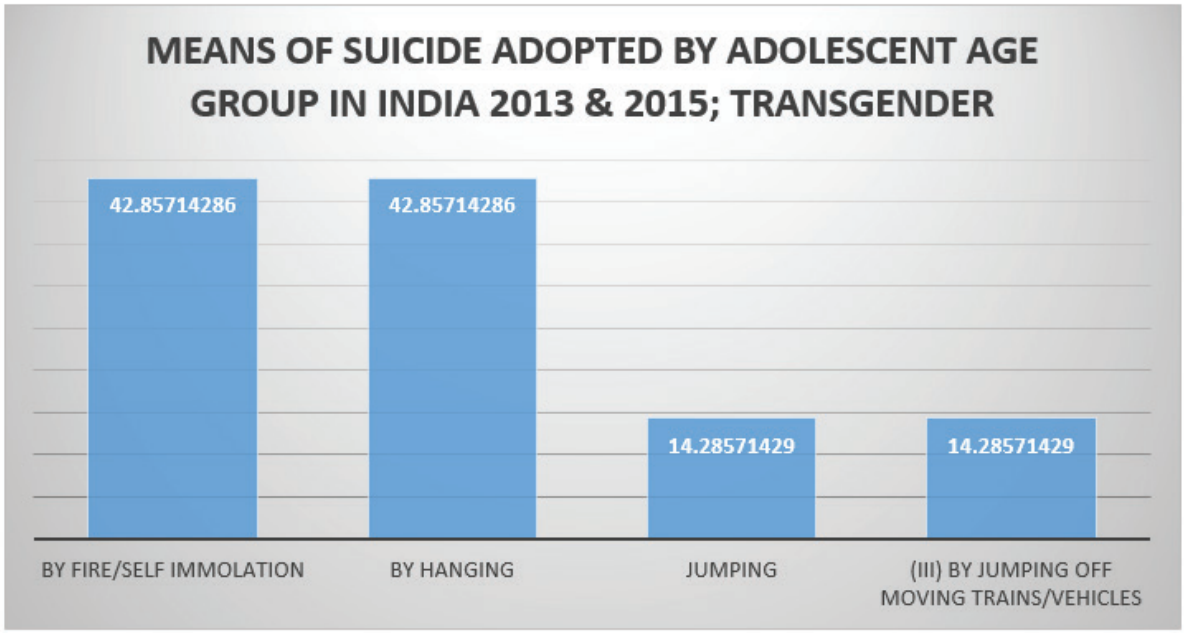


Figure No. 6, Means of Suicide Adopted By Adolescent Age Group in India & 2015; Transgender. (Suicide rate in percentage) (14)

Discussions and Conclusions

The percentage increase in adolescent suicide in India from 2013 to 2014 is 16.67% is higher that the records published by the National Crime Records Bureau 15.4% in increase from 2004 to 2014. The economic loss caused by adolescent suicides in 2014 accounts to 378.7 billion rupees which seriously affects the nation's developmental gains. The priority should be to prevent male suicides which is significantly higher than that of female suicides in India. The government

and NGO's must individually target the states with maximum number of suicides in 2013,2014 and 2015 1) Maharashtra, 2) Tamil Nadu, 3) West Bengal, 4) Madhya Pradesh , 5) Karnataka and 6) Andra Pradesh.

The percentage increase in student's suicide from 2013 to 2016 is 18.31% is alarming. The states with the maximum number of student suicides should be individually targeted and suicide prevention strategies involving student volunteers and teachers could be introduced in the educational institutions to address student suicides.

The best way to prevent adolescent suicides is to understand the Causes for suicides and to take appropriate measures to address them states the WHO, hence the suicide prevention policy could try and target people who are vulnerable to; other causes, other family problems, causes not known, love affairs, illnesses, other prolonged illnesses, insanity or mental illness, failure in exams, marriage related issues, dowry problems, drug abuse/addiction, unemployment, suspected/ illicit relations and professional and career problems.

Preventing access to the means of suicide helps in reducing the number of suicides as per WHO guidelines and we suicide prevention policy could try and limit access to the most common means of adolescent suicides; Hanging, poisoning, consumption of insecticides, consumption of other poison, other means, drowning, coming under running vehicles/ trains, jumping, jumping of moving vehicles, overdose of sleeping pills, fire/ self-immobilizing'

Further research must be done to understand - 1) high number of male suicides, 2) high number of student suicides, 3) high student and adolescent suicides in certain states, 4) the leading causes of adolescent suicide other family problems and other problems, 5) the actual number of transgender suicides in India.

The government should try and develop a suicide prevention policy considering the recommendations; 1) the states with highest number of adolescent and student suicides should be targeted individually, 2) student volunteers should be trained in educational institutions to give support to the students, 3) the adolescents who are vulnerable to common means of suicide should be assisted, 4) Access to the common means of suicide should be reduced 5) government should try and start a suicide prevention helpline, computer based and mobile based chat support to help adolescents 6) community based access points to give mental health first aid 7) Community mental health volunteers could be trained and employed in the PHC- SHC –CHC respectively. The primary focus should be to reduce the adolescent suicides and to foster their growth for the betterment of the nation.

Ethical Clearance: Not Required

Conflict of Interest : Nil

Funding : Self

References

1. WHO. Suicide [Internet]. 2019. Available from: https://www.who.int/news-room/fact-sheets/detail/suicide
2. WHO. Mental Health - National suicide prevention stratergies, progress, examples and indicatiors [Internet]. 2018. Available from: https://apps.who.int/iris/bitstream/handle/10665/279765/9789241515016-eng.pdf?ua=1
3. Kamalja KK, Khangar N V. A statistical study of suicidal behavior of Indians. Egypt J Forensic Sci [Internet]. 2017;7(1):12. Available from: https://doi.org/10.1186/s41935-017-0007-9
4. Brent DA, Perper JA, Goldstein CE, Kolko DJ, Allan MJ, Allman CJ, et al. Risk Factors for Adolescent Suicide: A Comparison of Adolescent Suicide Victims With Suicidal Inpatients. Arch Gen Psychiatry. 1988;45(6):581–8.
5. Zachariah B, de Wit EE, Bahirat JD, Bunders-Aelen JFG, Regeer BJ. What is in It for Them? Understanding the Impact of a 'Support, Appreciate, Listen Team' (SALT)-Based Suicide Prevention Peer Education Program on Peer Educators. School Ment Health [Internet]. 2018;10(4):462–76. Available from: https://doi.org/10.1007/s12310-018-9264-5
6. Ministry of Health & Family Welfare G of I. Crime and Law - Suicides (State Wise) [Internet]. Vol. Part I, Indiastat. 2015. Available from: https://www.indiastat.com/table/crime-and-law-data/6/suicides/267/1151128/data.aspx
7. Ministry of Health & Family Welfare G of I. Crime and Law - Suicides (State Wise) [Internet]. Vol. Part II, Indiastat. 2015. Available from: https://www.indiastat.com/table/crime-and-law-data/6/suicides/267/1151141/data.aspx

8. Implimentation, Ministry of Statistics and Programme G. Crime and Law - Suicides (State Wise) [Internet]. Indiastat. 2014. Available from: https://www.indiastat.com/table/crime-and-law-data/6/distribution-of-suicidal-deaths-by-age-group/477874/1004304/data.aspx
9. Ministry of Home Affairs G. Crime and Law - Suicides (State Wise) [Internet]. Indiastat. 2013. p. Part I. Available from: https://www.indiastat.com/table/crime-and-law-data/6/distribution-of-suicidal-deaths-by-age-group/477874/837734/data.aspx
10. 2451 LSUQN. Crime and Law - Suicides (Student) [Internet]. Indiastat. 2018. Available from: https://www.indiastat.com/table/crime-and-law-data/6/student-and-unemployed/478408/1200242/data.aspx
11. Ministry of Home Affairs G. Crime and Law - Suicides (Student) [Internet]. Indiastat. 2015. Available from: https://www.indiastat.com/table/crime-and-law-data/6/student-and-unemployed/478408/1035300/data.aspx
12. GoI M of HA. Crime and Law - Suicides (Student) [Internet]. Indiastat. 2014. Available from: https://www.indiastat.com/table/crime-and-law-data/6/student-and-unemployed/478408/923076/data.aspx
13. GoI M of HA. Crime and Law - Suicides (Student) [Internet]. Indiastat. 2013. Available from: https://www.indiastat.com/table/crime-and-law-data/6/student-and-unemployed/478408/830807/data.aspx
14. GoI M of HA. Crime and Law - Suicides (Means) [Internet]. Indiastat. 2015. Available from: https://www.indiastat.com/table/crime-and-law-data/6/total-means-adopted/477873/1035523/data.aspx
15. GoI Mi of HA. Crime and Law - Suicides (Means) [Internet]. Indiastat. Available from: https://www.indiastat.com/table/crime-and-law-data/6/total-means-adopted/477873/837592/data.aspx
16. GoI M of HA. Crime and Law - Suicides (Causes) [Internet]. Indiastat. 2015. Available from: https://www.indiastat.com/table/crime-and-law-data/6/total-causes/477800/1034957/data.aspx
17. Ministry of Home Affairs G. Crime and Law - Suicides (Causes) [Internet]. Indiastat. 2014. p. Part I. Available from: https://www.indiastat.com/table/crime-and-law-data/6/total-causes/477800/922253/data.aspx

Awareness of Therapeutic Positions in Women During Pregnancy Related Lumbar and Pelvic Pain

Ashwini Pawar[1], Chandrakant Patil[2]

[1]Final year student, Faculty of Physiotherapy, KIMS "Deemed To Be University" Karad, Maharashtra, India,
[2]Associate Professor, Department Cardiopulmonary Physiotherapy, Faculty of Physiotherapy, KIMS "Deemed To Be University" Karad, Maharashtra, India

Abstract

Objectives- Pregnancy related lumbar and pelvic pain is very common. This pain is mainly because of hormonal and postural changes occur during pregnancy. Lumbar and pelvic pain is the most common cause of discomfort experienced by pregnant women during pregnancy. so, Awareness about therapeutic positions to reduce that pain is very necessary. Some ergonomic positions given to the women which can help to improve posture and decrease discomfort and also relieving pain. It will give more comfort to the patient for day to day activities during pregnancy. Hence, this study aims to aware the pregnant women about therapeutic positions , that decrease the lumbar and pelvic pain and discomfort.

This study was conducted to find out the awareness of therapeutic positions in the pregnant women about lumbar and pelvic pain.

Methodology- The study group consisted of 64 women. . Females with age group of 25 to 35yrs. A prevalence study was conducted among females of all three trimesters of pregnancy. Females were selected on the basis of inclusion and exclusion criteria. They were assessed by performing visual analog rating scale and questionnaire was used to evaluate any physical disability contribute to lumbar and pelvic pain.. The data was collected and analysed accordingly.

Result- Data from sixty four females were obtained and analysed. Most of women were not aware about therapeutic positions ,only few were aware about therapeutic positions who was well educated. So 33% were aware and 67% were not aware about those positions. Following were some preferred therapeutic positions : 87% of women preferred side lying .8% preferred Quarter turn from prone, 3% preferred Sitting leaning forward, 2% preferred Sitting astride a chair.

Conclusion- We found out that there is awareness about therapeutic position and there effects is not seen in all women during pregnancy in Krishna hospital , Karad.

Keywords-*: lumbar and pelvic pain ,Therapeutic positions, Pregnant women*

Introduction

Pregnancy related low back or pelvic pain has been recognized as a medical entity since mentioned in the 4th century BC.[1] The majority of the studies reports that back pain experience in women during a pregnancy that cause substantial impact on their daily lives.[2-5] There are common physical changes associated with pregnancy ;those are ligamentous laxity, weight gain and hyperlordosis.[1] common musculoskeletal complaints of pregnancy women are low back pain and pelvic pain.[1,2]

Lumbar pain commonly presents as same as back pain experienced before pregnancy. Lumbar pain is located over and around lumbar spine with or without

Corresponding Author:
Dr.Chandrakant Patil .
Associate Professor, Department Cardiopulmonary Physiotherapy, Faculty of Physiotherapy, KIMS "Deemed To Be University'' Karad, Maharashtra, India. Pin -415110. Phone number-9561703473
Email ID- chandupatil69@gmail.com

radiation to leg or foot. Its functional limitations are prolonged weight bearing in standing or sitting and repetitive lifting. lumbar pain may resemble episodes of low back pain experienced before pregnancy. Erector spinae muscles may be tender on palpation.[2,7,8]

Pelvic pain approximately four times more prevalently seen than lumbar pain during pregnancy.[9] Pelvic pain located in buttocks and low back ,distal and lateral to the lumbar spine, may radiate to posterolateral thigh, occasionally to knee and rarely to calf. Functional limitation for this pain are turning in bad, climing stairs. running, walking ,lifting and twisting. this pain has been particularly associated with work involving lifting with twisting. it aggravates by jarring activities. Pelvic pain risk increased with work postures involving flexion of the upper part of body.[2,8-9,10-12]The 50-90% of women will experience some type of back pain during their pregnancy. In fact, recent research has shown that the severity of back pain and that pain of pregnancy may impact the entirely of some women's lives.[2-6]

It was found that 75% of women will have posterior posture at the end of pregnancy and suggested that an anterior posture associated with pubic symphysis problems. women gain weight during pregnancy and some postural changes also seen in women to maintain balance because of their center of gravity shifts.[13]

Generally some women use some general position for their comfort and decreasing strain on pelvic. Therapeutic positions helps to manage pain and prevent further complications at any stage of pregnancy, such as 1)Sitting leaning forward position in which patient sits on chair with knees apart, hands and upper body supported on raised table or plinth, back should be straight. 2) sitting astride a chair position in this patient sits astride in a chair in forward leaning position with back straight. 3) Patient in side lying position with pillows kept between two flexed knees. 4) Quarter turn from prone position in this position patient lies slightly prone position with flexed upper hip and knee, the lower arm should keep behind the trunk.[1]So every pregnant women should know these positions to avoid pain and further complications.

Therefore, the aim of study was to create awareness among four different therapeutic positions in pregnant women about lumbar and pelvic pain and which position is more preferred in pregnancy.

Methodology

Total 64 females were selected from Krishna Hospital, Karad, for the study who fulfilled inclusion criteria. The procedure was explained and consent was taken from those willing to participate.

Here, visual analog rating scale and questionnaire was used to evaluate any physical disability contribute to lumbar and pelvic pain performed. so these were performed to rule out the presence or absence of pregnancy related lumbar and pelvic pain. The data were collected and statistical analysis was done.

Result

1) **Distribution of Awarenness About Therapeutic Positions:**

	Frequency	**%**
YES(A)	21	33
NO(B)	43	67

Interpretation- Above table represents awareness about therapeutic positions in subjects. Out of 64 subjects, 22 subjects aware and 43subjects not aware. soo awareness about therapeutic positions is 33% and 67% not aware about that.

2) **Distribution of Preference of Therapeutic Positions:**

	Frequency	**%**
SL(A)	56	87
QTFP(B)	5	8
SLF(C)	2	3
SAC(D)	1	2

Interpretation- Above table represents preference of therapeutic positions in subjects. Out of 64 subjects. Side lying preferred by 56 subjects(87%),Quarter turn from prone preferred by 5 subjects(8%),Sitting leaning forward preferred by 2 subjects(3%),Sitting astride a chair preferred by 1 subject(2%)

3) **DISTRIBUTION OF TRIMISTERWISE:**

	Frequency	%
1st T(A)	0	0
2nd(B)	52	82
3rd(C)	12	18

Interpretation- Above table represents trimesterwise pain in subjects. Out of 64 subjects ,0 subjects (0)% had pain in first trimester,52 subjects (82%) had pain in second trimester and 12 subjects (18%)had pain third trimester.

4) **DISTRIBUTION OF Visual Analog Scale:**

	Frequency	%
0-5cm(A)	8	13
6-10cm(B)	56	87

Interpretation- Above table represents results of visual analog rating scale in subjects. Out of 64 subjects. 8 subjects(13%)had pain in between 0-5cm and 56 subjects (87%)had pain in between 6-10cm.

Discussion

The purpose of the study is to study the awareness of therapeutic positions can be adopted by pregnant women during pregnancy and that impact on the lumbar and pelvic pain.The objective of this study to find awareness of therapeutic positions in the pregnant women about lumbar and pelvic pain.

The study was carried out and result was drawn by using visual analog scale and with the help of questionnaire.

This project was done in six months of duration with sample size 64 and age group of 25-35 years. Then baseline information of age(yrs),weight(kg),and height(cm) along with details regarding the current pregnancy were taken.This participants were selected according to the inclusion and exclusion criteria. This study was conducted in Krishna hospital, karad. Consent form was taken from the subjects and assent form was taken by their caretakers. Visual analog scale and lumbar and pelvic pain questionnaire were performed to rule out the presence or absence of lumbar and pelvic pain.

The procedure was carried according to visual analog rating scale and lumbar and pelvic pain questionnaire. Then the intensity of the pain was seen by using visual analog rating scale in which ,we had asked patient to mark over 10cm line according to their pain intensity, that is at rest and on activity.

And also questionnaire was used to evaluate any physical disability contribute to lumbar and pelvic pain.

According to a article, it is said that there are lumbar and pelvic pain present in females .so some therapeutic helps that pain decrease and make pregnant women comfortable. so following positions are:

1) Side lying: participant in side lying with bilateral hip and knee flexion seperated by a pillow placed between the knees.

2) Quarter turn from prone :participant lies as far into prone as possible with the upper knee and hip flexed and lower leg straight. The lower arm should be behind the trunk in this position

3) Sitting leaning forward: participant sits with knees apart and upper body supported with arms on a raised table or plinth, keeping the back straight.

4) Sitting astride a chair: participant sits astride a chair in a leaning forward position while supporting the upper body on the back of the chair, and keeping the back straight.

Each of this position was explained to the participant and made them aware about effects of that therapeutic positions. And them about these positions

In age group,72%women in between 25-30yrs and 28%women in between 31-35yrs.In BMI ,88%women were normal category ,9% had were overweight ,3% were obese. most of the women in normal category and some in overweight. 53% women had full term normal pregnancy is type of previous pregnancy. 40% had lower segmental cesarean section. 7% women were primigravida. Usually in all cases back pain is commonly seen. 14%women had lumbar and 12% had pelvic girdle ; 74%women had both. Pain is present at lower back as well as lumbar area also. And in all women aching type of pain was seen.

Excessive pain usually seen second trimester. so,82%women had pain in second trimester.18% had in third trimester.67% had Activity limitations in prolonged standing and 33% had in prolonged bending. Most of women were not aware about therapeutic positions ,only few were aware about therapeutic positions who was well educated. So 33% were aware about that and 67% were not aware about those positions.from some preferred therapeutic positions, 87% of women preferred side lying .8% preferred Quarter turn from prone, 3% preferred Sitting leaning forward, 2% preferred Sitting astride a chair.

Conclusion

On the basis of result of study, it was concluded that there is lumbar and pelvic pain present in all pregnant women .But awareness about therapeutic position and there effects is not seen in all within age group of 25 to 35yrs. Pregnant women mostly preferred side lying position, but not aware about therapeutic positions. In pregnancy usually aching pain is seen. Mainly most of the women had low back pain and some had pelvic girdle pain and few had both pain. In most of women started low back pain in 2nd trimester. Side lying position is mostly prefer to relieve your lumbar and pelvic pain

Awareness about therapeutic positions in pregnant women is 33% and 67% women are not aware about those positions.

Conflicts of Interest: There were no conflicts of interest in this study.

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna institute of medical sciences.

Source of Funding: Self-funding

References

1. Ashby JF,Johnson GM . The therapeutic positional preferences of pregnant women. barrington physiotherapy clinic, school of Physiotherapy, university of Otago,New Zealand.(2015) ;43(3):86-92.
2. Perkins J, Hammer RL, Loubert PV. Identification and management of pregnancy-related low back pain. Journal of nurse-midwifery. 1998 Sep 1;43(5):331-40.
3. Kristiansson P, Sva¨rdsudd K, von Schoultz B. Back pain during pregnancy: a prospective study. Spine 1996;21:702–09
4. Mantle J. Back pain in the childbearing year. In: Boyling JD, Palastauga N, editors. Grieve's modern manual therapy, 2nd ed. London: Churchill Livingstone, 1994:779–808
5. Mantle MJ, Greenwood RM, Currey HLF. Backache in pregnancy. Rheumatol Rehab 1977;16:95–101.
6. O¨ stgaard HC, Anderson GBJ, Karlson K. Prevalence of back pain in pregnancy. Spine 1991;16:549–52.
7. Berg G, Hammar M, Mo¨ller-Neilsen J, Linde´n U, Thorbald J. Low back pain during pregnancy. Obstet Gynecol 1988;71:71–5
8. O¨ stgaard HC. Assessment and treatment of low back pain in working pregnant women. Semin Perinatol 1996;21:61–9.
9. Colliton J. Back pain and pregnancy. Active management strategies. Physician Sports Med 1996;24:89–93.
10. O¨ stgaard HC, Zetherstro¨m G, Roos-Hansson E. Reduction of back and posterior pelvic pain in pregnancy. Spine 1994;19:894– 900.
11. O¨ stgaard HC, Roos-Hansson E, Zetherstro¨m G. Regression of back and posterior pelvic pain after pregnancy. Spine 1996;21:2777– 80.
12. LaBan MM, Rapp NS. Low back pain of pregnancy. Phys Med Rehabil Clin N Am 1996;7:473–86.
13. Sandler SE. The management of low back pain in pregnancy. Manual Ther 1996;1:178–85.

Comparison of An *App* Based Low Density Lipoprotein Cholesterol (LDL-C) Estimation with Direct Assay and Friedewald Formula in Indian Population

B. Pallavi[1], Krishnamurthy U[2]

[1]Senior Registrar, Department of Clinical Biochemistry, Central Laboratory, St. Martha's Hospital, Bangalore,
[2]Associate Professor, Department of Biochemistry, Ramaiah Medical College, Bangalore

Abstract

Introduction: Accurate measurements of Low Density Lipoprotein Cholesterol (LDL-C) are imperative in classifying individuals with risk of cardiovascular Disease (CVD). Guidelines around the world advocate aggressive LDL-C lowering therapies. A novel equation, Martin Hopkins Equation [LDL-C (MH)], has been proposed to be an alternate to provide precise LDL-C estimates to initiate and/or adjust drug dosage.

Method: Lipid profile data of 739 adults were measured by enzymatic colorimetric methods. Calculated LDL-C by Friedewald formula, LDL-C (FF) and LDL-C (MH) was computed from ldlcalculator.com/ smartphone application.

Results: The sensitivity and specificity of LDL-C (MH) was 92.3% and 87.8% respectively. On Receiver Operating Characteristics Curve (ROC) analysis, Area under Curve (AUC) was 0.97 ($p<0.001$). Bland Altman plots revealed a minimal positive bias of 1.2 for LDL-C (MH).

Conclusion: The findings are suggestive of better estimates of LDL-C (MH) when compared to LDL-C (FF). A diagnostic laboratory could report LDL-C for absolutely *FREE* in the future. A new horizon in LDL-C estimation!!!

Keywords: *Low Density Lipoprotein Cholesterol, Cardiovascular Disease, Friedewald Formula, Martin Hopkins Equation, ROC.*

Introduction

Circulating Low Density Lipoprotein Cholesterol (LDL-C) has been considered as the main culprit and key contributor to plaque formation and atherosclerotic cardiovascular disease (ASCVD).[1] LDL-C cut points are considered as primary treatment goals to reduce risk of major cardiovascular events and mortality.[2-3] Thus its accurate estimations is the need of the hour to enable tailoring of therapies [(statins and non-statin based options like ezetemibe, proprotein convertase subtilisin/ kexin type 9(PCSK-9 inhibitors)] to reduce LDL-C levels which leads to improved patient care and outcome.[3]

The gold standard in estimation of LDL-C, β-quantification, is resource expensive and time-consuming. [4] Hence other scalable alternatives were developed. The analysis can be done either by **Direct estimation [LDL-C (Direct)]** which are detergent based assays or calculated using the defacto clinical standard, **Friedewald formula [LDL-C (FF)]** that considers a fixed factor of 5 to provide Very Low Density Lipoprotein Cholesterol (VLDL-C) values. [5]

Here we explore the plausibility of usage of a Novel equation to estimate LDL-C that utilizes an adjustable factor for Triglycerides (TGL)/VLDL-C ratio. With increasing incidence of high TGL states like Diabetes mellitus, Obesity, Insulin resistance, it would affect the variance of TGL/VLDL-C ratio, hence LDL-C

Corresponding author:
B. Pallavi
Senior Registrar, Department of Clinical Biochemistry, Central Laboratory, St. Martha's Hospital, Bangalore

measures could be inaccurate. [6] The recent AHA/ACC 2018 Guidelines have approved the usage of an alternate method of LDL-C estimation [**Martin- Hopkins equation**: LDL-C (MH)]. [2]

In an era of digital/mobile health with an App being developed for the same, ***LDL CALCULATOR,*** clinicians and patients can easily avail LDL-C values at the click of a few buttons from a lipid profile. In this age of precision medicine an attempt has to be made to begin looking beyond LDL-C (FF) and Homogenous assays for accurate LDL-C estimates enabling the correct classification of risk of CVD in all patients.

Objectives:

1) To determine underestimation/overestimation of LDL-C when calculated by using the formulae [LDL-C(FF) and LDL-C(MH)] compared with LDL-C by direct homogenous assay [LDL-C(Direct)], assuming the assay to be accurate.

2) To determine which of the calculated formulae shows maximum correlation with LDL-C (Direct) at various TGL levels.

Materials and Method

A) Data Collection:

A **cross- sectional comparative study** was conducted by the Department of Biochemistry, Ramaiah Medical College, Bengaluru and data was collected during the period May 2015 to July 2015(Power of study is 80%). The lipid profile parameters[Total Cholesterol(TC),High Density Lipoprotein Cholesterol(HDL-C),LDL-C(Direct) and TGL] were measured by enzymatic colorimetric methods on fasting venous samples on a fully automated Cobas® 6000 analyzer (Roche Diagnostics, Basel, Switzerland) at Ramaiah Hospital Laboratory. The data of 753 adults (≥18 years) was collected and those of children and pregnant women were excluded in the context of primary hyperlipoproteinemia and hemodilution respectively.

B) Calculated LDL-C:

a) FRIEDEWALD FORMULA:

LDL-C is almost always measured using LDL-C(FF) and is given as **TC-HDL-C-(TGL/5)**.[5] It begins underestimating LDL-C in patients with TGL levels as low as 150 mg/dl leading to reduced treatment of such patients and under-classification of risk of CVD. [6]

b) MARTIN HOPKINS EQUATION:

It was derived and validated by Martin et al using a large sample of lipid profiles (n=13,50,908),3015 times larger than the original Friedewald database, inclusive of fasting and non- fasting samples. The methods employed for TC was ultracentrifugation and TGL was directly measured. [7]

It features an adjustable factor for TGL/VLDL-C ratio based on the patient's Non- High Density Lipoprotein Cholesterol (Non-HDL-C) and TGL estimates. The approach consists of 6 levels of stratifying Non-HDL-C from <100 mg/dl to >220 mg/dl and TGL into 30 ranges from 7-49 mg/dl to 400-13975 mg/dl in a 180 cell table. [7]

LDL-C (MH) = TC-HDL-C-(TGL/adjustable factor)

= Non-HDL-C-(TGL/adjustable factor)

The factor ranges from 3.1-11.9 and are personalized to the specific lipid panel. It was found to be more accurate in comparison to LDL-C (FF), particularly when classifying LDL-C levels <70 mg/dl in the presence of high TGL levels. [6-9]

It is available as an online calculator on **ldlcalculator.com** or also as a **smartphone application** downloadable on Google Play or Apple play store.

C) STATISTICAL ANALYSIS OF DATA:

Statistical analyses were performed on Microsoft Excel and Medcalc software (version 19.0.5). The distribution of continuous variables were described as means with standard deviations **(mean ± SD)** and compared using **Student t-test.** Correlation between various methods of LDL- C was assessed by **Pearson's correlation**. Agreement between two measurements was tested by calculating systematic errors (Bias), and 95% limits of agreement (LOA) as Bias±2SD by **Bland-Altman plots**. The level of statistical significance was established at $p < 0.05$.

The risk of CVD was decided on the basis of LDL-C cut-points in accordance to NCEP –ATP III Criteria, i.e. <100 mg/dl (no risk of CVD) and ≥100 mg/dl (with risk of CVD). The sensitivity and specificity for LDL-C by the estimated formulae was calculated.

Receiver operating characteristics curve (ROC) and **Area under curve** (AUC) was used to evaluate the ability of the formulae to discriminate diseased cases from normal subjects.

Results

A total of 753 subjects aged between 18-93 years, of which 449(60.7%) were males and 290(39.2%) females were included in the study. Among them 14 patients had TGL> 400 mg/dl, the remaining 739 individuals were considered as the study cohort in final analysis.

The analysis at a cut- off point of LDL-C 100 mg/dl, showed sensitivity and specificity of LDL-C (MH) as 92.3% and 87.8% respectively. Odds ratio (OR) was found to be 87.22. On ROC analysis (Figure 3) the AUC was 0.97($p<0.001$). Also the sensitivity and specificity of LDL-C (MH) relative to LDL-C (FF) was 90.2% and 99.7% respectively and AUC was 0.99 ($p<0.001$). The overall mean LDL-C (Direct), LDL-C (FF) and LDL-C (MH) were 108.8±40.8, 103.5±37.5, 107.7±36.7 mg/dl respectively. On an overall basis, a minimal difference of 1.1±4.1 mg/dl was noted between LDL-C (Direct) and LDL-C (MH) values.

Gender wise comparison with and without risk of CVD of all measures of LDL-C:

There exists a significant difference ($p <0.001$) in the LDL-C estimated by both the formulae in both genders with and without risk of CVD as shown in Table 1. Also when LDL-C (Direct) was <100 mg/dl, in both genders overestimation by LDL-C (MH) was noted.

Effect of TGL on measurements of LDL-C (FF) and LDL-C (MH):

The consequences of serum TGL concentrations on the divergence of LDL-C (FF) and LDL-C (MH) values from LDL-C (Direct) was assessed. In Table 2, the study cohort was stratified into four groups on the basis of TGL levels and a measure of comparison of means of LDL-C calculated by the formulae against LDL-C (Direct) was attempted. At high TGL levels (Group III and Group IV) overestimation of LDL-C (MH) is observed though statistical significance could not be proved (Group III: $p= 0.59$, Group IV: $p= 0.42$) while underestimation was noted in LDL-C (FF) in all the groups. A strong correlation was also noted for LDL-C (MH).

Concordance in Guideline classification:

The concordance of values between LDL-C (Direct) and estimated LDL-C was analysed using NCEP-ATP III criteria. The study population was again assorted into 5 categories with respect to LDL-C (Direct) values. In Table 3, LDL-C (MH) showed a superior concordance with LDL-C (Direct) when compared with LDL-C (FF) across all the categories, also reaching statistical significance. With increasing values of LDL-C (Direct), the ability of LDL-C (FF) to correctly identify the patient population reduces but the same was not observed when LDL-C (MH) was used.

Correlation and Bland Altman plot between LDL-C (Direct) and calculated LDL-C:

Linear regression analysis between LDL-C (Direct) and estimated LDL-C revealed a strong, positive and similar correlation. The correlation coefficients were 0.87 ($p=1$) for LDL-C (MH) and 0.87 ($p <0.05$) for LDL-C (FF). (Figure 1) To find an agreement between LDL-C (Direct) and estimated LDL-C, the Bland Altman plots were used. (Figure 2) It shows a minimal positive bias of 1.2 for LDL-C (MH) and 5.3 for LDL-C (FF).

Table 1: Comparison of parameters between both genders with and without risk of CVD as defined by LDL-C cut points in accordance to NCEP-ATP III Criteria

Parameters	Males			Females		
	LDL-C (Direct)≥ 100 mg/dl (n=240) (With risk of CVD)	LDL-C (Direct)< 100 mg/dl (n=209) (Without risk of CVD)	p-value*	LDL-C (Direct)≥ 100 mg/dl (n=185) (With risk of CVD)	LDL-C (Direct)< 100 mg/dl (n=105) (Without risk of CVD)	p-value*
Age(years)	51.2±15.1	52.8±16.1	0.25	51.5±13.6	51.3±15.3	0.89
TC(mg/dl)	200.6±32.5	131.9±25.9	<0.001	205.5±31.4	138.9±22.7	<0.001

Cont... **Table 1: Comparison of parameters between both genders with and without risk of CVD as defined by LDL-C cut points in accordance to NCEP-ATP III Criteria**

TGL(mg/dl)	162.9±72.7	137.5±74	<0.001	153.3±68.1	130.3±74.8	0.05
HDL-C(mg/dl)	41.6±12.2	34.3±15.1	<0.001	45.8±13.2	40±16.4	<0.001
LDL-C (Direct) (mg/dl)	136.1±27.8	69.7±21.7	<0.001	137.2±27.1	74.2±19.4	<0.001
LDL-C(MH) (mg/dl)	130.6±27.4	75.1±20.2	<0.001	132.2±26.7	77±19.4	<0.001
LDL-C(FF) (mg/dl)	126.4±29	70.2±20.4	<0.001	129±27.5	72.9±18.7	<0.001

****student's't' test, p-value <0.05 is significant, p-value <0.001 is highly significant.***

Table 2: Comparison of mean difference and measure of comparison of means between various methods of LDL-C on the basis of different levels of TGL

LDL-C(mg/dl)	**TGL LEVELS(mg/dl)**			
	GROUP I : TGL<100 (N=217)	**GROUP II: TGL 100-199 (N=369)**	**GROUP III: 200-299 (N=118)**	**GROUP IV: 300-399 (N=35)**
LDL-C(Direct)	93.4±34.3	116.5±40.9	113.4±45.8	108.7±34.8
LDL-C(MH)	91.2±33.3	113.9±36.3	116.3±36.8	114.7±26.9
Difference in mean	2.2	2.6	-3.1	-6.0
p-value*/r value#	0.48/0.94	0.38/0.94	0.59/0.91	0.42/0.86
LDL-C(FF)	92.5±33.6	110.7±37.8	104.3±40.3	94.2±30.9
Difference in mean	0.9	5.8	9.1	14.5
p-value*/r value#	0.77/0.95	0.05/0.94	0.11/0.91	0.07/0.86

****student's't' test, p-value <0.05 is significant, p-value <0.001 is highly significant.***

r value =Pearson's correlation coefficient.

Table 3: Proportion of concordance between LDL-C (Direct) and estimated LDL-C on the basis of stratification of LDL-C cut points as per NCEP-ATP III Criteria

LDL-C (Direct)	LDL-C(MH)			LDL-C(FF)		
(mg/dl)	Concordance	%	p- value*	Concordance	%	p- value*
<100	282/314	89.8	<0.05	299/314	95.2	0.92
100-129	141/197	71.6	<0.05	127/197	64.4	<0.001
130-159	95/148	64.2	<0.001	88/148	59.4	<0.001
160-189	31/57	54.4	<0.001	26/57	45.6	<0.001
≥ 190	13/23	56.5	0.09	10/23	43.5	0.06

student's 't' test, p-value <0.05 is significant, p-value <0.001 is highly significant.

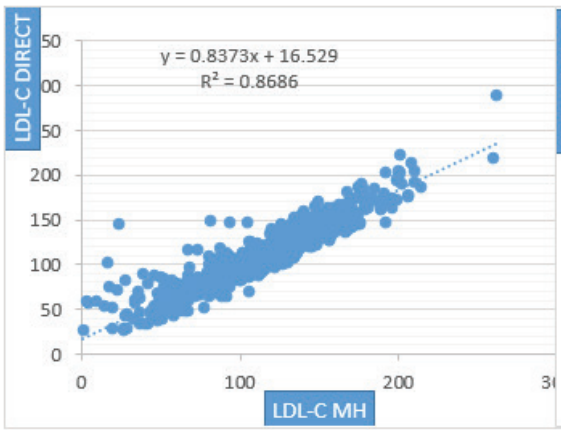


Figure 1(a): Scatter plot of LDL-C (Direct) and LDL-C (MH) shows a positive correlation of 0.86

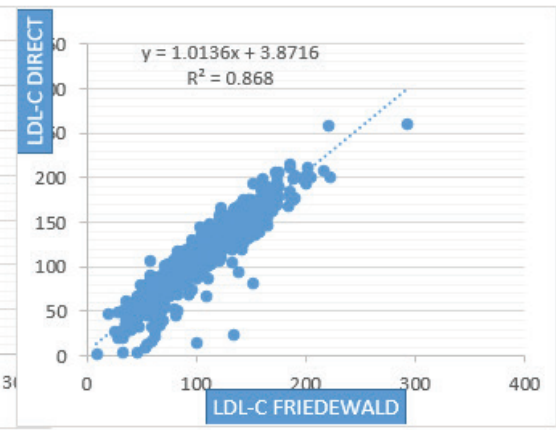


Figure 1(b): Scatter plot of LDL-C (Direct) and LDL-C (FF) shows a positive correlation of 0.86

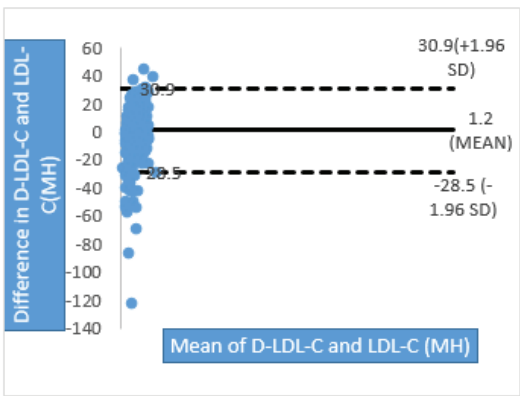


Figure 2(a): Bland Altman plot for LDL-C (Direct) and LDL-C(MH) shows a minimal bias of 1.2

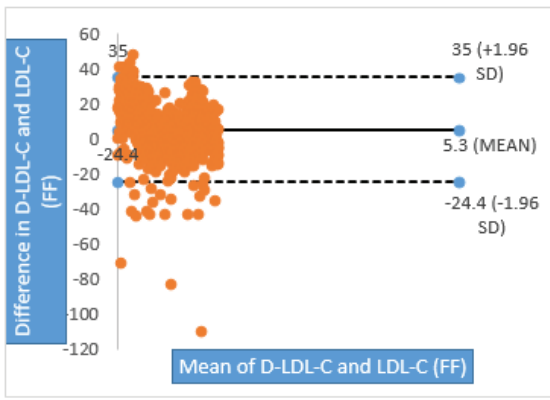


Figure 2(b): Bland Altman plot for LDL-C (Direct) and LDL-C(FF) shows a bias of 5.3

Figure 3: ROC for LDL-C (MH) at cut-off point of LDL-C 100 mg/dl (risk of CVD)

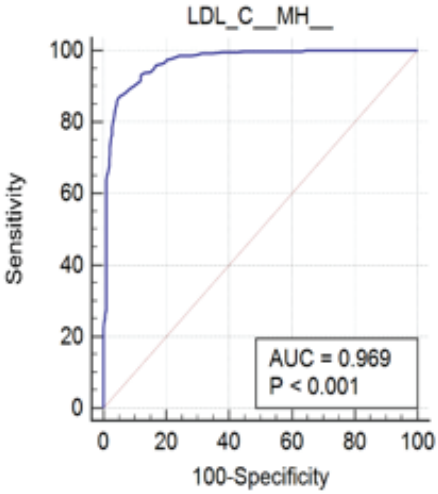


Figure 3(a): LDL-C (Direct) and LDL-C (MH)

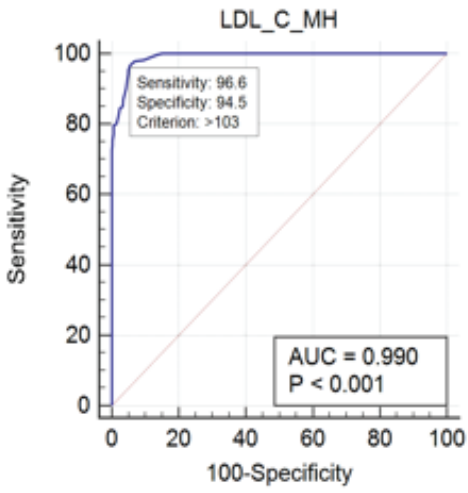


Figure 3(b): LDL-C (MH) and LDL-C (FF)

Discussion

Why is it time to look beyond the classic Friedwald formula that has been historically tolerated for five decades? The answer is Statins and PCSK-9 inhibitor therapies for hypercholesterolemia which are extremely effective at lowering LDL-C and its values are required by clinicians. As these drugs have undesirable side effects, inappropriate use is not encouraged, and thus the need for an extremely accurate LDL-C estimate is acute. Direct LDL-C offers relatively better accuracy but are costlier than a ***"FREE"*** calculation.

In 2013 a team led by Dr. Martin S Seth at John Hopkins University developed the equation which basically customizes the denominator through the 180-cell approach. Its beauty lies in the fact that using the information from a standard Lipid profile an accurate and FREE measure of LDL-C is obtainable. Besides, it obviates the need for a fasting sample thus attaining more patient compliance. [6]

This study was undertaken to assess the validity of LDL-C (MH) and LDL-C (FF) in comparison to LDL-C (Direct) assay. To the best of the author's understanding the equation has not been studied in the Indian population. This study demonstrated a superior performance of LDL-C (MH) at low LDL-C (<100 mg/dl). LDL-C (MH) tends to overestimate the LDL-C significantly ($p<0.001$) when compared to LDL-C (Direct) and LDL-C (FF). Thus it was capable of identifying individuals with high risk of CVD.

With an increase in TGL concentrations, the difference between LDL-C (Direct) and LDL-C (FF) increased but LDL-C (MH) values were independent of TGL levels. This outcome was comparable to studies by Choi *et al* [10], Decordova *et al*[11] and Martins J *et al.* [12] A strong, positive correlation ($r=0.87$) was noted for LDL-C (MH). The Bland Altman plot displayed a minimal positive bias of 1.2 for LDL-C (MH), similar to the study by Saiedullah *et al.* [13] but LDL-C (FF) showed a larger positive bias of 5.3. This can be indicative of a possibility of usage of LDL-C (MH) to obtain accurate measures in place of LDL-C (Direct) and LDL-C (FF). LDL-C (MH) showed a higher concordance with LDL-C (Direct) when compared to LDL-C (FF) across all the categories when stratified on basis of LDL-C cut points in accordance to NCEP- ATP III criteria, which was statistically significant ($p <0.001$). LDL-C (MH) showed a greater overall concordance of 62.5% in comparison to 60.9% by LDL-C (FF) which is in agreement to studies by Martin S *et al* [6] and by Lee J *et al.* [14] The sensitivity, specificity and ROC analysis as described in Results section emphasizes the strong association of LDL-C (MH) to correctly identify all individuals who are at higher risk of CVD at a cut point of LDL-C ≥100 mg/dl in comparison to both LDL-C (Direct) and LDL-C

(FF).

In our country with a burdening population of high TGL states and an increased risk of CVD, it would be thoughtful for us to move away from Friedewald formula and adopt the novel equation to prevent misclassification of risk of CVD. With diagnostic laboratories most often running on shoe string budgets LDL-C (MH) offers a cost effective and accurate solution. To routinely report LDL-C (MH), will require a re-programming of the Laboratory Information Systems (LIS) which will initially prove to be costly and daunting, but with time it will mitigate the need for Direct LDL-C assays. There could be a day in the future when a laboratory could report LDL-C for absolutely free, without costing any money to the patient for the same!

Limitations of this Study:

1) It requires verification on a large sample size of Indian population as it was originally derived and validated on the American population.

2) Difference in methodology of cholesterol estimations (Ultracentrifugation versus direct homogenous assay).

Conclusion

The novel approach can thus provide precise LDL-C levels without associated costs and inaccuracies inherent to other established methods of LDL-C measurement.

Acknowledgement: We thank Ramaiah Medical College and Hospital, Bengaluru for supporting this study.

Institutional ethics committee clearance was obtained.

Sources of Funding: Not applicable.

Conflict of Interest: The authors have declared no conflict of interest.

References

1. Kannel W.B., Dawber T.R., Kagan A., Revotskie N., Stokes J, Factors of risk in the development of coronary heart disease-six year follow-up experience. The Framingham Study. Ann Med Intern. 1961;55:33-50.
2. Grundy SM, Stone NJ, Bailey AL, et al. 2018 AHA/ ACC/CVPR/AAPA/ABC/ACPM/ADA/ AGS/APhA/SPC/NLA/PCNA guideline on the management of blood cholesterol: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. J Am Coll Cardiol 2018. (Epub ahead of print)
3. Expert Panel on Detection Evaluation and Treatment of High Blood Cholesterol in Adults. Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). JAMA 2001;285:2486 –97.
4. Bachorik P. Measurement of low-density-lipoprotein cholesterol. In: RifaiN, WarnickG, Dominiczak M, editors. Handbook of lipoprotein testing, 2nd ed. Washington D.C: AACC Press; 2000. p.245.
5. Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low- density lipoprotein cholesterol in plasma, without use of the preparative ultra-centrifuge. Clin Chem. 1972;18:499–502.
6. Martin S.S, Blaha M.J, Elshazly M.B, Toth P.P, Kwiterovich P.O, Blumenthal RS et al. Comparison of a novel method vs the Friedewald equation for estimating low-density lipoprotein cholesterol levels from the standard lipid profile. JAMA. 2013;310:2061–8.
7. Martin S.S, Blaha M.J, Toth P.P, Joshi P.H, McEvoy J.W, Ahmed H.M, et al. Very large database of lipids: rationale and design. Clin. Cardiol 2013;36(11):641-648.
8. Palmer M.K, Barter P.J, Lundman P, Nicholls S.J, Toth P.P, Karlson B.W. Comparing a novel equation for calculating low-density lipoprotein cholesterol with the Friedewald equation: a VOYAGER analysis. Clin Biochem. 2019;64:24-9.
9. Stein EA. Measuring LDL Cholesterol: for Old and New Calculations, Is There an Optimal Formula? Clinical Chemistry. 2014;60(12):1466-68.
10. Choi H, Shim J.S, Lee M.H, Yoon Y.M, Choi D.P, Kim H.C. Comparison of Formulas for Calculating Low-density Lipoprotein Cholesterol in General Population and High-risk Patients with Cardiovascular Disease. Korean Circ J 2016;46(5):688-698.
11. Cordova C.M, Cordova M.M. A new accurate

simple formula for LDL-cholesterol estimation based on directly measured lipids from a large cohort. Ann Clin Biochem. 2013; 50:13-19.

12. Martins J, Olorunju S.A.S, Murray L.M, Pillay T.S. Comparisons of equations for the calculation of LDL-Cholesterol in hospitalized patients. Clinica Chimica Acta. 2015;444:137-142.
13. Saiedullah M, Chowdhury N, Khan A.H. Evaluation of the Novel Method and the Regression Equation for Calculation of Low-Density Lipoprotein Cholesterol. Journal of Enam Medical College. 2015;5(1):10-14.
14. Lee J, Jang S, Son H. Validation of the martin method for estimating low-density lipoprotein cholesterol levels in Korean adults: findings from the Korea national health and nutrition examination survey, 2009-2011. PLoS One 2016;11(1).

Association of *Viharaja* and *Manasika Hetus* (Behavioural and Mental Factors) with A*mlapitta (*Hyperacidity) amongst Police Professionals in Pune

Babar Smeeta Shivaji[1], Joshi Mrudula Vinayak[2,] Joshi Vinayak Nilkanth[3]

*[1]Ayurveda Samhita and Siddhanta), M.A.(Sanskrit). Ayurveda Practitioner, Pune, Maharashtra, [2] Professor and HOD, P. G. Department of Ayurveda Samhita and Siddhanta, [3]Professor and HOD, Rognidan and Vikruti Vidnyan, Dr. D.Y. Patil Vidyapeeth, Dr. D.Y. Patil College of Ayurveda and Research centre, Pimpri, Pune, Maharashtra***,** *India*

Abstract

Background-Changing life style in conjunction to unhealthy dietary pattern, mental stress and strain is leading to *Ajeerna* (indigestion), and further *Amlapita* (hyperacidity). **Aim-**To evaluate the association of *Viharaja* and *Manasika Hetus* (behavioural and mental factors) with A*mlapitta (*Hyperacidity) amongst police professionals in Pune.

Settings and Design- This cross sectional study was conducted among Police professionals in Pune region. **Methods and Material: S**tudy included 100 identified patients of *AMLAPITA*; both males and females from the age group of 25-50years. A self administered, structured, pilot tested 9 item questionnaire was used to collect data. **Statistical Analysis:** Descriptive data was analyzed using number and percentages. **Results:** Maximum patients with *Pitta-Vataja Prakruti were* n=47, *Kapha-Pittaja Prakruti* were n = 41 and *Kapha-VatajaPrakruti were* n= 12. 71 (100%) *Amlapitta* Police Professionals did daily ***Ratri-jagarana*** who had night shift and 29 (100%) reported day shifts out of which 21(72.41%) Police Professionals did daily *Ratri-jagarana* yet they had day shift duty. Mental stress was more in Night shift personnel n=52 (73.24%) than stress observed in Day shift participants n=17(58.62%).

Conclusion: Present study help us to estimate association of *Amlapitta* with changed life style pattern. These etiological factors like *Viharaj and Manasika hetus* namely *Ratrijagarana,Vegavidharana,* Mental stress cannot be eradicated totally due to current career progression scenario. But definitely alternative therapies like yoga, meditation and diet plans can be suggested and practiced as and when necessary.

Key Words –*Amlapitta, Etiological factors, Police Professionals, Hyperacidity, Stress, Behavioural causes, mental causes*

Introduction

Amlapitta(Hyperacidity) is a very common disease of this era.30% of the general population is suffering from gastro-oesophageal reflux and gastritis resulting in heartburn.It is very troublesome disease and can give rise to many serious problems if not treated in time. Signs and symptoms of *Amlapiita* are very similar to gastritis [1]. *Amla* means sour and *Pitta* is the functional digestive component of the body. Thus *Amlapitta* (Hyperacidity) is a disease; in which sour blenching is the major symptom. *Avipak*(Indigestion), *Klama*(Exhaustion including normal 8 hr. duty) , *Utklesha* (Nausea) ,*Katu/ Tikta / Amla udgar* (pungent/ bitter/ sour Blenching) , *Hrut / kantha daha*(Heart / Throat burning) , *Aruchi* (Tastelessness), *Chchardi*(vomiting) ,*Shirashoola*(Head ache) are the important signs and symptoms of the

Corresponding author:
Dr. Joshi Mrudula Vinayak
Professor and HOD, Department of Ayurveda Samhita and Siddhanta, Dr. D.Y. Patil Vidyapeeth,
Dr. D.Y. Patil College of Ayurveda and Research centre, Pimpri, Pune.
E mail - mrudula.doctor@gmail.com
Mobile: +919022374758

disease[2,3].

It has been indicated that *Amlapitta* occurs in the persons having unhealthy food habits[1, 4]. The diet today is governed by social and professional background, has led people to consume unhealthy food and subsequently indigestion. Indigestion caused produces *Annavisha* (toxins) which get mixed up with *Pitta Dosha* and lodges in *Amashaya*(Stomach) and then it produces *Amlapitta* disease[5].

Police officer's job is one such public service profession wherein noxious conjunction due to disturbed life pattern is seen.Policeman has to be on duty for longstanding hours either in a day or night shift, leading to disturbed body clock. *Ratrijagarana* (Night awakening)[6,7,8,9], *Atapa sevana* (exposure to bright Sunlight), *Vega vidharana* (suppression of natural urges like hunger, thirst stool, urine, etc.)[7] is very common in their day to day life. *Ajeernashana*(repeated eating)[1,10,11,12], *Amla / katu / Vidahi/ ViruddhaAhar*[12,13,14]*sevan*(sour, pungent, spicy food & food having opposite qualities)are mentioned as dietary causes of the disease.This disturbed life pattern also causes, addiction of Paan, tobacco chewing, Gutka, alcohol which in addition contributes to Gastro-Intestinal disorders like *Amlapitta*. Moreover, work pressure causes high stress level especially mental stress, which again contributes to vitiate the *Pitta dosha* leading to *Amlapitta* disease.Therefore it becomes necessary to avoid *Hetus* (etiological factors) to minimize diseases like *Amlapitta* in police professionals.

This study will help us to evaluate the association of *Viharaja* and *Manasika Hetus* (behavioural and mental factors) with A*mlapitta (*Hyperacidity) amongst police professionals in Pune.

This data will help to fetch remedy for different preventive and curative modified dietary and life style changes on the basis of dominant etiological factors.

Materials and Method

This cross sectional study was conducted among 100 pre- diagnosed police professionals from Pune region suffering from *Amlapitta*, who were working on various posts, of both sex and aged between 25 to 50 years, willing to participate in the study were selected. Individuals suffering from *Avipak*, *Klama ,Utklesha ,Katu/ Tikta / Amla udgar ,Hrut / kantha daha ,Aruchi ,Chchardi , Shirashoola* (Head ache) as main symptoms were included; while those who suffered from Hypertension, Cardiac diseases, Diabetes mellitus, Congenital and Immunological disorders were excluded from the study. Approval was obtained from the scientific committee and Institutional Ethics committee (No: AY/PG/130/2014/15/IEC). Every participant signed an informed consent form before starting the study. A structured questionnaire with 9 major questions was administered. All the Police Professionals were asked to complete the questionnaire. Information regarding *Hetus*, *Lakshanas* of *Amlapitta*, Daily schedule and duty shifts and other occupational causes related to stress in Police profession was recorded.The collected data was entered in Microsoft Excel 2007. Descriptive analysis in the form of number and percentages were calculated.

Results

This cross sectional study was completed among 100 police professionals. Important findings regarding demographic variables like Age, *Prakruti* (Physical constitution), *Viharaja hetus namely Ratrijagarana, Vega vidharana* and Mental stress are listed. It was found that according to age, maximum number of patients were n= 39 from the group of 45 -50 years i.e. belonging to higher grade and minimum patients i.e. n= 24 from age group 35-45 years (Table 1).

Prakruti -Observations related to Physical constitution denoted maximum patients with *Pitta-Vataja Prakruti* n=47, *Kapha-Pittaja Prakruti* in n = 41 and *Kapha-VatajaPrakruti* n= 12(Table 2).

71 (100%) *Amlapitta* Police Professionals did daily ***Ratri-jagarana*** who had night shift and 29 (100%) reported day shifts out of which 21(72.41%) Police Professionals did daily *Ratri-jagarana* yet they had day shift duty.

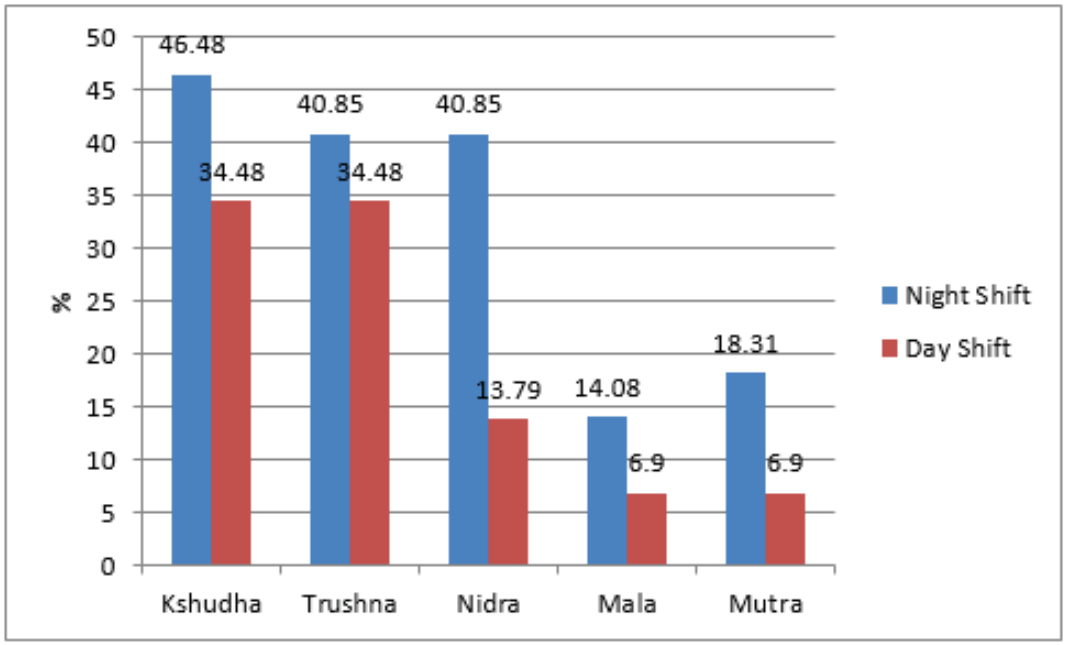


Fig1: Distribution of police professional based on the daily Vega Vidharana

Figure 1.***Vegavidharana*** ***(***suppression of natural urges***)*** It was noted in Night shift Participants *-Kshudha (hunger), Trushna(thirst), Nidra(sleep) and Mala(stool),Mutra (urine)Vegavidharana* was prominently noticed in 46.48%, 40.85%, 40.85%, 14.08% and 18.31% respectively.

It is more in comparison with Day Shift duty Police Professionals where the percentage noted was 34.48%, 34.48%, 13.79%, 6.90%, and 6.90% respectively.

TABLE 1 - Distribution of 100 patients of *Amlapitta* according to Age

Age Range in years	Number	
25 – 35		37
35 – 45		24
45 – 50		39
Total		100

TABLE2. Distribution of 100 Amlapitta Police Professionals according to Prakruti

PRAKRUTI	Number
PV(Pitta-Vata)	47
KP(Kapha-Pitta)	41
KV(Kapha-Vata)	12

TABLE 3– Distribution of 100 Police professionals with *ManasikaHetus* of *Amlapitta*

MENTAL STRESS	Number (%)
Night duty(n =71)	52(73.24)
Day duty(n =29)	17(58.62)

Table 3.***Manasikhetu-***Mental stress was more in Night shift personnel n=52 (73.24%) than stress observed in Day shift participants i.e. n=17(58.62%)

Discussion

Present survey study executed on 100 Police Professionals, pre-diagnosed with *Amlapitta*; acknowledges prevalence of disease *Amlapitta* in Police Professionals; along with important role of *Viharaja and Manasika Hetus* in disease creation. Age of Police professionals plays vital role in disease progression mainly due to continuous change in life style for longer duration. Working in shift duty is trigger factor for uneven sleep pattern, unpunctual and unhealthy food habits.

Present study reveals that Police Professionals with Night Shift were found to be more exposed to *Hetus* of *Amlapitta* and were suffering from classical symptoms of *Amlapitta* as compared to Day shift Police Professionals. According to this study *Hetu* – **Age** between 45-50 years in participants indicates the middle age group which is *Pitta* dominant phase of life. Further, the increasing load of responsibilities is also a characteristic of this age group which can be an etiological factor. ***Sharirprakruti(***Physical constitution***)*** adds on to susceptibility to disorders. *Pitta Vataj prakruti* dominates with n=47. These type of constitutions in persons make them physically weak and more sensitive to external factors.

Working in Night shift exposes them to *hetus* like *Ratrijagarana, Vegavidharana of Kshudha, Trushna, Nidra, Mala and Mutra vega.* These *hetus* are *Viharaj hetus* and cause *Annavaha and Rasavaha srotas dushti*(disturbed digestion and assimilation). This leads to *ajeerna*(indigestion), *agnimandya(weak capacity of digestion)* and finally results in *Amlapitta*.

In *Manasika hetus*[15]; *Krodha* (Anger) causes *Pitta prakopa(increase in Pitta), Chinta* (Stress)causes *rasa dhatu dushti, Bhaya(Fear)* causes *Trasa (*pain) and *Shoka(*Grief *)* causes *vataprakopa(Increase in Vata)*[16]. *Vata pitta anubandha* is there in *Manasika hetus* which causes indigestion[15] which again leads to Agnimandya and creates Vidhaha(burning), Shuktata(sour blenching) and Amlapitta symptoms appear.

Apart from above hetus if person takes Pitta prakopak (spicy ,pungent food items) Ahara, Vihara, Adhyashana(excessive eating), Viruddha-ahara(opposite property in food) ,Pishtanna (Bakery products), katu-lavan Rasa sevana (food with pungent and salty taste), it leads to vidagdhata (incomplete digestion) of Ahar(food) and then leads to Amlapitta.

Conclusion

Present study help us to estimate association of *Amlapitta* with changed life style pattern. These etiological factors like *Viharaj and Manasika hetus* namely *Ratrijagarana,Vegavidharana,* Mental stress cannot be eradicated totally due to current career progression scenario. But definitely alternative therapies like yoga, meditation, diet plans etc. can be suggested and practiced as and when necessary. This may help in lowering the rate of incidence, symptomatic relief and act as preventive measure in young Police professionals.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained from Institutional Ethics Committee, DR D Y Patil College of Ayurveda and Hospital, Pimpri, Pune.

References-

1. AcharyaYadavjiTrikamji,editor.CharakaSamhita ofAgnivesha, ChikitsaSthana, Reprint ed. Varanasi: ChaukhambaSurbhartiPrakashan; 2014. P- 517.
2. Acharya Narendranath Shastri, editor , 1 st ed.,MadhavaNidana (Madhukosa commentary), Amlapittanidanam,New Delhi : MotilalBanarasidas 2009, shloka -1, p-641.
3. PanditHemrajshermana, editor.ofKashyapsamhita, khilasthan, Amlapittachikitsa,Chaukhambha SanskritaSansthana, 2004, p-335-338.
4. PanditHemrajshermana, editor.of Kashyapsamhita, khilasthan, ,Amlapittachikitsa, Chaukhambha Sanskrita Sansthana, 2004, p-335-336.
5. PanditHemrajshermana, editor.ofKashyapsamhita, khilasthan, ,Amlapittachikitsa, Chaukhambha Sanskrita Sansthana, 2004, p-336-337.
6. Pandit. HariSadashiv Shastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta& Ayurved Rasayana of Hemadri,Sutrasthana 7/55, ChaukhambhaSanskritaSansthana, 2009.
7. Pandit. Hari Sadashiv Shastriparadkar editor of Ashtang Hrudayam of Vagbhatawith Commentries Sarvangsundara of Arunadatta&AyurvedRasayana of Hemadri, Sutrasthana 4/1, Chaukhambha SanskritaSansthana, 2009.
8. Pandit. HariSadashiv Shastriparadkar editor of Ashtang Hrudayam of Vagbhatawith Commentries

Sarvangsundara of Arunadatta&AyurvedRasayana of Hemadri, Sutrasthana 47/54, Chaukhambha Sanskrita Sansthana, 2009.

9. Dr.Shivprasadsharma editor ofAshtang Sangrahaof VruddhaVagbhat with Shashilekha Sanskrit Commentary byIndu, Sutrasthana 9/39, Chaukhambha SanskritaSeries office, 2016.
10. Dr.Shivprasadsharma editor of AshtangSangrahaof VruddhaVagbhat with Shashilekha Sanskrit Commentary byIndu, Sutrasthana 13/2, Chaukhambha Sanskrita Series office, 2016.
11. Pandit. HariSadashiv Shastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta& Ayurved Rasayana of Hemadri, Nidanasthana 1/22, Chaukhambha Sanskrita Sansthana, 2009.
12. Pandit. Hari Sadashiv Shastriparadkar editor of Ashtang Hrudayam of Vagbhatawith Commentries Sarvangsundara of Arunadatta& Ayurved Rasayana of Hemadri, Sutrasthana 8/13,14, Chaukhambha Sanskrita Sansthana, 2009.
13. Pandit. HariSadashivShastriparadkar editor of Ashtang Hrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta& Ayurved Rasayana of Hemadri, Sutrasthana 7/45, Chaukhambha Sanskrita Sansthana, 2009.
14. AcharyaYadavjiTrikamji, editor. CharakaSamhita of Agnivesha, Sutra Sthana,26/84 Reprint ed. Varanasi: ChaukhambaSurbhartiPrakashan; 2014. P- 150.
15. AcharyaYadavjiTrikamji,editor.CharakaSamhita ofAgnivesha, VimanaSthana 2/9, Reprint ed. Varanasi: ChaukhambaSurbharti Prakashan; 2014. P- 238.
16. AcharyaYadavjiTrikamji, editor. CharakaSamhita of Agnivesha, Chikitsa sthana 3/114-124, Reprint ed. Varanasi: ChaukhambaSurbhartiPrakashan; 2014. P- 407.

Clinical Correlation, Isolation, Speciation, and Antibiotic Susceptibility Pattern of Tribe Proteeae from Various Clinical Samples

Bavitha C[1], Udayalaxmi J[*2], Elizabeth G[1], Pooja Rao[2]

[1]MSc Microbiology student, [2]Associate Professor, Microbiology department, Kasturba Medical College, Mangalore, Manipal Academy of Higher Education, Manipal, Karnataka, India

Abstract

Introduction: Organisms belonging to Tribe Proteeae are usually present as commensals in the environment but can cause urinary tract and wound infections. There is a need for regular studies on sensitivity pattern of various bacteria causing infections to decide a suitable empirical therapy and there are not many studies on Tribe Proteeae.

Aim: To clinically correlate, isolate, speciate and determine the antibiotic susceptibility pattern of Tribe Proteeae from various clinical samples.

Materials and Method: All samples were cultured on standard culture media as per routine protocol. Isolates were identified by standard biochemical reactions. Antibiotic sensitivity was done by Kirby Bauer's disk diffusion method as per CLSI guidelines. ESBL production was detected by double disk diffusion method using ceftazidime (30µg) disk and ceftazidime/clavulanic acid (30/10µg) disk. Clinical data was collected from the record section of the hospital.

Results: Sixty samples yielded bacteria belonging to Tribe Proteeae. Most of the patients belonged to male gender 46 (76.7%) and >50 years 38 (63.3%) of age. *P mirabilis* was the predominant isolate 42 (70%). Maximum rate of isolation of *Proteus spp* was from diabetic foot ulcer 21 (35%). The predisposing conditions were diabetes mellitus, tracheostomy cases and only one case of carcinoma tongue. Most of our isolates were sensitive to various drugs tested. There were only three (5%) ESBL producers. Most of the isolates of *P.mirabilis* were sensitive to antibiotics than *P vulgaris* isolates.

Conclusion: Maximum rate of isolation of tribe Proteeae was from diabetic foot ulcer cases. *P.mirabilis* was the predominant isolate and was more sensitive to the antibiotics tested than *P.vulgaris.*

Key words: *Beta lactamases, Diabetic foot, Proteus mirabilis, Proteus vulgaris*

Introduction

The three genera, Proteus, Providencia and Morganella belong to Tribe Proteeae These bacteria are usually found in water, sewage and soil as they are the normal flora of the intestine. [(1)] They cause a variety of community-acquired and nosocomial diseases, which include bacteremia, wound infections and urinary tract infection. [(1-4)]

Among genus Providencia, *P. rettgeri* is most frequently isolated from urine of the catheterized patients in hospitals and nursing homes.[(4)] The genus Morganella causes opportunistic infections in humans. [(1,4,5)]

The antibiotic resistance due to the inadequate and inappropriate use of antibiotics is a public health

Corresponding author:
Dr. J. Udayalaxmi,
Associate Professor, Microbiology department,
Kasturba Medical College, Light house hill road,
Mangaluru, Karnataka, India-575001.
Email: udayalaxmi68@gmail.com
Ph.9342598080

problem, hence the need for regular studies on sensitivity pattern of various bacteria causing infections to decide a suitable empirical therapy.[6] The present study aims to clinically correlate, isolate, speciate and determine antibiotic susceptibility pattern of Tribe Proteeae from various clinical samples.

Materials and Method

It was a prospective time bound study conducted from October 1st 2017 to March 31st 2018 in Microbiology department of a tertiary care hospital in South India. All samples received at microbiology laboratory which were positive for Tribe Proteeae and the gram's stain picture indicates active infection from October 1st 2017 to 31st March 2018 were included in the study. Samples which did not yield Tribe Proteeae, which were received on dates other than the period of study and which yielded scanty mixed growth were excluded. Clinical data was taken from the records section of the hospital. Gram staining was done on all samples. All samples were cultured on Mac Conkey's agar, Chocolate agar and Blood agar. Semi quantitative standard loop method were used for urine samples and they were cultured on CLED, Mac Conkey agar and on blood agar.[7] Isolates were identified by standard biochemical reactions.[7]

Antibiotic sensitivity was done by Kirby Bauer's disk diffusion method according to CLSI guidelines.[8] ESBL production was detected by double disk diffusion method wherein Ceftazidime (30µg) disk and Ceftazidime/clavulanic acid (30/10µg) disk was used. If the difference between the two zones is > 5 mm the test was considered as positive. [8]

Statistical Analysis

Statistical analysis was performed by using SPSS version 16.0. Also between two variables statistically significant correlation will be done using Chi Square test. P value <0.05 was considered as significant.

Results

Sixty samples yielded bacteria belonging to Tribe Proteeae. Of these there were 46 (76.7%) male and 14 (23.3%) female; 38 (63.3%) were >50 years of age, 15 (25%) were 30-50 years of age and 7 (11.7%) belonged to <30 years of age. Of the 60 samples, there were 21 (35%) cases of diabetic foot ulcer, 18 (30%) cases of wound infection, 8 (13.3%) cases of endotracheal tube tip, 5 (8.3%) cases of urinary tract infection, 4 (6.6%) cases of skin and mucous membrane infection, 2 (3.3%) cases of sepsis were blood culture became positive, one (1.6%) case of endopthalmitis and one case (1.6%) of cholangitis where bile was received (Figure 1). Of the different skin and mucous membrane infection we had one case of carcinoma tongue with an ulcer over the tongue, 2 cases of perineal and perianal abscess, discharging sinus over axilla, one case of eczema and cellulitis. Diabetic foot ulcer patients were treated with magnamycin (cefaparazone sodium) and clindamycin. Tracheostomy cases were put on cefaperazone sulbactum, Cholangitis was treated with meropenem, eczema, cellulitis with augmentin (amoxyclav) and clindamycin, discharging sinus over the axilla was treated with linozelid and chloramphenicol, perianal abscess was treated with amoxiclav, metronidazole, clindamycin. Almost all patients had underlying co morbidities like diabetes mellitus or carcinoma.

Of the different isolates, there were 42 (70%) *Proteus mirabilis*, 15 (25%) *P.vulgaris,* 1(1.7%), *P.penneri*, 2 (3.3%) *Providencia* spp. Most of the isolates were sensitive to all the drugs tested. There were only three isolates which were ESBL producers (one isolate was *P. mirabilis* from urine sample, one isolate of *P. vulgaris* from diabetic foot ulcer and the third isolate was *P. penneri* from diabetic foot ulcer). Comparatively *P.vulgaris* showed more resistance to drugs then *P. mirabilis* (Table 1). *P. penneri* and *Providencia* spp showed resistance to most of the drugs studied but the number of isolates were very less to conclusively say so. We did not find any statistically relevant correlation between different clinical conditions and the antibiotic resistance.

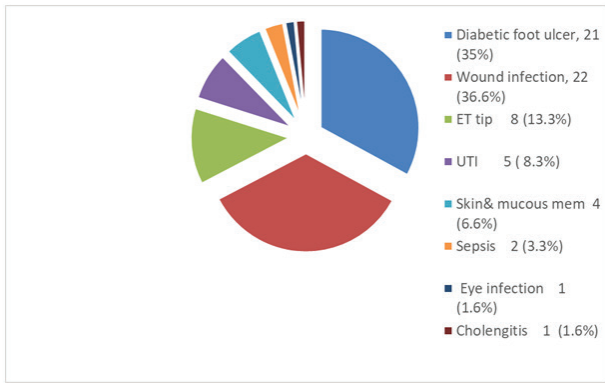


Figure 1: Clinical Correlation

Discussion

In a study conducted in Rajasthan, India, of 1876 clinical samples 5.4% (101/1876)

yielded *Proteus* species. Maximum isolation was from pus 80.2% (81/101) followed by urine 8.9% (9/101) and also maximum proteus species was isolated from inpatients than out patients and 91% (92/101) were ESBL producers. *P. mirabilis* was the predominant isolate. [2]

In a study conducted in Chandigarh, India, 60 consecutive non-repeated strains of *P. mirabilis* were evaluated for production of ESBLs, AmpC b-lactamases, and carbapenemases. Of these, 36 (60%) isolates were found to be ESBL producers, and 7 (12%) were positive for production of AmpC b-lactamases.[3]

In a study conducted in Ghana, Africa, of the 200 Proteus species obtained from patients suspected of bacterial infection, wound isolates were the highest (64.5 %) followed by ear swab. *P. mirabilis* was the commonest species (61.5 %), followed by *P. vulgaris* (30.5 %), and *P. penneri* (8 %). There was no significant difference between the out-patient and in-patient cases, just as there were no preferences for gender or age of the patients. All the species were resistant to chloramphenicol, ampicillin and co-trimoxazole. About 72.9 % of the isolates produced β -lactamase and 88.5 % were resistant to more than 2 antibiotics. *P. penneri* was the most resistant among the recovered species.[9]

In a study conducted in Mumbai, India, three Proteus species were recovered from 56 (1.12%). of the 4995 clinical samples collected, 38 of these samples (67.85 %) were taken from male patients and 18 (32.14 %) from females. Wound samples contributed the highest percentage of Proteus (67.85%) followed by urine. ESBL production was highest in *Proteus penneri* 58.33% followed by *Proteus vulgaris* 33.33% and *Proteus mirabilis* 8.33%..[10]

In a study conducted in Tamil Nadu, India, out of 3972 clinical samples 121 (3.04%) Proteus strains were isolated. *Proteus mirabilis* was more commonly isolated than *Proteus vulgaris*. Pus (44.6%) and urine (50.4%) were predominant samples. There were more numbers of male (63.6%) patients than female (36.4%). Isolates of Proteus spp were highly sensitive to imipenem, piperacillin-tazobactum, ofloxacin.and highly resistant to ampicillin, amoxycillin-clavulanic acid and 24.8% were ESBL producers. [11] In the present study also most of the patients were male and *P.mirabilis* was the predominant isolate but ESBL production was only 5% (3/60).

In another study, 100 isolates of Tribe Proteeae were collected over a period of 6 months from clinical specimens obtained from patients suspected of bacterial infection. Wound infections were the highest (52%) followed by urine (47%). *Proteus mirabilis* was the predominant species (61.5 %), followed by *Proteus vulgaris* (30.5%). More than 80% were resistant to ampicillin and cefazolin, 34% to quinolones, 32% to aminoglycosides and 48% to Co-trimaxazole. About 49 % of the isolates produced ESBL and 16 % were multidrug resistant. *Providencia stuartii* was the most resistant among the recovered species. Maximum sensitivity was noted with carbapenems and maximum resistance with ampicillin and first and second generation cephalosporins. [12]

In a study conducted at Republic of Cameroon, of the 1136 culture positive clinical specimens, 164 (14.4%) isolates were identified as members of Proteeae of which 110 (67.1%) were from urine, 37 (22.6%) from wounds and burns, 10 (6.1%) from blood and 7 (4.3%) from CSF. Speciation of the Proteeae isolates showed that 111 (67.7%) were *Proteus mirabilis*, 21(12.8%) *Proteus vulgaris*, 11 (6.7%) *Providencia alcalifaciens*, 6 (3.6%) *Providencia stuartii*, 4 (2.4%) *Morganella morganii* and 5 (3.0%) *Proteus penneri* and *Providencia rettgeri*. Most Proteeae isolates were susceptible to imipenem, ceftazidime, chloramphenicol, gentamycin, nalidixic acid, ofloxacin and amikacin.[13]

In the present study as in studies conducted in past, most of the Tribe Proteeae were isolated from diabetic foot ulcers, but we did not find much antibiotic resistance. But as in the past studies, *P.vulgaris* was more resistant to antibiotics than *P.mirabilis*.

Conclusions

Most of the patients belonged to male gender and >50 years of age. As in previous studies, *P mirabilis* was the predominant isolate. Maximum rate of isolation of *Proteus spp* was from diabetic foot ulcer. The predisposing conditions were diabetes mellitus, tracheostomy cases and only one case of carcinoma tongue. Most of our isolates were sensitive to various drugs tested. There were only three ESBL producers. *P.mirabilis* was more sensitive to antibiotics than *P vulgaris*.

Ethical Clearance- has been taken from the Institutional Ethical Committee

Source of Funding- Self, no external funding

Conflict of Interest – The authors have no conflict of interest

Conference presentation: The article has been presented as POSTER in the annual parasitology conference, TROPACON 2019 in KMC, Manipal this year.

References

1. Caroline Mohr O'Hara, Frances W. Brenner, Michael miller J. Classification, identification and clinical significance of *Proteus*, *Providencia* and *Morganella* Clin Microbiol Rev. 2000;13(4):534–46.
2. Pal N, Hooja S, Sharma R, Maheshwari R K. Phenotypic detection and antibiogram of β-lactamase-producing *Proteus* species in a tertiary care hospital, India. Ann Med Health Sci Res. 2016;6(5):267–73.
3. Datta P, Gupta V, Arora S, Garg S, Chander J. Epidemiology of Extended-Spectrum b-Lactamase, Amp C, and Carbapenemase Production in Proteus mirabilis. Jpn J Infect Dis. 2014; 67:44-6.
4. Chen Y T, Peng H L, Shia W C et al. Whole-genome sequencing and identification of Morganella morganii KT pathogenicity-related genes. BMC Genomics. 2012;13(7):S4.
5. Trivedi M K, Branton A, Trivedi D, Nayak G, Mondal S C, Jana S. Antibiogram, biochemical reactions and biotyping of biofield treated *Providencia rettgeri*. Am J Health Res. 2015; 3(6): 344-51.
6. Manohar P, Shanthini T, Ayyanar R. The distribution of carbapenem- and colistin-resistance in Gram-negative bacteria from the Tamil Nadu region in India. J Med Microbiol. 2017;66:874–83.
7. Collee JG, Andrew G. Fraser, Barrie P. Marmion, Anthony Simmons: Mackie and McCartney practical medical microbiology 14th edition.2016;151-77.
8. Performance standards for Antimicrobial disk susceptibility testing; 25th Informational supplement; pp. M100-S25. Wayne, PA, USA: National Committee for Clinical Laboratory Standards. NCCLS ;2015.
9. Feglo P K, Gbedema S Y, Armar Quay S N, Adu-SarkodieY, Opoku-Okrah C. Occurrence, species distribution and antibiotic resistance of Proteus isolates: A case study at the Komfo Anokye Teaching Hospital (KATH) in Ghana. 2010;1:347-352.
10. Pandey JK, Tyagi AKS. Prevalence of *Proteus* species in clinical samples, antibiotic sensitivity pattern and ESBL production. Int J Curr Microbiol App Sci. 2013; 2(10):253- 61.
11. Senthamarai S, Sivasankari S, Anitha C et al. A study on the antibiotic susceptibility pattern of *Proteus spp* among various samples. IJAPBC. 2015;4(2):355-58.
12. Begum S E, Anbumani N, Occurrence, species distribution and antibiotic resistance of Tribe Proteeae isolates. Indian J Appl Microbiol. 2012;15(1):83 – 8.
13. Kamga H L F, Assob J C N, Nsagha D S, Njunda A L, Nde Fon P, Tchape G N E. Epidemiological studies on Proteeae isolates from clinical specimens in the Laquintinie Hospital in Douala, Cameroon. Afri J Clin Exper Microbiol. 2012;13(2):112-20.

Effect of Garbhini Ahara-Vihara (Diet & Lifestyle in Pregnancy) On Garbhastha Sishu (Fetus) and Offspring

Bharadwaj Pooja[1], Kumar Pradeep[2], Srivastava Niraj[3], Saxena Varsha[4]

[1]Director General Ayush (Retd.), Government of Uttarakhand, Dehradun, [2]Professor, Department of Shalya Tantra, Faculty of Ayurveda, Institute of Medical Sciences Banaras Hindu University, Varanasi (U.P)., [3]Associate Professor, Department of Kaumarbhritya/ Balroga, Government Ayurvedic PG College & Hospital, Varanasi (Sampurnanand Sanskrit University), [4]Assistant Professor, Department of Shalya Tantra, Main campus Uttarakhand Ayurved University (UAU), Harrawala, Dehradun (Uttarakhand)

Abstract

Ayurveda not only focus on preventive and promotional health but also has strong footing in the field of healthy progeny. *Garbhini Paricharya* refers to antenatal care or prenatal which recommends *Ahara* (specific dietary regimen) and *Vihara* (activity for physical, mental and emotional well being). In *Ayurveda*, *Garbhini paricharya* is divided in three categories such as *Masanumasik Pathya ahara* and *Vihara* (monthly dietary regimen and lifestyle), *Garbhasthapak karma* (diet and activities for maintenance of pregnancy and better progeny) and avoidance of *Garbhopaghatakar Bhavas* (diet and activities which are harmful to fetus). We always say "you are what you eat" it may also be true that "you are what your mother ate". Modern medical science also believes that fetal growth is dependent on appropriate diet and life style of pregnant mother. Organogenesis is that period when important organ of fetus are developing. It is 6-10 wks of intrauterine life. During this period fetus is most at risk from birth defects caused by external factors. Many diseases and fetal development disorders are consider as being related to prenatal exposure to endocrine disrupting chemicals (EDC). The physical, mental, social, and spiritual well-being during pregnancy and practice of a wholesome regimen, play a prime role in achieving a healthy progeny.

In the present review article prime focus is given on effect of diet and life style of pregnant woman on fetus described in *Ayurveda* and modern medical science.

Keywords: - *Garbhini, fetus, Ahara-Vihara, Pranayama, endocrine disrupting chemicals (EDC).*

Introduction

Ayurveda not only focus on preventive and promotional health, but also has strong footings in the field of healthy progeny. Pregnancy is a beautiful period in women's life. *Ayurveda* believe on "pregnancy by choice not by chance" and life of women is not complete until and unless she gets pregnant and gives birth. In *Ayurveda*, Regular supervision of a woman during pregnancy is called *Garbhini paricharya* (antenatal care). The term *Garbhini Paricharya* is a compound of two separate words i.e. *Garbhini* & *Paricharya*. According to *Amarkosha*, *Garbhini* means a woman in which *Garbha* is present [1] and '*Paricharya*' means caring in every aspect. *Garbhini Paricharya* includes all aspects of care of pregnant women like *Ahara* (dietary regimen), *Vihara* (activities), *Pathya* (wholesome diet) *Apathya* (unwholesome diet), *Yoga* and Meditation etc.

Ayurveda has beautifully explained a quotation regarding the care of pregnant women that the *Garbhini* should be treated just like a pot filled with oil as the slightest oscillation of such pot can cause spilling of oil similarly slightest stimulation in *Garbhini* can cause *Garbhapata* (abortion) or *Garbha vikriti* (anomalies in fetus). [2] In Modern medical science, antenatal care (ANC) is systemic supervision of pregnant lady including the examination &advice from beginning of conception to delivery. Modern medicine describes antenatal Care by describing antenatal Diet i.e. extra calorie diet, diet to Prevent Anemia, Personal Hygiene, Rest and Sleep, Exercise, Light Work, drugs prohibited and Coitus, etc.[3]

In *Ayurveda, Garbhini Paricharya* (Antenatal care) advised for a pregnant woman can be summarized under following three categories such as *Masanumasik Pathya ahara* and *Vihara* (Monthly dietary and lifestyle regimen) *Garbhasthapak karma* (diet and lifestyle for maintenance of pregnancy and better progeny) and *Garbhopaghatakar Bhavas* (diet and lifestyle which are harmful to fetus) and.

Masanumasik Pathya Ahara (Monthly dietary regimen) during pregnancy:–

Ayurveda advised that *Garbhini* (pregnant lady) should take sweet, liquid, nutritive diet with good quantity of milk, freshly cooked rice, meat or meat-soup, butter extracted from milk, milk cooked with *Madhura* group of drugs and other congenial diet. Fetus derives its nutrition from mother, what so-ever she takes the rasa derived is divided in three parts i.e. for the nourishment of the mother, for nourishment of fetus and for development of breasts / formation of breast milk [4]. The requirement of mother nutrition varies according to development of fetus and changes month wise.

Effect of excessive use of Rasa in pregnancy on fetus:-

The diet has to be balanced, excess use of any particular rasa or *Dosha* aggravating causes various congenital abnormalities or influences gene expression at a later life producing various diseases. [5] If pregnant women take *Vata* aggravation diet then fetus may suffer from *Kubja* (dwarf), *Kuni* (Arm without hand or finger), *Pangu* (motionless limb), *Muka* (Dumb) and *Minmin* (Nasal voice) [6]. If any body part of pregnant women is affected by the *Vatadi dosha*, then the same part of the fetus will also be get affected by *Vatadidosha* [7]. If pregnant women take *Kapha Vardhak Ahara* then fetus may suffer from- *Kustha* (Skin diseases), *Kilasa,* Congenital teeth at birth, *Switra* (Lucoderma) and *Janmajata Pandu roga* (Congenital anemia) [8].

Effect of Diet and environment in Pregnancy:-

EDC are natural or synthetic chemical molecules able to modify an organism's operation of the hormonal system [9]. Many diseases and disorders of children are associated with prenatal exposure of endocrine disrupting chemicals (EDC), including low birth weight (LBW) baby [10], premature delivery [11], autism [12], allergic disorders [13], pubescent development disorders [14] and even Cancers are also a possible consequence [15].

(1) Effect of Alcohol Consumption on fetus:-

Consumption of alcohol during pregnancy may result in abortion, fetal mortality and prematurity [16]. Alcohol consumption during first five weeks pregnancy may harm embryos and fetus; such damage is referred to as fetal alcohol spectrum disorders (FASD) [17]. Fetal alcohol syndrome (FAS) has a typical pattern of facial alterations, pre- and/or postnatal growth restriction associated with evidence of structural and functional changes in CNS changes due to intrauterine alcohol exposure [18].

(2) Effect of Smoking on fetus:-

Exposure to tobacco smoke is considered most harmful and it is associated with high rates of long and short term morbidity and mortality for mother and child [19]. Maternal smoking during pregnancy has also been linked with increase BMI in children (due to reduced height and increased amount of body fat [20] and risk for obesity in childhood and adult life [21].

(3) Effect of Physical and mental stress on fetus:-

Physical and mental stress such as grief, shock, anger, excessive exercise etc. influences on secretion of vasopressor hormones which lead to IUGR, Preterm and more chances of LBW babies associated, gestational diabetes and congenital defects. It can also affect development of brain and might lead to behavioral disorder in childhood period [22].

(4) Effect of excessive coffee intake on fetus: -

Caffeine is rich source of foods such as coffee, tea, soft drinks, chocolates and its excessive intake increase chance of birth defect on fetus [23]. Caffeine intake is negatively associated with low birth and placental weight, greater number of stillbirths, increased expression of apoptotic markers and altered placental and bone formation [24].

Effect of Mode of life on fetus:-

A. **Abode**:- The abode of pregnant woman should be regularly fumigated and be free from mosquito etc.[25]

B. **Bath: –** Pregnant women should take daily bath with water boiled with specific drugs capable of suppressing *Vata* [26]

C. **Daily routine**: – *Garbhini* (pregnant women) should get up in the morning, worship the rising sun, fumes, homage and pray in loud voice or move in fresh air with deep breathing [27].

D. **Behavior**: - *Garbhini* (pregnant women) should be made to live in harmonious, happy atmosphere; behavior of everyone should be congenial and affectionate.

Mode of life which is harmful to fetus:-

Ayurveda believe that *Garbhini* (pregnant women) should not move in dirty, foul smelling places; avoid wine and other intoxicants, smoking and excessive exercise etc. [28]. Due to *Ati-vyayama* (physical activities or exercise in excess), *Ati-langhan* (excessive fasting), *Ati-vyavaya* (excessive sexual indulgence), *Ati-karshana* (Excessive emaciation because of affliction of disease) etc. affect the different organs or body parts in a pregnant women by vitiating the relative *Dosha* and that *Dosha* will also affect the same body parts or organs of fetus [29]

Effect of non fulfillment of Dauhrida:

Ayurveda describes that in 4th month of pregnancy mother consider as *Dauhrida* (one sense organ of mother and another of fetus). If pregnant mother is not having fulfilled desires during this period it can cause – distorted eyes or no eyes, Hump back, crooked arm and legs, mental retardation, dwarf, abnormality in sense organ, congenital abnormality and even death of fetus [30].

Drugs beneficial for maintenance of pregnancy (Garbhasthapaka dravyas):-

Ayurveda describes many *Garbhasthapaka aushadh* is in *Prajasthapana mahakashaya* such as Aindri (*Bacopa monnieri*), Brahmi (*Centella asiatica*), Satavirya (*Asparagus racemosus*),Sahrshravirya (*Cynodon dactylon*), Amogha(*Stereospermum suaveolens*), Avyatha (*Tinospora cardifolia*), Shiva (*Terminalia chebula*), Arista (*Picrorhiza kurroa*) Vatyapushpi or Bala (*Sida cardifolia*) and Vishwasenkanta (*Callicarpa macrophylla*) [31].These drugs can be use orally by preparations of milk or ghee and cold decoction of these drugs for bath. *Acharya Kasyapa* has advised that amulet of Trivrit (*Operculina tharpethum*) should be tied in the waist of pregnant woman [32]. In present era many therapy such as music therapy, happiness in pregnancy, yoga, meditation etc. help to maintenance of pregnancy and better progeny.

How to live a Happy and Healthy life style during pregnancy:-

1. Music therapy in pregnancy:-

The infants of mothers exposed to music during pregnancy have significantly influences neonatal behavior. Many studies showed that 30 minutes music therapy per day for two weeks significantly reduced their stress, anxiety, and depression, when compared with participants who did not take music therapy [33].

2. Happiness in pregnancy:-

Children of depressed mothers may experience a delay in cognitive development, such as language delays and even lower IQ. Many studies indicate that the happiness during the pregnancy, the lower the chances of the baby facing mental and physical health challenges [34].

3. Yogasana in pregnancy:-

Yogasana in pregnancy reduces muscle cramps during third trimester, increases the flexibility of spine, tones up the lower body, improves digestion, relives constipation, improves blood circulation, and relives stress. Common *Yogasana* in pregnancy is *Vrikshasan* (Tree pose), *Vajrasan* (Thunderbolt pose), *Matsyakridasan* (Flapping fish pose) and *Marjariasan* (Cat stretch pose) etc.

4. Effect of Pranayam (Breathing exercise) in pregnancy:-

In Sanskrit, the *Pranayama* word is prepared by -'*Prana*' and '*Ayama*'. Here *Prana* means energy and *ayama* means the distribution of energy. *Pranayam* provides rich oxygenation to the blood and promotes a calmer mind and body. *Anulom* and *Vilom* is main *pranayam* which is practiced during pregnancy in each trimester. It provides more oxygen to the pregnant women and more oxygen is transferred to the fetus. *Swastikasana* and *Vajrasana* are the best *Yogasana* for practiced the breathing techniques. *Yogasana* and *Pranayama* is very effective in high risk cases of pregnancy also such as hypertension, asthama, Gestational Diabetes Mellitus, cardiac diseases diabetes and thyroid disorders. [35]

Discussion and Conclusion

Garbhini Paricharya aims at excellence in the formation of the fetus, its development without anomalies,

a secure full term normal delivery and maintenance of the health of the fetus. In this regard they divide whole *Garbhini paricharya* in three categories such as *Masanumasik Pathya ahara* and *Vihara* (Monthly dietary and activities regimen), *Garbhasthapak karma* (diet and activities for maintenance of pregnancy and better progeny) and *Garbhopaghatakar bhavas* (diet and activities which are harmful to fetus). *Acharyas* considers milk is an ideal product as a diet for pregnant women because it is a rich source of calcium, lactose and fat [36]. Milk help in relieving constipation which is common problem during pregnancy. In second trimester pregnant women mostly suffer from edema of feet and other complications of water retention. In 6th month Gokshura (*Tribulus terrestris*) is advised which act as good diuretic and prevent retention of water. In *Ayurveda* many *Garbhopaghatakar bhavas* (diet and activities which are harmful to fetus) described such is *Ati-vyayama* (physical activities or exercise in excess), *Ati-langhan* (excessive fasting), *Vegavidharana* (suppression of natural urges) and not fulfillment *Dauhrida* desires etc. But if *Garbhini* practicing *pranayama* then during labour minimum release of adrenaline and proper release of oxytocin which make labour easier and smoothen. There is urgent need to include this plan in RCH (Reproductive and Child Health) programme for maternal and fetal wellbeing. So that national goal may be achieved in more effective manner.

Source of Funding- Nil Conflict of interest- None Declared

Ethical Approval: No ethical approval is required as no animals or humans have been used in the study.

References

1. Amarakosha- edited with "Sarala- Maniprabja" Hindi Commentary, Acharya Shri. Hargovinda Shastri Varanasi: Chaukhamba Sanskrit Sansthana, 2001.
2. Sushruta. Sushruta samhita, English translation by Sharma P.V, Vol II, Sharirsthan (3:31), Chaukhambha Vishvabharati , Varanasi. (2005)
3. K Park: Textbook of Preventive and Social Medicine, Jabalpur; 21st ed.; Banarasidas Bhanot Publisher; 2011: 481, 484.
4. Kashyapa Samhita, Sharir sthana, 5/14, vidyotinihindi commentary, Bhishgacharya SS. Varanasi: Chaukhambha Sansthan; 2004
5. Agnivesha. Charaka samhita , English translation by Sharma RK, Dash B. Vol-II, Sharira sthan (4:18-21), Chaukhambha Sanskrit series office, Varanasi. (2010)
6. Sushruta. Sushruta samhita, English translation by Sharma P.V, Vol II, Sharira sthan (2:51), Chaukhambha Vishvabharati , Varanasi. (2005)
7. Sushruta. Sushruta samhita, English translation by Sharma P.V, Vol II, Sharira sthan (3:17), Chaukhambha Vishvabharati , Varanasi. (2005)
8. Vagbhata .Astanga samgraha, English translation by Srikantha Murty KR, Vol-II, Sharira sthana , (2/56), Chaukhambha Orientalia , Varanasi. (2001)
9. World Health Organization Global Assessment of the State-of-the-Science of Endocrine Disruptors. (accessed on 20 July 2017)]; 2015
10. Veiga-Lopez A, Kannan K, Liao C, Ye W, Domino SE, Padmanabhan V: Gender-Specific Effects on Gestational Length and Birth Weight by Early Pregnancy BPA Exposure. J ClinEndocrinolMetab. 2015 Nov; 100(11):E1394-403.
11. Maitre L., Fthenou E., Athersuch T., Coen M., Toledano M.B., Holmes E., Kogevinas M., Chatzi L., Keun H.C. Urinary metabolic profiles in early pregnancy are associated with preterm birth and fetal growth restriction in the Rhea mother-child cohort study. BMC Med. 2014; 12: 110.
12. Kalkbrenner A.E., Schmidt R.J., Penlesky A.C. Environmental chemical exposures and autism spectrum disorders: A review of the epidemiological evidence. Curr. Probl. Pediatr. Adolesc. Health Care. 2014;44:277–318.
13. Gascon M., Casas M., Morales E., Valvi D., Ballesteros-Gómez A., Luque N., Rubio S., Monfort N., Ventura R., Martínez D., et al. Prenatal exposure to bisphenol A and phthalates and childhood respiratory tract infections and allergy. J. Allergy Clin. Immunol. 2015;135:370–378.
14. Ferguson K.K., Peterson K.E., Lee J.M.,Mercado-Garcia A., Blank-Goldenberg C., Tellez-Rojo M.M., Meeker J.D. Prenatal and peripubertal phthalates and bisphenol A in relation to sex hormones and puberty in boys. Reprod. Toxicol. Elmsford N. 2014; 47:70–76.
15. Cohn B.A., La Merrill M., Krigbaum N.Y., Yeh G., Park J.-S., Zimmermann L., Cirillo P.M. DDT Exposure in Utero and Breast Cancer. J. Clin. Endocrinol.Metab. 2015;100:2865–2872.

16. Hoyme HE, May PA, Kalberg WO, Kodituwakku P, Gossage JP, Trujillo PM, et al. A practical clinical approach to diagnosis of fetal alcohol spectrum disorders: clarification of the 1996 institute of medicine criteria. Pediatrics. 2005;115(1): 39- 47.
17. Thackray H, Tifft C. Fetal alcohol syndrome. Pediatr Rev. 2001;22(2):47-55.
18. Mattson SN, Schoenfeld AM, Riley EP. Teratogenic effects of alcohol on brain and behavior. Alcohol Res Health. 2001;25(3):185-91.
19. Mathias Mund, Frank Louwen , Doris Klingelhoeferand Alexander Gerber: Smoking and Pregnancy — A Review on the First Major Environmental Risk Factor of the Unborn, Int. J. Environ. Res. Public Health 2013, 10, 6485-6499.
20. Sondergaard, C.; Henriksen, T.B.; Obel, C.; Wisborg, K. Smoking during pregnancy and infantile colic. Pediatrics 2001, 108, 342–346.
21. Taal, H.R.; Geelhoed, J.J.; Steegers, E.A.; Hofman, A.; Moll, H.A.; Lequin, M.; van der Heijden, A.J.; Jaddoe, V.W. Maternal smoking during pregnancy and kidney volume in the offspring: The Generation R Study. Pediatr. Nephrol. 2011, 26, 1275–1283.
22. Mary E Coussons; Effects of prenatal stress on pregnancy and human development: mechanisms and pathways, Obstetric Med. 2013 Jun; 6(2): 52–57. Published online 2013 May 3.
23. Thaís de Mérici Domingues e Paula , Felipe Lioe Teh Shang , Helio Chiarini-Garcia1 and Fernanda Radicchi Campos Lobato de Almeida: Caffeine Intake during Pregnancy: What Are the Real Evidences?, Journal of Pharmacy and Pharmacology 5 (2017) 249-260 doi: 10.17265/2328-2150/2017.05.004
24. Momoi, N., Tinney, J. P., Liu, L. J., Elshershari, H., Hoffmann, P. J., et al. 2008. "Modest Maternal Caffeine Exposure Affects Developing Embryonic Cardiovascular Function and Growth." Am J Physiol Heart Circ Physiol 294: 2248-56
25. Kashyapa Samhita, Sharir sthana, 5/15, vidyotini hindi commentary, Bhishgacharya SS. Varanasi: Chaukhambha Sansthan; 2004
26. Agnivesha. Charaka samhita , English translation by Sharma RK, Dash B. Vol-II, Sharirasthan (8:20), Chaukhambha Sanskrit series office, Varanasi. (2010)
27. Vagbhata .Astanga samgraha, English translation by Srikantha Murty KR, Vol-II, Sharir sthana , (2/54-56), Chaukhambha Orientalia , Varanasi. (2001)
28. Agnivesha. Charaka samhita , English translation by Sharma RK, Dash B. Vol-II, Sharira sthan (4:18-21), Chaukhambha Sanskrit series office, Varanasi. (2010)
29. Singh B.M: Text book of Bal-roga (Kaumarbhritya) part-1 (2015), Chaukhambha Orientalia Sansthan, Varanasi- 221001
30. Sushruta. Sushruta samhita, English translation by Sharma P.V, Vol II, Sharira sthan (3:18), Chaukhambha Vishvabharati , Varanasi. (2005)
31. Agnivesha. Charaka samhita, English translation by Sharma RK, Dash B. Vol-I, Sutra sthan (4:49), Chaukhambha Sanskrit series office, Varanasi. (2010)
32. Kashyapa Samhita, Sharirsthana, 10/181, vidyotinihindi commentary, Bhishgacharya SS. Varanasi: Chaukhambha Sansthan; 2004.
33. Brazelton TB, Nugent JK. Neonatal Behavioral Assessment Scale. 3rd edition. London, UK: Mac Keith Press; 1995.
34. Rukiye Turka ,Tugce Sakarb&Reyhan Erkaya: The effect of pregnancy on happiness; Procedia - Social and Behavioral Sciences 237 (2017) 1247 – 1253.
35. Radhika Chandrakar, Kamakhya Kumar, Purnendra Chandrakar; To Study the Effect of Integrated Yoga Practices on Stress during Pregnancy; Imperial Journal of Interdisciplinary Research (IJIR) Vol-2, Issue-9, 2016.
36. Jha Kajal; Concept of Antenatal Care in Ayurveda: Garbhiniparicharya, Ayur Info Special Issue 2067, March 2011, Cited on 25.07.2013.

Age determination using Nolla's Method- A Radiographic Study

Bharathi.S[1], Meenakshi.K[2]

[1]Undergraduate Student, [2]Senior Lecturer, MDS Oral Medicine And Radiology, Saveetha Institute of Medical and Technical Sciences, Chennai, India

Abstract

Background: Tooth development shows less variability in relation to chronological age. Tooth development is widely used to assess maturity and predict age. So, dental tissues can be used as a better aid for estimating age. Radiography plays an important role in humane age determination. There are five common methods to determine age using radiographs: Gleiser and Hunt (1955); Demijiran et al (1973); Gustafson and Koch (1974); Harris and Nortje (1984); Kullman et al (1992). Nolla's method (1960) was one of the various method used in age determination using radiographs. The aim is to estimate the age using Nolla's method of forensic age estimation.

Materials and Method: The present study was conducted on 20 selected individuals(10 males and 10 females) between age 9-17. Dental age assessment was done using OPG. The radiograph were compared with the Nolla's chart (fig-1) and dental age was assessed using age norms for upper and lower teeth including third molars proposed by Nolla. The chronological age and dental age obtained using Nolla's method was later subjected to statistical analysis.

Results: There is no significant difference between chronological age and estimated age with Nolla's method both in males and females i;e is 'p' value is not significant in both males and females (.161 in females and .757 in males).

Conclusion: Nolla's method of age determination was accurate in both males and females.No statistical significance was found between chronological age and estimated age for males and females. Hence Nolla's method can also be used in forensic dentistry.

Keywords: *Nolla's method , dental age, chronological age.*

Introduction

Growing individuals not only differ in the timing of the maturational events, but also in the sequence of maturational events. The developmental status of an individual can be assessed from various parameters such as height, weight, chronological age, secondary sexual characteristics, skeletal age, and dental age [(1)]. Age is one of the essential factors, which play an important role in every aspect of life. The assessment of age is useful in planning treatment of orthodontic and pedodontic patients, and in forensic medicine and forensic odontology and also provides valuable information when the birth date is not available, as in case of illegal immigrants. Its use is increasing in both civil and criminal matters and is also helping in the identification of age at death of a dead individual in mass disasters and natural calamities. In children, age determination from the teeth is relatively simple and accurate; it is based on the stage of development and eruption of teeth [(2)]. The branch of radiology comes handy which provides baseline data for age estimation [(3)]. The aim of an ideal age estimation technique is to arrive at an age as close to the chronological age as possible. Various age estimation methods have been tested and reported in the literature [(4)]. Visual, radiographic, chemical and histological methods are various methods of estimating age [(3)].

Visual method: It is based on of the sequence of eruption of the teeth and the changes that are caused due to function such as attrition, changes in colour are indicators of ageing.

Radiographic method: Radiographs of the dentition can be used to determine the stage of dental development of the teeth. This method is the most commonly used method as it aids in age determination over a long span of time.

Histological method: Histological methods require the preparation of the tissues for detailed microscopic examination which can determine more accurately the stage of development of the dentition. This technique is more appropriate for post-mortem situations.

Chemical analysis: The chemical analysis of dental hard tissues determines alterations in ion levels with age. These techniques are not of great value to the forensic odonatologist and future developments may provide adjunctive means of collecting evidence of value in the dental framework.

Radiograph plays an important role in human age determination. Demirjian and Nolla's method was widely used age estimation methods using radiographs since it utilizes maturation of teeth for age assessment. Demirjian et al classified teeth development into 8 stages which includes only 7 mandibular teeth and concluded a method for age estimation [1]. This method is most widely accepted [5,6]. Later, Acharya included the 3rd molar as well and arrived at a formula for Indian population [7]. Nolla classified the teeth development into 10 stages and arrived at a method [8]. Tooth development shows less variability than other developmental features and also low variability in relation to chronological age [9]. Dental tissues are resistant to mechanical, chemical and thermal changes and is suitable for estimation of age because it is continuous, progressive process that can be followed radiographically from the crypt stage to the closure of root apex. Dental age estimation is based upon the rate of development and calcification of tooth buds and the progressive sequence of their eruption in the oral cavity. Also tooth development is uniform and is less influenced by external factors such as malnutrition, diseases and mental stress and less affected by endocrine status [10]. As radiographs provide a two-dimensional view of the dental tissues it is very much helpful in estimating age. With this background the aim of our present study was done with an objective to assess age by using Nolla's method and to estimate the efficacy of Nolla's method.

Materials and Method

The present study was conducted on randomly selected 20 individuals. Among them, 10 were males (50%) & 10 were females (50%). The age ranged from 9-17 years. Age assessment was done using radiographs (OPG). A brief history of each individual including name, age, sex, date of birth, name of the school and address were recorded. Age and date of birth was reverified using valid identity proofs. Chronological age was calculated from date of birth to date of radiograph being taken. Chronological age= Date of radiograph taken-Date of birth. Dental age or estimated age was calculated from the radiographs taken using Nolla's normalized table for boys and girls. The results were then subjected to statistical analysis.

Criteria for sample collection:

- None of the subjects selected had undergone orthodontic treatment
- All the subjects selected were moderately built and were of growing age with no history of deformities, bone diseases, and major illness in the past
- None of the subjects showed any facial asymmetry.
- No history of trauma or surgery was reported in the dentofacial region
- The subjects with muscular dystrophy, congenital abnormalities affecting growth and development, or traumatic injuries of hand wrist and jaws were excluded.
- The presence of all the eight left or right maxillary and mandibular teeth (erupted or not) was considered.

Nolla's method:

It was devised by C M Nolla [11] in 1960. Nolla evaluated the mineralization of permanent dentition in 10 stages. Each tooth is assigned a reading and a total of the maxillary and mandibular teeth are made. The total is compared with the pre-determined values in the norms table to determine the age. This method is one of the most acuurate and reliable method as girls and boys are dealt separately.

The radiograph was compared with the Nolla's developmental stages (fig-1) and dental age was assessed using age norms for upper and lower teeth for females (table-1) and males (table-1) including third molars proposed by Nolla.

Fig-1

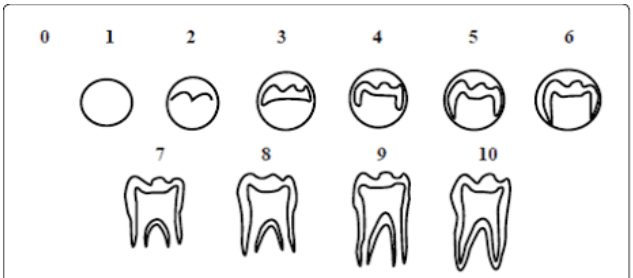


Figure 1: showing Nolla stages of development of third molar. Stage 0 - absence of crypt, Stage 1 – presence of crypt, Stage 2 – Initial calcification, Stage 3 – 1/3rd crown completed, Stage 4 – 2/3rd crown completed, Stage 5 – crown almost completed, Stage 6 – crown completed, Stage 7 – 1/3rd crown completed, Stage 8 – 2/3rd crown completed, Stage 9 – root completed, apex open, Stage 10 – apical foramen closed.

Nolla's developmental stages:

Stage 10: Apical end of root completed

Stage 9: Root almost complete; open apex

Stage 8: Two-third of root completed

Stage 7: One-third of root completed

Stage 6: Crown completed

Stage 5: Crown almost completed

Stage 4: Two-third of crown completed

Stage 3: One-third of crown completed

Stage 2: Initial calcification

Stage 1: Presence of crypt

Stage 0: Absence of crown.

Table 1- Norms for males and females including third molars.

	Age in years	Sum of stages of 8 mandibular teeth	Sum of stages of 8 maxillary teeth.	Sum of stages of 16 maxillary and mandibular teeth.
Males	7	54.2	49.5	103.7
	8	59.5	57	116.5
	9	66.7	62	112.7
	10	67.5	66.6	134.1
	11	70.0	68.3	138.3
	12	72.6	73.2	145.7
	13	74.7	75.4	150.1
	14	75.9	76.5	152.4
	15	76.7	77.1	153.8
	16	77.5	78	155.5
	17	78.0	78.7	156.7
Females	7	49.5	45.5	95
	8	55.1	51.8	106.9
	9	59.7	57.3	117
	10	63.5	61.8	125.3
	11	66.7	65.6	132.3
	12	69.8	69.3	139.1
	13	72.3	72.2	144.5
	14	74.3	74.4	148.7
	15	75.9	75.9	151.8
	16	77.3	77.7	155
	17	77.6	78	155.6

The estimated age was obtained using Nolla's method and was compared with chronological age and was subjected to statistical analysis.

Results

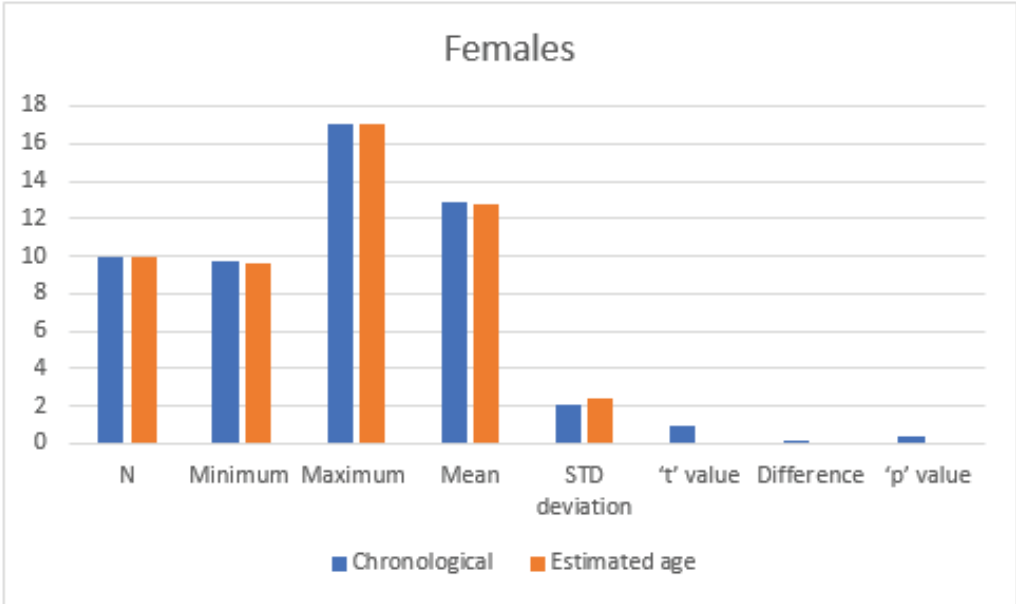
This study comprised of 20 patients between the age group of 9-17 years and the method used to determine the age was Nolla's method. Chronological age and estimated was calculated for females and males. Paired 't' test was done (graph-1,2)(table 2,3). Distribution of patients with their gender, chronological age with minimum and maximum and the estimated age using Nolla's method with minimum and maximum was calculated. Mean and standard deviation was also calculated for females and males (table-2,3). There is no significant difference between chronological age and estimated age with Nolla's method both in males and females i;e is 'p' value is not significant in both males and females (.376 in females and .468 in males)

Table-2- Females (Paired 't' test)

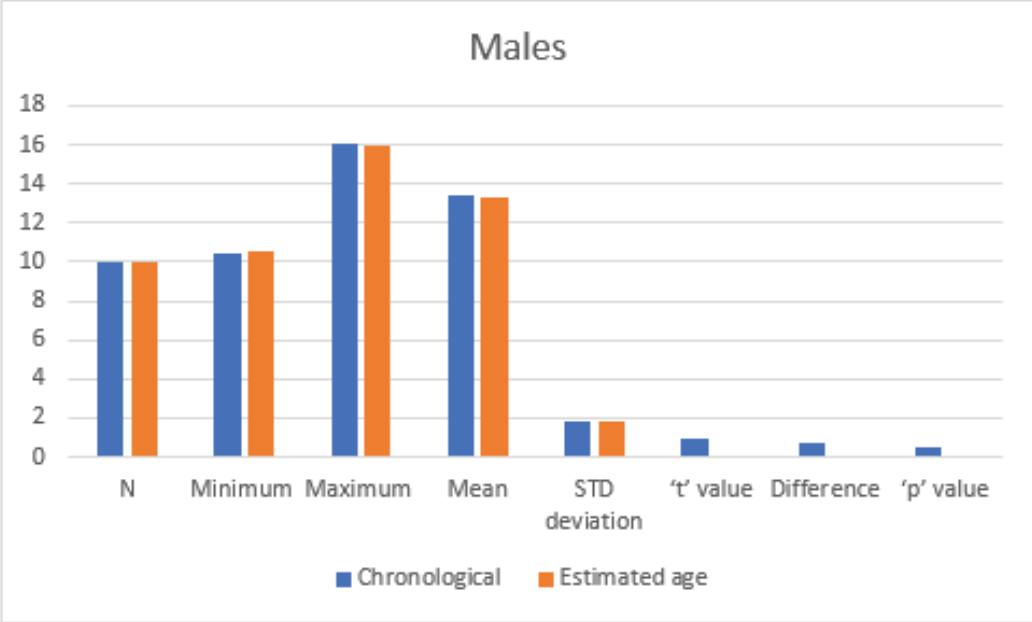
	N	Minimum	Maximum	Mean	Std. Deviation	't' vale	Difference	'p' value
Chronological age	10	9.70	17.00	12.8920	2.12701	.930	.161	.376 Not Significant
Estimated age	10	9.60	17.00	12.7310	2.40482			

Table - 3 – Males (Paired 't' test)

	N	Minimum	Maximum	Mean	Std. Deviation	't' vale	Difference	'p' value
Chronological age	10	10.40	16.10	13.3700	1.84695	.930	.757	.468 Not Significant
Estimated age	10	10.50	16.00	13.2910	1.84226			



Graph-1



Graph-2

Discussion

Our study comprises 20 individuals which includes 10 females and 10 males of age 9-17 years. Out of 10 female individuals, five females showed dental age underestimation by 5 months and 2 months and three female individuals showed dental age underestimation by 1 month. Two females showed exact correlation with estimated age

Out of 10 male individuals, three male individuals showed dental age underestimation by 3 months and 2 months. Four male individuals showed dental age overestimation by 5 months, 3 months, 2 months and 1 month. Three male individuals showed exact correlation with estimated age. Difference of less than 6 months was considered as normal [12].

Distribution of patients with their gender, chronological age with minimum age of 9.70 for females and 10.40 for males and maximum of 17.10 for females and 16.10 for males and the estimated age using Nolla's method with minimum age of 9.60 for females and 10.50 for males and maximum of 17 for females and 16 for males is shown in table 2 and table 3 and graph 1 and graph 2.

There is no significant difference between chronological age and estimated age with Nolla's method both in males and females. 't' value was 0.930 for both males and females. 'p' value was .161 in females and .757 in males (table-2,3) and (graph-1,2).

It also shows mean and standard deviation in two methods. Mean chronological age was 12.8920 and standard deviation of 2.12701 was seen in females and mean of 13.3700 and standard deviation of 1.84695 was seen in males. The mean of estimated age by Nolla's method was 12.7310 and standard deviation of 2.40482 was seen in females and mean of 13.2910 and standard deviation of 1.84226 was seen in males. Average chronological age and average estimated age by Nolla's method shows statistically non-significant difference and good correlation was found. (table-2,3).

The dental system is an integral part of the human body; its growth and development can be studied in parallel with other physiological maturity indicators such as bone age, menarche, and height [13].

Nolla's method was introduced by Nolla in 1960. In this method the staging is done based on calcification of individual tooth which is from stage 0 to 10. It has additional staging of mineralization which proves it to be more accurate and reliable and thus making it the most commonly used method around the world [14].

Miloglu et al conducted a study on Turkish males using the Nolla's method and inferred that the mean difference in the dental and chronological age

ranged from -0.5 to 0.0 years proving the accuracy of Nolla's method above any other method of dental age estimation, similar statistics were obtained by Caro et al (2001) [15, 16]. And the study by Green found that dental age showed the highest degree of correlation with chronological age [17]. Lauterstein supported this study by his study finding that chronological age bore a positive correlation to the number of erupted teeth [18]. Nolla's method was also used on Maltese school children in 2005 and no significant difference was found between dental age and chronological age [19]. Another study was conducted on Brazilian population in 2007 to evaluate the applicability of the methods proposed by Nolla and Nicodemo and colleagues for assessing dental age and its correlation to chronological age and concluded that the mean difference between true and estimated age for males and females was underestimated and the use of correction factors were recommended [20].

In 2011 Nolla's method was applied to investigate whether or not this method is appropriate for Turkish children for the determination of the dental age. The study suggested that the method is suitable for Turkish boys, but it is less suitable for Turkish girls [21]. In another study conducted in 2012 Validity of Demirjian and Nolla methods for dental age estimation for North Eastern Turkish children were compared and Nolla's method was found to be a more accurate method for estimating dental age in North Eastern Turkish population [22].

The present study agrees with the previously mentioned analysis by various researchers and proves that Nolla's method of estimating dental age by analysing 10 stages of teeth development is better as compared to other methods and easy to perform.

Conclusion

Nolla's method can be considered as a good method of dental age assessment. No statistical significance was found between chronological age and age estimated using Nolla's method for males and females. It could be stated that assessment of maturation is of utmost importance in certain orthodontic protocols such as for myofunctional therapy and the importance of age estimation includes an assessment of minor/major status in individuals without legal documents, Nolla's method, the widely used method shall be a reliable method. And also, dental radiographs have been used in forensic applications mainly for age estimation [23]. Besides the technique is cost efficient as compared to other methods of age estimation and is readily available across all dental clinics.

Ethical Clearance:Nil

Source of Funding:self

Conflict of Interest: Nil

References

1. Demirjian A, Goldstein H, Tanner JM. A new system of dental age assessment. Hum Biol 1973; 45:211-27.
2. Vane Swetah. C. S., Dr. Nithya Jagannathan Age estimation using pulp/tooth volume ratio of Mandibular first premolar obtained from Cone Beam Computed Topography in Indian population; Int. J. Pharm. Sci. Rev. Res., 47(2), November - December 2017; Article No. 21, Pages: 119-122
3. Willems G, Moulin-Romsee C, Solheim T. Non-destructive dental-age calculation methods in adults: Intra and inter observer effects. Forensic Sci Int. 2002; 126:221-6[Pub Med].
4. Ritika Gupta, Harsh Rajvansh, Hafsa Effendi, Sarah Afridi, Kiran Kumar Vuyyuru, Bhuvana Vijay, Manu Dhillon Dental age estimation by Demirjian's and Nolla's method in adolescents of Western Uttar Pradesh.
5.] Demirjian A, Goldstein H. New systems for dental maturity based on seven and four teeth. Ann Hum Biol 1976; 3: 411–421.
6. Cameriere R, Flores-Mir C, Mauricio F, Ferrante L. Effects of nutrition on timing of mineralization in teeth in a Peruvian sample by the Cameriere and Demirjian methods. Ann Hum Biol 2007; 34:547-556.
7. Acharya AB. Age estimation in Indians using Demirjian's 8-teeth method. J Forensic sci. 2011; 56:124-7[Pub Med]
8. Kiran Sachan, V.P. Sharma, Pradeep Tandon. Reliability of Nolla's dental age assessment method for Lucknow population. J Ped Dent. 2013 1(1):8-13.
9. Balwant Rai, S.C. Anand. Tooth Developments: An Accuracy of age Estimation of Radiographic Methods. World Journal of Medical Sciences. 2006;1(2):130-132.
10. McKenna CJ, James H, Taylor JA, Townsend GC. Tooth development standards for South Australia.

Aust Dent J 2002; 47:223-7.

11. Nolla CM The development of permanent teeth. J Dent Child 1960; 27:253-266.
12. Deepthy Thomas, Prashanth Shenai, Lakshmikanth Chatra, Veena K M, Prasanna Kumar Rao, Rechana Prabhu, Shahin K A, Prathima Shetty Age Assessment Using Nolla's Method in a Group of Mangalore Population: A Study on 25 Children Journal of Contemporary Medicine 2014;4(3): 121-127.
13. Willems G, Van Olmen A, Spiessens B, Carels C. Dental age estimation in Belgian children: Demirjian's technique Revisited. J Forensic Sci 2001; 46:893.
14. Bolanos MV, Manrique MC, Bolanos MJ, Briones MT. Approaches to chronological age assessment based on dental calcification. Forensic Sci Int 2000; 110:97-106.
15. Miloglu O, Celikoglu M, Dane A, Cantekin K, Yilmaz AB. Is the assessment of dental age by the Nolla method valid for eastern Turkish children? J Forensic Sci 2011; 56:1025-1028.
16. Caro, A.C. and I.C. Contreras, 2001. Analysis and comparison de cuatro methods radiographics para determinar la ede dental en dientes permanent. Int. J. Dent. Anthropol., 2: 9-15.
17. Green LJ. Interrelationship among height, weight and chronological, dental and skeletal ages. Angle Orthod 1961; 31:189-93.
18. Lauterstein AM. A cross-sectional study in dental development and skeletal age. J Am Dent Assoc 1961; 62:161-7.
19. Kevin Briffa, Nicholas Busuttil Dougall, James Galea,David Mifsud, Simon Camilleri. Chronologic and Dental Ages of Maltese Schoolchildren - A Pilot Study. Malta Medical Journal. 2005; 17:31-35.
20. Lucio Mitsuo Kurita, Alynne Vieira Menezes, Marcia Spinelli Casanova, Francisco Haiter-Neto. Dental maturity as an indicator of chronological age: radiographic assessment of dental age in a brazilian population. J Appl Oral Sci. 2007;15(2):99-10.
21. Ozkan Miloglu, Mevlut Celikoglu, Asim Dane,Kenan Cantekin,Ahmet Berhan Yilmaz. Is the Assessment of Dental Age by the Nolla method Valid for Eastern Turkish Children? Journal of forensic sciences. 2011;56(4):1025-1028.
22. Bilge Nur, Adem Kusgoz, Mehmet Bayram, Mevlut Celikoglu, Metin Nur, Saadettin Kayipmaz, SinaYildirim. Validity of demirjian and nolla methods for dental age estimation for Northeastern Turkish children aged 5–16 years old. Med Oral Patol Oral Cir Bucal.2012; 17(5):871-877.
23. Uma Maheswari T N. Dental biometrics. Int J Forensic Odontol 2017; 2:45

Assessment of Mass Drug Administration activities for Lymphatic Filariasis Elimination in Vizianagaram District of Andhra Pradesh

Bikash Chandra Nayak[1], Aurobindo Samantaray[2], Y. Bharani Krishna[3]

[1]Assistant Professor, [2]Associate Professor, [3]Professor & Head, Department of Community Medicine, Maharajahs Institute of Medical Sciences, Nellimarla, Vizianagaram

Abstract

Background: Lymphatic Filariasis commonly known as elephantiasis is a painful and profoundly disfiguring disease that has a major social and economic impact. Mass Drug Administration (MDA) programme for the elimination Lymphatic Filariasis (LF) has been implemented globally since 1997 and the MDA campaign launched in India during 2004 to interrupt the transmission of Lymphatic Filariasis

Methods: The present study is a cross-sectional descriptive study conducted from 13th to16th June, 2019 in Vizianagaram district of Andhra Pradesh. The three rural and one urban area of Vizianagaram district were selected using multistage cluster sampling technique Clusters of 30 houses from one village of each PHC and one ward of urban area with a total of 120 households were selected for the study.

Results: A total of 120 households covering 456 population were surveyed out of which 47.1% were male and rest 52.9 % were females. Overall drug distribution coverage is 94% and effective coverage rate is 88%.

Conclusions: There is a pressing need to promote operational research on possible transmission from nearby districts and confirmatory mapping of uncertain areas. Further qualitative comprehensive studies with more diverse participants are needed to ascertain the causal relationship.

Keywords: *Mass drug administration, Lymphatic Filariasis, Drug coverage, Effective coverage rate*

Introduction

Lymphatic Filariasis commonly known as elephantiasis is a painful and profoundly disfiguring disease that has a major social and economic impact[(1)] Currently 886 million people in 52 countries worldwide remain threatened by lymphatic Filariasis and require preventive chemotherapy to stop the spread of this parasitic infection[(2)]. Two-thirds of the endemic population resides in South-East Asia and one-third lives in India[(3)]. LF is prevalent in 256 districts in 21 states and union territories (UTs) and, as on 2017 around 630 million population live in the endemic districts[(4)].

Corresponding Author –
Dr. Aurobindo Samantaray
Email Id – drabs84@gmail.com
Mobile no - 9861073830

The Global Program to Eliminate Lymphatic Filariasis (GPELF) was launched by the World Health Organization (WHO) in 2000 with the goal of eliminating LF as a public health problem by the year 2020[(5)]. The Government of India (GOI) in 2004 began a nationwide mass drug administration (MDA) campaign in all the known LF endemic districts with an annual single dose of diethylcarbamazine citrate (DEC) with the aim of eliminating it as a public health problem by the year 2015. The current strategy of MDA is to administer annual single supervised dose of anti-filarial drugs by door to door visit along with drug administration at booths and groups preferably on a single day with two-day mopping up operations. MDA is to be repeated annually for a period of 5 years or more aiming at minimum 85% drug compliance for interruption of transmission[(6)]. National Health Policy 2017 envisages achievement and maintenance of elimination of LF in endemic pockets of India by 2017[(7)].

Post MDA assessment is routinely conducted to find out the performance of the implementing units in terms of Coverage and compliance of MDA activities and also to evaluate the reported coverage. This schedule process assist in finding out hindrance if any and to suggest suitable remedial measures. As per the program guideline, this sample survey study was conducted in Vizianagaram district, which is one of the 10 enlisted endemic districts of Andhra Pradesh. Post MDA independent assessment has been conducted in Vizianagaram district after the last round MDA activities conducted between 8th to10th February 2019.

The present study was conducted with the following objectives.

1. To find out the coverage, compliance, and effective coverage rates.

2. To evaluate the reported outcome along with processes followed all through the mass drug administration activities.

3. To determine the constraints in MDA activities and suggest suitable corrective measures.

Materials & Method

Study design and period of study:

The present study is a cross-sectional descriptive study conducted from 13th to16th June, 2019 in Vizianagaram district of Andhra Pradesh.

Study Area:

The present evaluation study was conducted in Vizianagaram district of Andhra Pradesh. In line with the proposition by National task force for evaluation of post MDA activities, the present assessment was conducted in four areas (clusters) – three rural and one urban[8].

Eligible population:

Study population includes all eligible individuals residing permanently in the MDA campaign area. Aligned with the program recommendation, DEC and Albendazole tablets were distributed to the eligible beneficiaries (excluding children under 2 years, pregnant women & seriously ill persons) and special consideration given for on-spot consumption of tablets (9)

Sampling technique:

The three rural and one urban area of Vizianagaram district were selected amongst the 50 endemic PHC and 5 endemic urban areas by using multistage cluster sampling technique. In first stage of stratification, One PHC was selected randomly from each cluster (High, Moderate and Low Coverage based on coverage report). From each of the earmarked PHCs, one sub-centre and thereafter one village from each of the selected sub-centres were finalized for the study purpose. One urban area was randomly selected with lowest reported coverage considering the similar technique. So the areas finalized for the evaluation study were three villages (i.e. Nelivada of Bondapalli PHC, Ramavaram of Gantyada PHC and Kella of Gurla PHC) and Bit-1 ward of Vizianagaram Urban area. Clusters of 30 houses from one village of each PHC and one ward of urban area with a total of 120 households were selected for the study.

Tools and techniques:

Following the program recommendations, the data were collected in a pre-designed pretested semi structured proforma during interviewing the study participants. In-depth interview of health care service providers conducted as part of qualitative assessment and the response were captured in an open ended questionnaire form.

Data analysis & Statistical Methods:

Data Collected during the sample evaluation survey entered in MS Excel and analysed using SPSS version 21. All the analysed results are shown in the form of percentages and projected as tables.

Results

Post MDA assessment conducted in four clusters including three rural and one urban area. Table-1 shows distribution of populations surveyed in listed four clusters. A total of 120 households covering 456 populations were surveyed in Vizianagaram district. Overall 47.1% of studied populations were male and rest 52.9 % were females. Out of the total 456 study populations, only 08 were below <2 years so DEC tablets were distributed to 448 (98.2%) eligible individuals. Out of 448 eligible study participants, majority (79.7%) were aged ≥ 15 years while 12.5 % were in the age group of 2 – 14 years. The age and sex wise distribution of study population in both urban and rural areas were almost similar. Similarly, in both the rural & urban majority of the population were in the age group 15 years or above.

Gender and age wise composition of all 120 interviewed respondents were illustrated in Table-2. Overall, Male and female respondents correspond to 40 % and 60% respectively. Likewise collectively in both settings, majority (77.5%) of the respondents belong to the age group 30–59 years and only 5.8% respondents were above 60 years of age.

The area wise drug distribution coverage, Drug compliance rate and effective coverage rate is described in Table-3. Overall drug coverage was 94% in all the four clusters. Drug coverage in rural area (95%) is marginally better than the urban area (92%). Out of the three rural clusters, maximum coverage was attained in PHC, Gurla area (96%) which corresponds to the reported coverage data shared by the district authority. On the whole drug compliance rate was 93%, as 394 persons consumed the drugs out of 422 drug receivers. Drug compliance rate in both the urban (94%) and rural (93%) is found to be approximately comparable. Effective coverage rate in rural clusters is somewhat better (88%) than the urban cluster (86%).

As illustrated in Table-4, knowledge shared to 92% of interviewed persons by the drug administrator on mode of transmission and various MDA activities. Additionally, Drug Administrator persuaded everyone to swallow the tablets in presence of him/her.

The role of various service providers in creating awareness in the community is elucidated in Table-5. Respondents of all 120 (100%) households were aware of MDA prior to the scheduled activities. Though almost all type of frontline health workers supported in generating awareness in the community, but the role of ASHA is significantly appreciable in rural areas (100%). On the other hand, AWW had taken noticeably effort in sharing knowledge among urban populations.

Various forms of IEC material used and their impact in creating community awareness are well revealed in Table-6. Overall in both urban and rural clusters, posters (58%) were responded as the most effective form of IEC material followed by Banners (32%), handbills (7%) and news papers (3%).Though there was a provision for mike announcement and street play as other forms of community awareness activities, but no one responded regarding the same.

Table-1: Age and Sex-wise distribution of study population

Age group	**Rural**			**Urban**			**Total**		
	Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
< 2 years	00	05	05 (1.4%)	02	01	03 (2.7%)	02	06	08 (1.8%)
2 – 4 years	03	10	13 (3.8%)	02	02	04 (3.54%)	05	12	17 (3.7%)
5 – 14 years	16	11	27 (7.9%)	06	07	13 (11.5%)	22	18	40 (8.8%)
> 15 years	145	153	298 (86.9%)	41	52	93 (82.3%)	186	205	391 (85.7%)
Total	164 (47.8%)	179 (52.2%)	343 (100%)	51 (45.1%)	62 (54.9%)	113 (100%)	215 (47.1%)	241 (52.9%)	456 (100%)

Table-2: Gender and Age wise distribution of respondents

Age group	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
15 – 29 years	03	09	12 (13.3%)	03	05	08 (26.7%)	06	14	20 (16.7%)
30 – 59 years	29	42	71 (78.9%)	09	13	22 (73.3%)	38	55	93 (77.5%)
> 60 years	04	03	07 (7.8%)	00	00	00 (0%)	04	03	07 (5.8%)
Total	36 (40.0%)	54 (60.0%)	90 (100%)	12 (40.0%)	18 (60.0%)	30 (100%)	48 (40.0%)	72 (60.0%)	120 (100%)

Table-3: Area wise distribution of Drug (DEC +Albendazole) Coverage, Compliance and effective coverage rate

Area	Eligible study population (X)	Drug Received (Y)	Drug Coverage (Y/X)	Drug Consumed (Z)	Drug Compliance (Z/Y)	Effective Coverage rate (Z/X)
PHC Bondapalli	107	100	93 %	92	92%	86%
PHC Gantyada	122	116	95 %	107	92%	88 %
PHC Gurla	109	105	96 %	100	95%	92 %
Total Rural	338	321	95%	299	93%	88%
Urban Vizianagaram	110	101	92 %	95	94%	86 %
Grand Total	448	422	94 %	394	93%	88 %

Table-4: Performance indicator of Drug administrator during MDA activity

Approach of Drug Administrator	Rural (N=90)	Urban (N=30)	Total Number of interviewed person (N=120)
DA explained regarding ELF and mode of transmission	84	26	110 (92%)
DA persuaded to swallow the drug concurrently	Yes	Yes	Yes

Table-5: Role of service provider in awareness generation prior to MDA activities

Informed about MDA	Rural Total (N=90)	Urban Vizianagaram (N=30)
Number of Respondents informed about MDA previous to drug distribution	90	30
Source of information (Multiple response)	ASHA-90 AWW – 66 ANM – 51	ASHA- 05 AWW – 30 ANM – 7

Table-6: Most effective form of IEC material assisted in generating community awareness

Area	Posters	Banners	Handbills	News paper	Mike announcement	Drama/Street play
Rural(N=90)	54 (60%)	30(34%)	3 (3%)	3(3%)	Nil	Nil
Urban (N=30)	16 (53%)	8(27%)	5(17%)	1(3%)	Nil	Nil
Grand Total(N=120)	70 (58 %)	38(32%)	8(7%)	4(3%)	Nil	Nil

Discussion

In the present study, multistage sampling technique adopted to select 3 rural clusters and one urban area. Similar techniques used in a study Dr Ashok Rupraoji Jadhao et al in Nagpur district of Maharastra[10] and Paul A et al in in Purbabarddhaman District, West Bengal[11]

Sex wise distribution of our study was found to be 47.1 % for males and 52.9 % for females. The result is being in congruence with the study finding by Patel et al conducted in Gulbarga district of Karnatak in 2010 (Male and female composition was 46.9% and 53.1%). [12]

With regard to the age group of respondents, in our study 94.2 % of the respondents were in the age group 15–59 years. Whereas in a study conducted by Patel et al though majority of the respondents were in this age

group (62.7% in Bagalkot district and 63.9% in Gulbarga districts, respectively) but it was significantly lower than our study. [12]

A high MDA coverage (>85%) with sustainable efforts for 5 years, is required to achieve the interruption of transmission and thereby elimination of LF in India [13]. The overall estimated drug distribution coverage is 94% and effective coverage was 88%, which is more than the expected targets and it is fairly better in rural clusters (88%) than the urban cluster (86%). The result is being in resemblance with the study conducted by Singh et al in Tikamgard district of Madhya pradesh in 2013 with overall coverage rate of 94.6% and an effective coverage rate of 85.2% [14]. This achievements might be due to increased awareness through community participation coupled with highly supervised program implementation.

Undoubtedly in our study it was found that, all the respondents aware about the MDA programme prior to the scheduled date by the Front Line Workers coupled with messages communicated through various forms of IEC materials. The role of ASHA is significantly appreciable in rural areas (100%). Our finding is higher than the study result conducted by a Jadhao AR et al in Nagpur district of Maharashtra (86.4% obtained the information from various field level health workers) [10] and similarly another study conducted by Paul A et al shows, FLW were the most frequent (80.82%) source of knowledge sharing about MDA.[11]

With regard to various forms of IEC material used, Posters and banners were found to be the effective forms of IEC material assisted in creating community awareness both in rural and urban Vizianagaram. This finding is comparable with the study conducted by Rajkumar et al, where 79.3% of respondents were aware of MDA trough banners / posters in the Medak district of Telengana state.[15]

Conclusion and Recommendation

In spite of good drug coverage and compliance observed in recent past consecutive years, Vizianagaram district failed to meet the transmission interruption criteria even after prolonged MDA. This necessitates promoting operational research on possible transmission from nearby districts and confirmatory mapping of uncertain areas.

Creating an enabling environment, through coordinated community awareness programs involving different stakeholders and local media with announcements by loudspeakers may be undertaken.

Programme implementation can be improved by ensuring supervised 'on-the-spot' drug consumption. This may be achieved by engaging trained external monitors during the MDA round through third party institutional partnership.

The present evaluation study is only cross-sectional in nature having resource constraints, so further qualitative comprehensive studies with more diverse participants are needed to ascertain the causal relationship.

Acknowledgement: Authors would like to acknowledge Govt of Andhra Pradesh under NVBDCP for their funding and support. We also truthfully acknowledge the cooperation provided by health authorities at all levels.

Funding: As part of the independent third party evaluation survey, fund was received from the Director of Public Health and Family Welfare, Government of Andhra Pradesh

Ethical Approval: Not required

Conflict of Interest: None

References

1. World Health Organization. Building partnerships for lymphatic filariasis : strategic plan, Working version September, 1999. Available from - https:// apps.who.int /iris/handle/10665/66252. [Assessed on 3rdth October]
2. World Health Organization. Fact Sheet. Available from - https://www.who.int/news-room/fact-sheets/detail/lymphatic-filariasis. [Assessed on 3rdth October]
3. World Health Organization, Dept. of Control of Neglected Tropical Diseases, Geneva; 2009. Available from - http://www.who.int/iris/ handle/10665/44214#sthash. w9257Gz8.dpuf. [Assessed on 16th October]
4. Ministry of Health & Family Welfare, Government of India. Accelerated plan for elimination of lymphatic Filariasis; 2018. Available from - https://nvbdcp.gov.in/ WriteReadData/

l892s/1031567531528881007.pdf. [Assessed on 16th October]

5. Ministry of Health and Family Welfare, Government of India. National Health policy; 2002. Available from - http://planningcommission.nic.in/sectors/health.php? sectors=hea. [Assessed on 16th October]
6. Ministry of Health & Family Welfare, Government of India. National Vector Borne Disease Control Programme, Directorate General of Health Services. Filariasis control in India & its elimination. New Delhi: National Vector Borne Disease Control Programme, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of India. Available from - http://nvbdcp.gov.in/doc/guidelines-filariasis-elimination-india. [Assessed on 16th October]
7. Ministry of Health & Family Welfare, Government of India. National Health Policy 2017. Available from - https://mohfw.gov.in/sites/default/files/9147562941489753121.pdf. [Assessed on 18th October]
8. Ministry of Health and Family Welfare, Government of India. Guidelines on Filariasis Control in India and its Elimination. National Vector Borne Disease Control Program; Ministry of Health and Family Welfare, Government of India, 2009. Available from - http://nvbdcp.gov.in/doc/guidelines-filariasis-elimination-india.pdf. [Assessed on 18th Oct 2019].
9. Operational guidelines on elimination of lymphatic filariasis. Delhi: Directorate of National Vector Borne Disease Control Programme 2004; p. 1–36. Available from - https://nvbdcp.gov.in/WriteReadData/l892s/43461824631532409675.pdf. [Assessed on 2nd Nov 2019].
10. Jadhao AR, Sahoo DP, Deshmukh JS et el. Mass Drug Administration Coverage Evaluation for Elimination of Lymphatic Filariasis in Nagpur District of Maharashtra. JMSCR. 2017;05(09):28230-28236. Available from : https://pdfs.semanticscholar.org /5971/f31b1ca6c2f005c133565d2252a778857972.pdf. [Assessed on 14th Nov 2019]
11. Abhishek Paul. Coverage Evaluation Survey of Mass Drug Administration for Lymphatic Filariasis in Purbabarddhaman District, West Bengal. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). 2018;17(5):10-15.
12. Patel PK. Mass Drug Administration Coverage Evaluation Survey for Lymphatic Filariasis in Bagalkot and Gulbarga Districts. Indian J Community Med. 2012;37(2):101–6.
13. Ministry of Health & Family Welfare, Government of India. National Vector Borne Disease Control Programme. Available from : http://nvbdcp.gov.in/MDA.html. [Assessed on 15th Nov 2019].
14. Singh S, Patel M, Kushwah SS. An evaluation of mass drug administration compliance against filariasis of Tikamgarh district of Madhya Pradesh-A household-based community study. J Fam Med Primary Care 2013;2:178-81.
15. Rajkumar PS, Pandve TK, Nagaiah Tajmul G Bansode A, Inamdar NS. An Operational Research on Annual Mass Drug Administration (MDA) For Elimination of Lymphatic Filariasis in Medak District, Telangana. IAIM. 2016;3(7):239-44.

Maternal Education and its Relation with Fertility and Mortality: A Case Study among the Deoris of Assam, with Special Reference to Lakhimpur District

Biren Saikia

Asst. Prof. (Guest) Dept. of Humanities and Social Science, North-Eastern Regional Institute of Science & Technology (NERIST) Nirjuli, Arunachal Pradesh

Abstract

Education is considered to be one of the most important variables affecting fertility behaviour and is believed to be the single most important variable accounting for a large reduction in fertility. It is not only played a historic role in demographic transition but still remains a significant variable affecting fertility behaviour in present times. Therefore, this paper has attempted to study the possible relationship of maternal education with fertility and mortality among the Deori communities and also attempted has been made to study the wife's attitudes towards additional children in relation with different demographic and socio-economic variables for the same communities.

Key wards: - *Education, Fertility, Mortality etc.*

Introduction

Education is considered to be one of the most important variables affecting fertility. It is not only played a historic role in demographic transition but still remains a significant variable affecting fertility behaviour in recent times. The couples with higher educational attainment level are likely to have less desire for additional children. Apart from that, it leads to improved knowledge of and favourable attitude towards birth controlled and make better communication between husband and wife. Educated women are more likely to marry at a late age, postpone childbearing, use family planning methods and seek prenatal care when pregnant. Educated persons are aware of the problems that may result from a big family. P.k.B. Nayar[1] found that women education is the most responsible factor causing fertility decline in recent times in Kerela. Before dwelling at length the education and its relations with fertility and mortality among the Deori communities the present authors considered necessary to give a short description of the origin of the Deoris, their present divisions and the settings.

The Deoris are one of the important social groups of Assam. Ethnically they belong to Indio-Mongolioid race and linguistically to the Tibeto-Burman family Bharali[2]**.** The Deoris are a Scheduled Tribe Plain found mostly in Lakhimpur, Dhemaji, Sonitpur, Jorhat, Sibsagar, Dibrugarh, Tinsukia districts of Assam and some are also found in Lohit and Changlang districts of Arunachal Pradesh. The Deoris are one of the four divisions of Chutiya Bordoloi *etal*.,[3]**.** They were the priest group of the great Chutiya community. These four divisions are-(1) Dibangiya (2) Tenga Paniya (3) Borgoyan and (4) Patrogoyan. According to the 2001 census, the total population of the Deoris are 2, 45,000 in Assam and the Lakhimpur District contributes 53,3,56 numbers of the population. There is a total of 133 numbers of revenue villages in Assam and 43 numbers of villages under Lakhimpur District.

A Deoris woman is of yellow-brown complexion, moderate height, long black hair, straight, medium broad face. She wears colourful traditional artificially woven clothes shows as to how the Deoris women weave traditional fine clothes. Like the other communities, marriage is an indispensable part of the Deoris Society which can be regarded as a social institution. The girls generally marry between the ages of 18 to 24. The tribe endogamous systems, as well as clan exogamy, are strictly adhered to in respect of marriage. Once a girl marries she belongs to her husband's family. The children take their father's clan name. Divorce generally

does not occur in the Deori community.

The present paper studies the possible relationship of maternal education with fertility and mortality among the Deori communities and also focuses the wife's attitudes towards additional children in relation with different demographic and socio-economic variables for the same communities.

Objectives of the Study

The present study has been pursued keeping in view the following objectives-

(a) To study the possible relationship of maternal education with fertility and mortality among the Deori communities and

(b) To study the wife's attitudes towards additional children in relation with different demographic and socio-economic variables for the same communities.

Review of Literature

There is enough literature about the effect of education on fertility. According to **Caldwell and McDonald**[4] education of mother is a tool which helps them in breaking some of the traditional norms and makes them relatively more independent in taking decisions within the family situation. **Palloin**[5] has shown that literacy has a much greater influence on child mortality than on infant mortality. In the case of India, several surveys reveal that the education of women is an important factor for determining the fertility rate. A **Mysore population study**[6] reported that the average number of children born to women in Bangalore city who were illiterate or educated up to middle standard was higher than that of women who were educated up to higher school or more. The **National Sample Survey** [7] reports 1960-61 and 1961-62 rounds, showed a decrease in the average number of children born alive with an increase in women's education. It is well established that the decline of fertility in Kerala is due to the high literacy level of women there. **Borah**[8] found that infant and child mortality as a very significant determinant of fertility among the Adis of Arunachal Pradesh.

Data and Methodology

Relevant data for the study have been collected from both primary and secondary sources of information. The secondary data has been collected from Deori Autonomous Council, Narayanpur, different report of the National Sample Survey, articles in different journals, unpublished research works, newspapers and various websites etc. For the collection of primary data, we have restricted to the Narayanpur revenue circle of Lakhimpur District of Assam where the large numbers of Deoris are found. Out of the 27 Deori villages we have selected five villages for the collection of primary data. The villages are, viz Bordeuri, Kinapather, Kachikata, Pichala and Deotola. About 15% of the total Deori households of each of the five sample villages have been randomly selected for our investigation which works out to a total of 600 households for our detailed study.

The finding out the determinants of fertility differentials the technique of multiple regression and in analyzing the attitude of the couples towards additional children the technique of Binomial Logit Model have been applied. The technique of multiple regression analysis has been applied to examine the influence of various direct and indirect determinants of fertility differentials of the Deori couples under the present study. In the applied model live birth (LB) has been taken as the dependent variable, which depends on the following proximate and distant variables, viz.,

Proximate Variables:

Wife's Age at marriage (AM), Breast feeding (BF), Contraceptive use (CU), (using dummy variable, 1 for using and 0 for not using contraceptives), Abortion (AB)

Distant Variables:

Wife's and Husband Education (E) (Using dummy variables, scored 1 either of the couple is having education of M.E. level and beyond and 0 if otherwise), Per Capita Monthly Income (I), Wife Monthly Income (WMI), Wife's Nature of Occupation (WNO) (using dummy variables, 1 for wives who are cultivators and 0 for otherwise), Husband Nature of Occupation (HNO), (using dummy variables, 1 for husband's who are cultivators and 0 for otherwise),Wife's Labour Force Participation (WLFP), (using dummy variables, 1 for working women, and 0 for non-working women), Infant and Child Mortality Experience (ICM), Miscarriage and still Birth Experience (MSB), Effective Married Life Lived (EMLL), Type of Family (TF),(using dummy variables, 1 for nuclear and 0 for joint families), Family Members (FM)

Results and Discussion

To examine the effects of the above mentioned 15th variables on live birth (LB), the following multiple regression function has been framed-

$$LB_r = \beta_0 + \beta_1 AEM_r + \beta_2 BF_r + \beta_3 CU_r + \beta_4 AB_r + \beta_5 E_r + \beta_6 I_r + \beta_7 WMI_r + \beta_8 WNO_r + \beta_9 HNO_r + \beta_{10} WLFP_r + \beta_{11} ICM_r + \beta_{12} MSB_r + \beta_{13} EMLL_r + \beta_{14} TF_r + \beta_{15} FM_r + \epsilon_r$$

The results summarizing the effects of all the fifteen variables on live births have been presented in the following table-1

Table-1: Determinants of Fertility among the Deoris: Multiple Regression Results

Regressor	Unstandardized Coefficient	Standardized Coefficient	't'-Ratio	Tolerance	VIF
Constant	.980	-	-	-	-
AEM	-0.07314	-0.061	-2.478*	0.792	1.262
BF	0.01860	-0.054	2.290**	0.850	1.176
CU	0.137	0.019	0.793	0.819	1.221
AB	0.212	0.021	0.908	0.880	1.136
E	-0.06580	-0.013	-0.491	0.671	1.491
I	-0.0002108	-0.057	-1.950**	0.563	1.777
WMI	-0.00007095	0.045	1.423	0.478	2.090
WNO	0.03978	0.008	0.218	0.382	2.615
HNO	-0.164	-0.033	-1.108	0.555	1.803
WLFP	-0.125	-0.019	-0.571	0.425	2.352
ICM	0.996	0.558	22.827*	0.801	1.249
MSB	-0.160	-0.053	-2.290**	0.894	1.119
EMLL	0.08929	0.296	11.290*	0.697	1.435
TF	0.629	0.113	4.239*	0.677	1.476
FM	0.339	0.354	12.618*	0.610	1.640

Note: *=Significant at 1 % level, **= Significant at 5 % level.

R^2=0.721, $\overline{R}^2$=0.713, D.W=1.785, F=88.568*

The estimated result shows that for the Deoris, wife's age at marriage (AEM), breastfeeding (BF), per capita monthly income (I), infant and child mortality experience (ICM), miscarriage and stillbirth experience (MSB), effective married life lived (EMLL), type of family (TF), and number of family members (FM) are found to be significant variables explaining the variations in live birth (LB). The intercept value of 0.980 indicates that if the values of all the 16 regressions were fixed at

zero, the live birth will be less than one, (i.e., 0.980)

For examining the relative importance of the independent variables, it is revealed that the partial regression coefficient (β1) of the female age at effective marriage (AEM) is -0.07314, indicating that with the influence of all other explanatory variables held constant, as AEM increases say by one year, on an average, live birth goes down by 0.07314 units.

It is also found that controlling all others, longer duration of breastfeeding practice increase, on an average, live birth by a negligible amount of 0.018 units.

The regression coefficient for infant and child mortality experiences reveals that there is a highly significant positive relationship between live birth and infant and child (up to 5 years of age) mortality experiences of the couples. The partial regression coefficient of ICM being 0.996 indicates that an increase in infant and child mortality experience of the couples by saying one unit, controlling the influences of the other variables included in the model, increases live birth on an average, by almost one unit.

The regression co-efficient of the miscarriage and still birth experience (MSB) of the couple's shows that it has a depressing effect on live births. Holding all the others variables constant, an increase in miscarriage and still birth experience of the couples, say by one unit, reduces on an average, live birth by 0.160.

The partial regression co-efficient of EMLL being 0.08929, indicates that an increase in the length of effective married life lived, say by one year, increases live birth, on an average by 0.08929 units.

The regression co-efficient of TF indicates that fertility increases by 0.629 units if the type of family is nuclear. Moreover, Number of members in the family (FM) has also been found to have a significant positive influence on live birth. Having an additional member in the family, controlling the effects of all other factors, increases live birth, on an average, by 0.339.

The comparison of the standardized beta coefficients indicate that amongst all the determinants included in the model, infant and child mortality experience is the most important determinant of fertility. A standard increase in infant and child mortality experience leads, on an average, to a 0.558 standard deviation increase in live births. The effective married life lived by the couples has been found to be the third most significant factor influencing fertility among the Deori couples of the surveyed areas.

The data for the survey areas shows that the fertility level declines considerably with an increase in the educational level of women among the Deoris. The enhancement of educational amenities directly works as a contraceptive. The higher educational attainment couples are likely to have less desire for additional children. Educated persons are aware of the problems that may result from big family. Moreover they have the knowledge of family planning and practice contraceptives. Table-2 gives the information about education and wife's attitude towards additional children among the survey areas-

Table-2: Education and Wife's Attitude Towards Additional Children

Education	Percentage					
	Husband			Wife		
	Favourable	Unfavorable	Total	Favourable	Unfavorable	Total
Illiterate	118 (62.11)	72 (37.89)	190(100)	223(59.15)	154(40.85)	377(100.0)
Literate	231(63.28)	134(36.72)	365(100.0)	98(55.05)	80(44.95)	178(100)
Upto primary level	41(63.07)	24(36.93)	65(100)	18(69.23)	8(30.77)	26(100.0)
Upto M.E. Level	64(64.0)	36(36.0)	100(100.0)	26(47.28)	29(52.72)	55(100.0)
Upto High School level	65(58.55)	46(41.45)	111(100.0)	29(45.31)	35(54.69)	64(100.0)
Beyond High School level	61(68.53)	28(31.47)	89(100.0)	25(75.75)	8(24.25)	33(100.0)
Total	349(62.88)	206(37.12)	555(100.0)	321(57.84)	234(42.16)	555(100.0)

Source:-From field survey.

From the Table-2 it is found that, so far as the education is concerned, the study revealed that the percentage of wives having favourable attitude to additional child is higher for the illiterate females (59.15%) than the literate females (i.e.55.05%). On the other hand, in case of the husbands it has been noticed that the literate husbands have more preference for additional child (63.28%) as compared to the illiterate husbands (i.e.62.11%) It is also reveals that among the literate Deori wives and husbands the desire for additional child is more for those who have attained education beyond high school level.

Factor Affecting Attitude to Additional Children:

To quantify the factors determining the wife's attitudes towards additional children in relation with different socio-economic and demographic variables have been examined by applying the Binomial Logit Model.

In the applied model, wife's attitude towards additional children (ATAC) is the dummy dependent variable (using 1 for favourable and 0 for unfavorable attitude towards additional children) and the independent variables are- (1) Live Birth (LB), (2) Infant and Child Mortality Experience (ICM), (3) Per-Capita Monthly Income (I), (4) Wife's Monthly Income (WMI), (5) Number of Family Members (FM), (6) Type of Family (TF), (using dummy variables, 1 for nuclear families and 0 for joint families), (7) Wife's Age at Effective Marriage (AEM), (8) Miscarriage and Still Birth Experiences (MSB), (9) Wife's Labour force participation (WLFP), (using dummy variables, 1 for working women and 0 for non-working women), (10) Wife's Nature of Occupation (WNO), (using dummy variables, 1 for wives who are cultivators and 0 for otherwise) (11) Husband's Nature of Occupation (HNO), (using dummy variables, 1 for husbands who are cultivators and 0 for otherwise) (12) Education (E), (using dummy variables, scored 1 if either of the couples is having education of M.E. level and beyond and 0 if otherwise),(13) Effective Married Life lived (EMLL), (15) Knowledge of Family planning (KFP) (using dummy variables, 1 for wives having knowledge of family planning and 0 for otherwise)The model is –

$$ATAC = I_n\left(\frac{D}{1-D}\right) = \beta_0 + \beta_1 LB_i + \beta_2 ICM_i + \beta_3 I_i + \beta_4 WMI_i + \beta_5 FM_i + \beta_6 TF_i + \beta_7 AEM_i + \beta_8 MSB_i + \beta_9 WLFP_i + \beta_{10} WNO_i$$

$$+ \beta_{11} HNO_i + \beta_{12} E_i + \beta_{13} KFP_i + \beta_{14} EMLL_i + \beta_{15} KFP_i + U_i.$$

Where, D_i is a dummy variable, If the expected value of D_i continues to be P_i the probability is that the i^{th} person will make the choice described by D_i =1(i.e, having favourable attitude towards additional children) the results of the estimated Logit Model are reported in the table-3

Table-3: Determinants of Attitude Towards Additional Children, Binomial Logit Regression Results-Dependent Variable: Attitude Towards Additional Children (ATAC)

Regressor	Coefficient (β)	Std. Error	wald	Antilog (β*)
Constant	6.821	1.399	23.761*	917.107
LB	-0.802	.104	59.473*	.449
ICM	0.615	.127	23.368*	1.850
I	0.000	0.000	1.537	1.000
WMI	0.000	0.000	2.626	1.000
FM	-0.042	.062	.458	.959
TF	0.106	.320	.110	1.112
AEM	-0.138	.061	5.095**	.871
MSB	0.097	.150	.420	1.102
WLFP	0.697	.453	2.363	2.007
WNO	-0.291	.372	.611	.748
HNO	1.440	.336	18.416*	4.220
E	0.201	.290	.478	1.222
EMLL	-0.091	0.021	19.498*	0.913
KFP	-0.830	0.279	8.848*	0.436

Note: *=Significant at 1 % level, **= Significant at 5 % level.

N=555, R^2_p =0.79, Cox & Snell R^2=0.379, Nagelkere R^2=0.509

Hosmer and Lemeshow Goodness of fit test statistic =15.613

From the estimated regression coefficients it is found that there is a highly significant negative relationship between live birth (LB) experience and wife's attitude towards additional children. If the number of live birth experience increases by one unit, holding other variable constant, the log of odds of wife's favourable attitude to additional children is reduced by .802 units.

It is revealed that there is a highly significant positive influence of infant and child mortality experience on the wife's favourable attitude towards additional children. The ICM coefficient of 0.615 indicates that with other variables held constant, as the infant and child mortality experience increases by one unit, on an average, the log of odds of the wife's favourable attitude towards additional children increases by 0.615 units.

The antilog of ICM coefficient (i.e.1.85) suggest that, controlling for the other variables, an increase in wife's infant and child mortality experience increases by one unit, increases the chance of having favourable attitude towards additional children by 1.85 percent.

Wife's age at effective marriage has been found to have a significant negative effect on the favourable attitude towards additional children. The AEM coefficient being -0.138, suggests that with other variables constant, if wife's age at effective marriage increases by one year, on an average the estimated logit decreases by about 0.14 units.

The antilog of the AEM coefficient (0.871) indicates that one year increase in wife's age at effective marriage, other things remaining constant, reduces the favourable attitude towards additional children by 0.871 units.

It is observed from the table that husband nature of occupation has a highly significant influence on the wife's favourable attitude towards additional children. The HNO coefficient (1.44) indicates that, other things remaining constant, with a cultivator's wife increases the log of odds of having favourable attitude towards additional children by 1.44 units. The antilog (4.22) of the coefficient HNO also suggests that, other things remaining constant, the odds of wife's having favourable attitude towards additional children is four times more if the husbands are cultivators than when husbands are having different nature of occupations.

Similarly, the knowledge of family planning has been found to have a highly significant negative influence on the wife's favourable attitude towards additional children. The coefficient of KFP (-0830) indicates the negative impact of having knowledge of family planning on the log of odds of wife's having favourable attitude towards additional children.

Thus, the other regressors included in the model have no statistically significant effect on the attitude towards additional children. The R^2_p (i.e. 0.79) indicates that, the model correctly 'predicts' that in respect of about four fifths of the wives, the attitude towards additional children is dependent on the 15 independent variables included in the model.

Conclusion

As it has been observed from the survey that higher educated women are not only favourable predisposed towards family planning but also use modern and effective contraceptives and start practicing contraception soon after marriage or the first birth. For the findings of our survey it is also revealed that the wives having favourable attitude to additional child is higher for the illiterate females (59.15%) than the literate females (55.05%) but in case of the husbands it has been revealed that the literate husbands have more preference for additional child (63.28%) as compared to the illiterate husbands (i.e.62.11%) among the Deoris.

Ethical Clearance- Taken from **Institute of Research for Tribals and Scheduled Castes, Guwahati,** Assam

Source of funding- Self

Conflict of interest- Health and hygienic conditions in different minority communities in Assam.

References

1. Nayar PKB, 'Factors in Fertility Decline in Kerala' In K. Mahadevan etal (eds.), Fertility and Mortality, Sage Publications New Delhi India in 1986.
2. Bharali PN and Borah AK, "Educational Problems Among the Deorias, A Plains Scheduled Tribe of Assam" Published in *Bulletin* Assam Institute of Research for Tribals and Scheduled Castes, Guwahati in 2001 vol.-1

3. Bordoloi, BN, GC Sharma Thakur & MC Saikia, Tribes of Assam, Part-1. Published in Assam: Tribal Research Institute Guwahati in 1987.
4. McDonald P and Caldwell JC, 'Influence of maternal education on infant and child mortality levels and causes' International population conference: proceedings and selected papers, 1981 p.45
5. Palloni A, Mortality in Latin America: Emerging Patterns. Population and Development Review, 1981 Vol-7 pp. 623-649.
6. The Mysore population study, Published in United Nations Dept. of Economics and Social Affairs in 1961.
7. National Sample Survey, Tables with notes on family planning Sixteenth round. The cabinet Secretariat, Govt., of India July 1960-Jun 1961. No. 116. New Delhi, 1960.
8. Borah R, Tribal Demography in Arunachal Pradesh-A Case study of the Adis, Ph. D. thesis, Dibrugarh University, submitted in 2003 pp. 88-91.

A Study to Assess the Effectiveness of Critical Care Education on Knowledge of Students in Care of Patients with Mechanical Ventilator among Nursing Students in Srm College of Nursing, Kattankulathur, Tamil Nadu, India

C. Kanniammal[1], T. Suseelal[1], A. Akila Devi[2], K.Ambiga[2], A. Sheeba Jebakani[2]

Dr. C. Kanniammal[1] Dean, Dr. T. Suseelal[1] Associate professor, Mrs. A. Akila Devi[2] professor, Mrs. K.Ambiga[2] Associate professor, Mrs. A. Sheeba Jebakani[2] Associate professor, Medical surgical department, SRM College of Nursing, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu District, Tamil Nadu, India

Abstract

Critical care education among nursing students is an emerging topic globally.Nurses lead a vital role in all hospital setting. Critical care nursing skills must be taught to the student nurses to provide optimum care during emergency situation.The present study assessed the impact of critical care education among students in SRM College of Nursing. A quantitative study with one group pre and posttest design was used.Totally hundred students between age group 18-20yrs participated in the study. After explaining and getting their consent by convenient sampling technique pretest was taken with 18 self structured objective type questions.Education on critical care was given by experts on current trends, technologies, evidenced based practice, pharmacological management, and role play, quality nursing care during ventilator support and legal responsibilities in critical care for 6 hrs. After the education post assessment was done with same questionnaire. Analysis was done with descriptive, MCNemar's test, and student paired t test. The post knowledge of students with care of patient in mechanical ventilator was significant with $p < 0.05$. This study high lights the need for educating the staff in critical care in the hospital setting.

Key words: *Critical care, Nursing students, Quality nursing care, Mechanical ventilator, Education*

Introduction

Critical care Nursing is one of the challenging area for nurses.In 18th century Florence Nightingale developed evidenced based care in Nursing.During 18th and 19th century general nursing staffs were trained to provide care to the patients in emergency situation.As technology advanced there was many changes evolved in nursing field.In 1923 Critical care facility first evolved. During 19th century it boostup and 20th century it was implemented with excellence in critical care.It enhances quality care as most important aspects in CCU. Undergraduate students need skills to care critically ill patients[1].

Current scenario is mainly focused to develop nurse practitioners to work in critical care unit. Nurses provide efficient care when the patients are brought in critical condition.

Nurses has to report to the doctor about any abnormal results,regarding their patients,so that it can be solved immediately[2]. Now a day the life expectancy of the people is more and there is increasing number of acutely ill patients are being admitted in hospital[3].

Delayingthe care may lead to severe complications and death.Students has to develop right attitude and Knowledge when they are posted in intensive care unit[4]. A nurse has a primary role in the health care of patients. Quality aspect of care should be strengthened with

Corresponding Author:
Dr. T. Suseelal,
Associate professor, SRM College of Nursing, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu Dist – 603203, Tamil Nadu, India,
E-mail:suseelal.john@gmail.com

excellence of research study. Nurses are always near to the patients. They can understand abnormal rhythms, changes in vital signs and immediately report to doctors[5].

Evidenced based practice(EBP) is important to avoid the outdated practice.EBP it includes clinical expertise,patient value and preference. If the nurses in ICU are Knowledgeable they will not do harm to the patients[6]. Evidenced based practice in critical care reflect to improve quality patient care. It bridge the gap between theory and practice.[7]Critical care nurses are expected to provide standard nursing practices that requires expert guidance[8].Critical care nurses must be skilful, punctual, dedicated and they should cultivate attitude to care patients sincerely[9].Nurses must be intelligent to handle critical situation and should be emotionally prepared to work even the patients are very sick and at times of death and departure[10].The present study intended to evaluate the Knowledge of students and to educate them regarding the care of patient in mechanical ventilator.

Materials and Method

It was a descriptive study based on Knowledge assessment of critical care among nursing students in SRM College of Nursing, Kattankulathur. Formal approval was obtained from SRM Institute ethical committee. One group pre and post test design is used in this study. After explaining and getting the written consent from the participants with convenient sampling technique the data was collected from 100 samples on 22nd July 2019.After pilot study reliability of the tool was assessed by using Test retest method. The knowledge score reliability correlation co efficient value is 0.83. Pre test was taken by using standardized objective type interview questionnaire (18) in number on care of patient during ventilator. Continuing Nursing Education was given for 6 hours by various experts on current trend, evidenced based practice, and role of nursing team, pharmacotherapy, and quality care on patient during mechanical ventilator and legal aspects of critical care. A role play – mime programme on dealing with emergency situation was demonstrated by 10 students. Post test was taken with the same questionnaire .Each correct answer was given a score of (1) and the wrong answer was given a score of (0).The collected data was spread in Excell sheet SPSS Version 16.0 and analyzed. Confidentiality and anonymity was maintained throughout the study.

Results

The demographic table revealed among 100 participants majority of them were between the age group of 19-20 years (40%), between 18-19 and 20-21 years were (30%). Regarding education majority of them were BSC nursing fourth year (30%), second year (30%), third year ((26%), Diploma nursing second year (14%). Regarding their residential background urban and rural region were (50%). In relation to religion Hindus were (80%) and Christians were (20%).

Table 1: pre Knowledge score of students in critical care education programme N= 100

s.no	Statements	Knowledge on			
		Correct		Not correct	
		n	%	n	%
1	Improper securing of ET Tube might cause	37	37.00	63	63.00
2	The complication that occurs due to endotracheal tube obstruction	35	35.00	65	65.00
3	The nurse should understand that a ventilator alarm could be due to	67	67.00	33	33.00
4	How often do you change the humidifiers?	73	73.00	27	27.00
5	Which position do you recommend to prevent ventilator associated pneumonia?	53	53.00	47	47.00
6	How often do you give eye care when patient is on ventilator?	41	41.00	59	59.00
7	How often the position of the patient is changed ?	51	51.00	49	49.00
8	Tidal volume can be termed as	39	39.00	61	61.00
9	Which of the following is selected when the patient is not able to continue any spontaneous breath during ventilator?	15	15.00	85	85.00
10	How often chest physio should be given when the patient is in ventilator?	19	19.00	81	81.00
11	Which of the ventilator parameter is adjusted in order to reduce paCo2 ?	22	22.00	78	78.00

Cont... **Table 1: pre Knowledge score of students in critical care education programme N= 100**

12	What are the key indicators to evaluate the adequacy of oxygenation in ventilated patient?	40	40.00	60	60.00
13	When the intubation is required for a short period, which of the following is recommended?	42	42.00	58	58.00
14	The dosage of Inj. Morphine is	35	35.00	65	65.00
15	Which is the most common sedative used when the patient is on ventilator?	41	41.00	59	59.00
16	What is the action of dopamine?	32	32.00	68	68.00
17	Which of the following is an indication for weaning?	33	33.00	67	67.00
18	Ventilator associated pneumonia can be prevented	31	31.00	69	69.00

The above table shows each question wise pre-test percentage of knowledge score.

They are having maximum knowledge in how often do you change the humidifiers (73.0%) and minimum knowledge score in Which of the following is selected when the patient is not able to continue any spontaneous breath during ventilator(15.0%).

Table 2: Post Knowledge score among students in critical care education programme.

N= 100

sno	**Statements**	**Knowledge on**			
		Correct		**Not correct**	
		n	**%**	**N**	**%**
1	Improper securing of ET Tube might cause	57	57.00	43	43.00
2	The complication that occurs due to endotracheal tube obstruction	55	55.00	45	45.00
3	The nurse should understand that a ventilator alarm could be due to	87	87.00	13	13.00
4	How often do you change the humidifiers?	88	88.00	12	12.00
5	Which position do you recommend to prevent ventilator associated pneumonia?	73	73.00	27	27.00
6	How often do you give eye care when patient is on ventilator?	65	65.00	35	35.00
7	How often the position of the patient is changed ?	73	73.00	27	27.00
8	Tidal volume can be termed as	63	63.00	37	37.00
9	Which of the following is selected when the patient is not able to continue any spontaneous breath during ventilator?	46	46.00	54	54.00
10	How often chest physio should be given when the patient is in ventilator?	47	47.00	53	53.00
11	Which of the ventilator parameter is adjusted in order to reduce paCo2 ?	42	42.00	58	58.00
12	What are the key indicators to evaluate the adequacy of oxygenation in ventilated patient?	60	60.00	40	40.00
13	When the intubation is required for a short period, which of the following is recommended?	62	62.00	38	38.00
14	The dosage of Inj. Morphine is	62	62.00	38	38.00
15	Which is the most common sedative used when the patient is on ventilator?	61	61.00	39	39.00
16	What is the action of dopamine?	60	60.00	40	40.00
17	Which of the following is an indication for weaning?	64	64.00	36	36.00
18	Ventilator associated pneumonia can be prevented	59	59.00	41	41.00

The above table shows each question wise post-test percentage of knowledge .They are having maximum knowledge in How often do you change the humidifiers (88.0%) and minimum knowledge score in Which of the ventilator parameter is adjusted in order to reduce $paCo_2$ (42.0%).

Table 3: Comparison of pre and post knowledge mean score of students in critical care education programme

N=100

	No. of students	Mean score	SD	Mean Difference	Student paired t-test
Pretest	100	7.06	2.31	4.18	t=10.29 P=0.001***
Posttest	100	11.24	3.43		

Significant at p<0.05 level

The above table shows in the pretest the students are having 7.06 knowledge score and after intervention they were having 11.24 knowledge score, so the difference is 4.18 knowledge score, this difference is large and it is statistically significant. It was calculated using student paired t-test.

Table 4:Comparison of pre and post Knowledge score among students in critical care education programme

N=100

Level of knowledge	Pretest		Posttest		Extended McNemar's test
	n	%	N	%	
Inadequate knowledge	85	85.00	20	20.0	$\chi 2$=65.89 P=0.001***
Moderate knowledge	15	15.00	54	54.0	
Adequate knowledge	0	0.0	26	26.0	
Total	100	100	100	100	

Significant at p<0.05 level

The above table reveals before Critical care education, 85.0% of the students are having inadequate level of knowledge score, 15.0% of them having moderate level of knowledge score and none of them are having adequate level of knowledge score.

After Critical care education, 20 %of the students are having inadequate level of knowledge score , 54.0% of them having moderate level of knowledge score and 26.0% of them are having adequate level of knowledge score.

Level of knowledge gain of between pretest and posttest was calculated using Extended McNemar's chisquare test is significant with p<0.05.

The association with demographic variables revealed elder students and urban area students are having more knowledge score than others. Statistical significance was confirmed using chi square test (P<0.05) all the other variables are not significant P>0.05. So there's no association between the post level Knowledge score and the demographic variables.

Discussion

This continuing nursing education programme dealt on various aspects of critical care nursing to improve

students Knowledge and skills to work in critical care unit. Most of the students are willing to work in ICU after their graduation. Critical care area is a place where serious patients are admitted at time they are in a stage of fight or flight. At this junction the expertise Nursing assessment and care is needed without any delay. The nurses must understand their responsibility and they work deligently in saving the life of patients. Many adult patients were admitted in critical care unit and most of them died within 6 hrs after all expert treatment loosing the patient's life is a horrible situation for the family and it reduces the economical status of our country. ICU nurse must be vigilant in observing the signs and symptoms, nursing care in critical situation and documentation. After the death of patients all documents are saved for legal concern. Nurses must keep it in mind and they should provide optimum care to their patients to save their lives. The present study post test revealed out of 100 students 28% of them having adequate Knowledge 54% of them having moderately adequate Knowledge and 20% having inadequate knowledge with x^2=65.84,P<0.01. Also the mean score is difference 4.18 (P<0.01). This study result was consistent with the study done by Jaber. A etal., (2016) revealed positive students experience after critical care course. This study can be done in hospital among staff nurses working in critical care unit.

Conclusion: The present study concluded that the student's knowledge is improved after the critical care education programme.

Conflict of Interest: The authors have no conflict of interest.

Funding/Support: None declared.

References

1. Jafar A. Alasad, Muayyad M. Ahmad, Nazih Abu Tabar Huthaifa Ahmad.Nursing student's Experiences in Critical Care Course: A Qualitative StudyJournal of Intensive and Critical Care. 2016.
2. Williams E[1], Palmer C. Student nurses in critical care: benefits and challenges of critical care as a learning environment for student nurses. NursCrit Care. 2014 Nov;19(6):310-5. doi: 10.1111/nicc.12053.
3. Elizabeth Williams R Student nurses in critical care: benefits and challenges of critical care asa learning environment for studentnurses.2013.,https://doi.org/10.1111/nicc.12053.
4. NurselVatansever, NerimanAkansel, Experience of Nursing Students during their Clinical Placements, International Journal of Caring Sciences, September. 2016., 9 (3) : 1040.
5. Patrick Gallagher, Billiejoan Rice, Paul Tierney, Karen Page and Aidin McKinney Evaluating a critical care course .A study looked at how final-year student nurses felt they benefited from taking part in a critical care course . 2011
6. Sevinc Tastan, Emine Iyigun, Hatice Ayhan, Sevgi Hatipoglu, Experiences of Turkish undergraduate nursing students in the intensive care unit. Australian journal of nursing practices.DOI: https://doi.org/10.1016/j.colegn.2013.12.003
7. Lena Stevens, Janet Yvonne Mattsson. Development of an individual assessment instrument for critical care nursing students Journal of Nursing Education and Practice. 2017, Vol. 7, No. 2 http://dx.doi.org/10.5430/jnep.v7n2p54
8. Sigrid Wangensteen Inger, S. Johansson ,Monica E Björkström , Gun Nordström Critical thinking dispositions among newly graduated nurses, Journal of leading global Nursing Research .2010
9. Bartlett, Doreen .J.; Cox, Peter D. Measuring Change in Students' Critical Thinking Ability: Implications for Health Care Education Journal of Allied Health. 2002.,31 (2):64-69
10. PanelN M, Beauvais[a], Brady1E. R.O,' Sheac2M T. Qunin G[3].Emotional intelligence and nursing performance among nursing students. Nurse Education Today 2011;1(4)2: 396-401 https://doi.org/10.1016/j.nedt.2010.07.013

Manuscript type: Original

Food Habits and Physical Activity among Adolescent Medical Students of a Medical College in Tumkur, Karnataka, India

Chandana Krishna[1], Sagar MK[2], Krishna Iyengar[3], Viswanatha PG[4]

[1]Assistant Professor of Community Medicine, Sri Siddhartha Medical College, Agalkote, Tumkur, [2]Intern, Sri Siddhartha Medical College, Agalkote, Tumkur, [3]Professor and Head, Dept of Community Medicine, Sri Siddhartha Medical College, Agalkote, Tumkur, [4]Assistant Professor of Community Medicine, Subbaiah Institute of Medical Sciences and Research centre, Shimoga

Abstract

Background: Adolescence is a transitional stage of physical, physiological and psychological development from puberty to legal adulthood. Worldwide more than 1.2 billion are adolescents i.e. one in every six persons is an adolescent. About 21% of Indian population is adolescents. The health status of an adolescent determines the health status in his/her adulthood. Healthy dietary habits & physical activity among medical students are even more important as they are future physicians.

Objectives: 1. To assess the dietary habits of the study subjects. 2. To assess the physical activity of the study subjects

Methodology: A cross-sectional study was conducted among the adolescent medical students (<19yrs) during January-April 2019. Data on dietary habits & physical activity was collected using pretested semi-structured questionnaire & PAQ-A scale (Physical activity questionnaire- Adolescents).

Results: Among the study subjects, 73.5% were male, 25.8% consumed all three meals in a day, 90.3% and 58.1% skipped their breakfast & dinner respectively, <30% consumed healthy foods like fruits & vegetables, milk etc. Almost everyone consumed junk food at least once a week. 51.5% felt that they had unhealthy food habits. 29.4% spent their free time doing very little/no physical activity. 50% never engaged in sports activity. Walking was the most common physical activity (45.5%).

Conclusion: There was an alarming prevalence of unhealthy dietary practices, & poor physical activity that should be targeted and modified. Strategies need to be adopted to improve young youths' nutritional status and to establish a healthy lifestyle.

Key words: *Food habits, physical activity, adolescent, medical students*

Introduction

Adolescents are the young people aged between 10 to 19 y. It is a transitional stage of physical, physiological and psychological development from puberty to legal adulthood. Worldwide more than 1.2 billion are adolescents: this indicates that roughly one in every six persons is an adolescent.[1] About 21% of Indian population is adolescents (about 243 million).[2]

They are the future of the nation, forming a major demographic and economic force. The health status of an adolescent determines the health status in his/her adulthood. Many serious diseases in adulthood have their roots in adolescence.[3]

Physical activity is every movement produced by skeletal muscles that results in energy expenditure[4]

Corresponding Author:
Viswanatha PG
Address: Assistant Professor of Community Medicine, Subbaiah Institute of Medical Sciences and Research centre, Shimoga. Phone numbers: 9164538988
E-mail address: vgowda300@gmail.com

and is also one of the most important steps in health improvement. Sedentary behavior is not simply a lack of physical activity but is a cluster of individual behaviors where sitting or lying is the dominant mode of posture and energy expenditure is very low.[5] It is well-known that physical activity decreases the prevalence of many chronic diseases, such as cardiovascular, autoimmune and malignant diseases as well as diabetes mellitus.

Beside physical activity, adequate dietary habits are equally important in the prevention of many diseases and health improvement. Therefore, one of the most important problems of modern life is obesity that arises from inadequate physical activity and bad dietary habits.[6] A shift from high school to college is one of the most vulnerable periods in the life of young adult person who is faced with many different challenges. During this period an individual deals with huge pressure and expectations which therefore inevitably lead to changes in the lifestyle. A great number of students leave their parents' homes, resulting in alteration of dietary habits and life conditions. Healthy life habits are exchanged with an unhealthy lifestyle usually at the beginning of college. This unhealthy lifestyle mostly refers to increased consumption of fast food and decreased consumption of fruits and vegetables. Snacking and breakfast skipping are frequent in young youth.

Healthy dietary habits among medical students are even more important as they are future physicians. Amongst this college population, it is assumed that the medical students have a great knowledge about healthy lifestyle and dietary habits. However there is no evidence to indicate that this knowledge translates into practices in terms of maintaining good health.

Hence this study was taken up to assess the dietary habits and physical activity among adolescent medical students of a Medical college.

Objectives:

a. To assess the dietary habits of the study subjects

b. To assess the physical activity of the study subjects

c. To assess the association between the dietary pattern and physical activity of study subjects

Materials and Methods

A cross-sectional study was conducted between January – August 2019 at a medical college in Tumkur. Medical students in the adolescent age group (10-19years) studying in the college.

Inclusion criteria: Medical students in adolescent age group (10-19years) who consent for the study

Exclusion criteria: Absent at the time of data collection even after 3 visits

Methodology

After taking permission from head of the Institution & IEC, the first and second year students who fulfil the inclusion & exclusion criteria were approached and the purpose of the study was explained. Data was collected using pre-tested semi structured questionnaire regarding the dietary pattern in the last 7days in collected and data on physical activity was collected using PAQ-A (Physical activity Questionnaire-Adolescents). Data was entered in MS-excel and analysed using SPSS version 20. Data like socio-demographic data was analysed using descriptive statistics. Association was assessed using chi square and Fischer's exact test. Quantitative data was analysed using T-test to compare between 2 groups.

Results

A total of 131 study subjects responded to the questionnaire and hence were included in the study.

i. Socio-demographic profile of study subjects:

Among the study subjects, 53 (40.5%) were females and 78 (59.5) were males. Age of the study subjects was 18.84±0.39years. Height, weight and BMI was 62.5±15.9Kg, 163.8±14.57cm and 23.5±5.9 respectively. 76 (58.0%) had normal BMI, 15 (11.5%) were thin and 9 (6.9%) were severely thin. 15 (11.5%) were overweight and 16 (12.2%) were obese. There was a statistically significant difference in weight and height between male and female study subjects. (Table 1)

ii. Dietary pattern of the study subjects:

Only 59 (45.0%) of study subjects consumed all three major meals of the day. Skipping of breakfast and dinner was seen in 22 (16.8%) and 3 (2.3%) respectively. Adequate fruits and vegetables were consumed by 55 (41.9%) and 61 (46.6%) respectively. Unhealthy foods like soft drinks, salted snacks and fried food & chats were consumed by 40 (30.5%), 40 (30.5%) and 39

(29.8%) respectively. Only 32 (24.4%) felt that they had healthy food habits. There was a statistically significant difference in consumption of 3 major meals, skipping of breakfast, consumption of fruits, vegetables, soft drinks, salted snacks and perception regarding dietary habits between male and female subjects. (Table 2)

iii. Physical activity among the study subjects:

Among the study subjects, 91 (69.5%) were inactive, 32 (24.4%) were minimally active and only 8 (6.1%) were very active. There was a statistically significant association between physical activity and sex of the study subjects. (Table 3)

iv. Association between dietary pattern and physical activity:

Consumption of all three meals, not skipping of breakfast or dinner, adequate consumption of fruits and vegetables was relatively higher in very active study subjects compared to minimally active and inactive study subjects. There was a statistically significant association between perception about diet and physical activity. (Table 4)

Table 1: Socio-demographic profile of the study subjects

Characteristics	Total	Male	Female	p-value
Age	18.84±0.39	18.85±0.39	18.83±0.38	0.81
Weight	62.5±15.9	66.48±13.34	54.85±10.1	<0.001
Height	163.8±14.57	169.6±11.9	155.3±14.0	<0.001
BMI	23.5±5.9	23.28±5.05	23.15±5.79	0.89
Severe thin	9 (6.9)	8 (10.3)	1 (1.9)	0.18
Thin	15 (11.5)	10 (12.8)	5 (9.4)	
Normal	76 (58.0)	41 (52.6)	35 (66.0)	
Overweight	15 (11.5)	11 (14.1)	4 (7.5)	
Obese	16 (12.2)	8 (10.3)	8 (15.1)	

Table 2: Dietary pattern of the study subjects

Characteristics*	Total	Male	Female	P-value
Consumption of all 3 major meals	59 (45.0)	43 (55.1)	16 (30.2)	0.005
Skipping of breakfast	22 (16.8)	4 (5.1)	18 (34.0)	<0.001
Skipping of dinner	3 (2.3)	2 (2.6)	1 (1.9)	0.51
Fruits	55 (41.9)	40 (51.3)	15 (28.3)	0.028
Vegetables	61 (46.6)	44 (56.4)	17 (32.1)	0.03
Soft drinks	40 (30.5)	29 (37.2)	11 (20.8)	0.018
Salted snacks	40 (30.5)	32 (41.0)	8 (15.1)	0.019
Fried food & chats	39 (29.8)	28 (35.9)	11 (20.8)	0.24
Perception of eating habits: healthy	32 (24.4)	27 (34.6)	5 (9.4)	<0.001

*Multiple responses

Table 3: Physical activity among the study subjects

Characteristics	Total	Male	Female	p-value
Inactive	91 (69.5)	48 (61.5)	43 (81.1)	0.011
Minimally active	32 (24.4)	22 (28.2)	10 (18.9)	
Very active	8 (6.1)	8 (10.3)	-	

Table 4: Association between dietary pattern and physical activity

Characteristics	Inactive	Minimally active	Very active	P-value
Consumption of all 3 major meals	38 (41.8)	16 (50.0)	5 (62.5)	0.249
Skipping of breakfast	19 (20.9)	2 (6.3)	1 (12.5)	0.311
Skipping of dinner	3 (3.3)	-	-	0.102
Vegetables	41 (45.1)	14 (43.8)	6 (75.0)	0.629
Fruits	38 (41.8)	10 (31.3)	7 (87.5)	0.165
Soft drinks	28 (30.8)	8 (25.0)	4 (50.0)	0.731
Salted snacks	27 (29.7)	8 (25.0)	5 (62.5)	0.218
Fried food & chats	26 (28.6)	7 (21.9)	6 (75.0)	0.057
Feels that their eating habits are healthy	16 (17.6)	11 (34.4)	5 (62.5)	0.043

Discussion

Among the study subjects, 53 (40.5%) were females and 78 (59.5) were males. Age of the study subjects was 18.84±0.39years. In a study in Surat by Piyushkumar[11] et al., 56% (164) were girls and 44% (129) were boys with the mean age of 18.65 ± 1.45years. In another study by Goran Janković[10] et al., the age of study subjects was 19.97 ± 0.56years

In the present study,76 (58.0%) had normal BMI, 15 (11.5%) were thin and 9 (6.9%) were severely thin, 15 (11.5%) were overweight and 16 (12.2%) were obese. In a study by Piyushkumar[11] et al., 115(43%) had normal BMI, 89(33%) were underweight and 65(24%) were pre-obese and obese. In another study by Goran Janković[10] et al., 369 (75.80%) had normal BMI, 31 (6.40%) were underweight, 81 (16.60%) were overweight and 6 (1.20%) were obese.

In the present study, only 59 (45.0%) of study subjects consumed all three major meals of the day. Skipping of breakfast and dinner was seen in 22 (16.8%) and 3 (2.3%) respectively there was a statistically significant difference in consumption of 3 major meals, skipping of breakfast, consumption of fruits, vegetables, soft drinks, salted snacks and perception regarding dietary habits between male and female subjects. In another study by Mohanty BB[7] et al., there was a statistically significant difference in number of meals & snacks, meat, fruits & vegetables, dairy food and juice. In another study by Manijeh Alavi1[12] et al., (48.4) skipped breakfast while only few (8.3 percent) skipped lunch

In the present study, 91 (69.5%) were inactive, 32 (24.4%) were minimally active and only 8 (6.1%) were very active. There was a statistically significant association between physical activity and sex of the study subjects. In another study by Goran Janković[10] et al., 305 (62.20%) were moderately active, 110 (22.40%) were very active and 75 (15.30%) were inactive. But there was no statistically significant association between physical activity and sex of the study subjects. In another

study by Hamdan[13] et al., about 50% of the students performed physical activities and exercise sometimes, whereas very few performed physical activities and exercise on regular basis.

In the present study, Consumption of all three meals, not skipping of breakfast or dinner, adequate consumption of fruits and vegetables was relatively higher in very active study subjects compared to minimally active and inactive study subjects. There was a statistically significant association between perception about diet and physical activity. In another study by Goran Janković[10] et al., there was a statistically significant association between physical activity and consumption of meat & meat product, white flour products and commercial drinks.

Conclusion

- There was an alarming prevalence of unhealthy dietary practices, & poor physical activity that should be targeted and modified.
- Strategies need to be adopted to improve young youths' nutritional status and to establish a healthy lifestyle

Ethical Clearance- Taken from Institutional ethical committee of Sri Siddhartha Medical College, Tumkur, Karnataka

Source of Funding- Self

Conflict of Interest - Nil

References

1. Progress for Children: A report card on adolescents. Socio-demographic profile of adolescents: Number 10 April 2012 UNICEF. Figure: 2.1 Page 6 [Internet]. [cited 2019 April 10]. Available from: http://www.unicef.org/publications/files/Progress_for_Children_No._10_EN_04232012.pdf
2. Strategy Handbook. Rashtriya Kishor Swasthya Karyakram.Adolescent Health Division Ministry of Health and Family Welfare Government of India. January 2014 [Internet]. [cited 2019 April 10]. Available from: https://www.dropbox.com/s/0oj4p422y7st4ku/RKSK%20Strategy%20Handbook.pdf
3. C. Sivagurunathan, R. Umadevi, R. Rama, S. Gopalakrishnan. Adolescent Health: Present Status and Its Related Programmes in India. Are We in the Right Direction? Journal of Clinical and Diagnostic Research. 2015 Mar, Vol-9(3): LE01-LE06
4. Caspersen, C.J., Powell, K.E., & Christenson, C.M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health related research. Public Health Reports, 100(2), 126-131.
5. Sedentary Behaviour and Obesity Expert Working Group. Sedentary Behaviour and Obesity: Review of the Current Scientific Evidence; Department of Health: London, UK, 2010.
6. Goran Janković, Željka Stanojević, Sanja Mazić, Nikola Topalović, Dragan Đurđević, Aleksandra Isakovic. Physical activity and dietary habits among second year students of the school of medicine, university of Belgrade. Physical Education and Sport 2017;15(2):239 – 248.
7. Mohanty BB, Rath K, Jena SK, et al. Dietary habit of medical students- a study among the students of a health university in Eastern India. J. Evolution Med. Dent. Sci. 2018;7(22):2698-2701, DOI: 10.14260/jemds/2018/608
8. Alissa EM, Fatani AL, Almotairi AM, Jahlan BM, Alharbi SK, Felemban LS, et al. Food Consumption Pattern and their Association with Physical Activity Level Among Medical and Para-Medical Students. Austin J Nutr Metab. 2015; 2(3): 1023.
9. C Cavadini, B Decarli, J Grin, F Narring, P-A Michaud. Food habits and sport activity during adolescence: differences between athletic and non-athletic teenagers in Switzerland. European Journal of Clinical Nutrition 2000;54(1):16-20.
10. Bogna Grygiel-Go´rniak, Andrzej Tomczak, Natalia Krulikowska, Juliusz Przysławski, Agnieszka Seraszek-Jaros, El_zbieta Kaczmarek. Physical activity, nutritional status, and dietary habits of students of a medical university. Sport Sci Health 2016;12:261–267.
11. Piyushkumar C Parmar, Rahul B Damor, Anjali M Modi, Dhaval Patel, Naresh R Godara, JK Kosambiya. Exploring the dietary habit of medical students' and their perception about its effect on health. Indian Journal of Public Health Research & Development 2017;8(1):154-8.
12. Manijeh Alavil, Monir Baradaran Eftekhari, Rosemary Noot, Jafar Rafinejad, Ahdieh Chinekesh. Dietary Habits among Adolescent Girls and Their Association with parental Educational Levels.

Global Journal of Health Science 2013;5(5):202-6.

13. Al-Shehri HM, Al-Qahtani AM, Shaikh IA, Hassan MA, Al-Qahtani NS, Al-Qahtani AM, Alzaher AM, Alabas MA. Assessment of lifestyle and eating habits among undergraduate students in Najran University, Najran, Saudi Arabia. Int J Med Sci Public Health 2017;6(3):638-646.

Anaemia and Its Determinants among Adolescent Medical Students of a Health University in Tumkur, Karnataka, India

Chandana Krishna[1], Venkatesh P[2], Krishna Iyengar[3], Rajesh S[1]

[1]Assistant Professor, [2]Associate Professo, [3]Professor and Head, Department of Community Medicine, Sri Siddhartha Medical College, Agalkote, Tumkur

Abstract

Introduction: Adolescence is the period of most rapid growth second to childhood. The physical and physiological changes that occur in adolescents place a great demand on their nutritional requirements and make them more vulnerable to anemia. Anemia in adolescence causes reduced physical and mental capacity and diminished concentration in work and also possess to major threat to future safe mother hood in girls. Medical students, even though from a good socio-economic background, are vulnerable to anaemia because of poor diet and increased physiological demand.

Methodology: This cross-sectional study was undertaken among adolescent medical students of a health university in Tumkur, India.

Results: In this study, anaemia was seen in 11 (11.22%) of the study subjects. There was a statistically significant association between anaemia and sex, type of diet, consumption fruits, and presence of pallor.

Conclusion: In the present study, anaemia was seen in 11 (11.22%) of the study subjects. Socio economic factors have a significant role in occurrence of anaemia which later manifests itself as poor performance.

Keywords: *Anganwadi, nutritional assessment, undernutrition, socio demographic factors*

Introduction

Adolescence is a period of transition from childhood to adulthood. It is characterised by rapid physical, biological and hormonal changes resulting in psycho-social, behavioural and sexual maturity in an individual. Anaemia, a manifestation of under-nutrition and poor dietary intake of iron is a public health problem, not only among pregnant women, infants and young children but also among adolescents. Anaemia in India primarily occurs due to iron deficiency and is the most widespread nutritional deficiency disorders in the country today. The prevalence of anaemia in girls (Hb<12g%) and in boys (Hb< 13g%) is high as per the reports of NFHS-3 and the National Nutrition Monitoring Bureau Survey. According to NFHS 3 data, over 55 percent of both adolescent boys and girls are anaemic.[1]

Anaemia is a condition in which the number of red blood cells (RBCs), and consequently their oxygen-carrying capacity, is insufficient to meet the body's physiological needs. Anemia is characterised by reduction in number of red blood cells or haemoglobin concentration. AWHO expert group proposed that anemia or deficiency should be consider to exist when the haemoglobin is below 13g/dl and 12g/dl in males and females respectively.[2, 3]

Adolescence is the period of most rapid growth second to childhood. The physical and physiological changes that occur in adolescents place a great demand on their nutritional requirements and make them more vulnerable to anemia. Anemia in adolescence causes reduced physical and mental capacity and diminished concentration in work and also possess to major threat to future safe mother hood in girls. [4,5]

Medical students, even though from a good socio-economic background, are vulnerable to anaemia because of poor diet and increased physiological demand. There is a need to study the magnitude of anaemia in medical students.

Hence this study was undertaken to study health status and burden of anaemia among adolescent medical students.

Objectives of the Study

i. To find out the burden of anaemia among the study subjects

ii. To assess the various determinants of anaemia among the study subjects

Method

This cross-sectional study was conducted during January 2018 to December 2018 at a Health university in Tumkur, Karnataka, India. First & second year medical students of Sri Siddhartha Medical College aged ≤19yrs during the study period.

Inclusion criteria

1. First & second year medical students with aged ≤19yrs studying at Sri Siddhartha medical college, Tumkur, who consent for the study.

Exclusion criteria

1. Students who are chronically absent.
2. Any known case of haemoglobinopathy

Methodology

- After taking clearance from Institutional Ethical Committee, the study subjects fulfilling the inclusion criteria were recruited and the methodology explained.
- After taking written consent for the study, the proforma was administered to collect data on socio-demographic profile, medical history and clinical examination was done.
- All the study subjects were screened for anaemia by using CBC analyser.
- According to WHO criteria (Hb<13 gm/dl in males and Hb<12 gm/dl in females), the study subjects are classified as anaemic or normal.
- Data was entered in MS excel and data was analysed using EPI INFO version 7.2.2.6.
- Socio-demographic data was analysed using percentages and descriptive statistics. Association between various variables and anaemia was analysed using chi-square test. Quantitative data was compared between anaemic and non-anaemic subjects using student T test.

Results

a. Socio-demographic profile:

Age of the study subjects was 18.51±0.80years. Among the 98 study subjects, 56 (57.14%) were females and 42 (42.86%) were males. Weight, height and BMI of study subjects were 66.19±14.06Kg, 165.1±10.03cm and 24.23±4.38 respectively (Table 1).

b. Prevalence of anaemia:

The study subjects were classified based on WHO criteria i.e., Hb<12g/dl among females and Hb<13g/dl among males. Anaemia was seen in 11 (11.22%) of the study subjects. Mean haemoglobin was 14.22±2.03g/dl.

c. Symptoms and signs of anaemia among the study subject:

Hair fall (30.61%) was the commonest symptom among study subjects followed by lack of concentration (13.27%). Pallor was seen in 15.31% of study subjects (Table 2)

d. Association between various socio-demographic variables and anaemia

Anaemia was common in females compared to males, more in urban subjects compared to rural subjects, more among vegetarians compared to non-vegetarians. Anaemia was more among subjects who consumed less fruits and vegetables. There was a statistically significant association between anaemia and sex, type of diet, consumption fruits, and presence of pallor. There was a significant difference in haemoglobin and haematocrit between anaemic and non-anaemic subjects (Table 3).

Table 1: Socio-demographic profile of the study subjects

Characteristics		**N=98**
Sex	Female	56 (57.14)
	Male	42 (42.86)
Domicile	Rural	18 (18.37)
	Urban	80 (81.63)
Diet	Mixed	84 (85.71)
	Vegetarian	14 (14.29)
BMI	Normal	32 (32.65)
	Underweight	8 (8.16)
	Overweight	27 (27.55)
	Obese I	17 (17.35)
	Obese II	14 (14.29)

Table 2: Distribution of study subjects based on symptoms and signs of anaemia

Characteristics	**Number (N=98)***
Decreased appetite	4 (4.08)
Palpitation	2 (2.04)
Easy fatigability	1 (1.02)
Hair fall	30 (30.61)
Excessive menstrual flow	4 (4.08)
Lack of concentration	13 (13.27)
Pallor	15 (15.31)
Bald tongue	7 (7.14)

Figures in the parentheses *Multiple responses

Table 3: Association between anaemia and various socio-demographic factors

Characteristics		**Anaemic**	**Not anaemic**	**χ2**	**p-value**
Sex	Male	1 (2.38)	41 (97.62)	5.701	<0.01
	Female	10 (17.86)	46 (82.14)		
Domicile	Rural	-	18 (100.0)	2.75	0.09
	Urban	11 (13.75)	69 (86.25)		
Diet	Mixed	6 (7.14)	78 (92.86)	9.73	<0.01
	Vegetarian	5 (35.71)	9 (64.29)		
Consumption of vegetables	<3times a week	4 (11.11)	32 (88.89)	0.007	0.97
	>3times a week	7 (11.29)	55 (88.71)		
Consumption of fruits	<3times a week	8 (18.18)	36 (81.82)	3.83	<0.05
	>3times a week	3 (5.56)	51 (94.44)		
Consumption of junk food	<3times a week	6 (12.50)	42 (87.50)	0.15	0.69
	>3times a week	5 (10.00)	45 (90.00)		
Pallor	Present	4 (26.67)	11 (73.33)	4.19	<0.05
	Absent	7 (8.43)	76 (91.57)		
Age		18.54±0.68	18.50±0.82	0.88	
Weight		69.72±12.57	65.74±14.24	0.37	
Height		167.36±11.53	164.81±9.86	0.43	
BMI		24.96±4.27	24.14±4.41	0.56	
Haemoglobin		11.22±0.81	14.60±1.82	<0.001	
Haematocrit		30.63±2.49	39.44±5.19	<0.001	
WBC count		8863.6±2868.5	9173.6±2217.3	0.67	
Neutrophil%		53.33±5.41	57.69±7.70	0.07	
Lymphocyte%		38.71±4.18	34.84±7.41	0.09	
Monocyte%		7.95±3.01	7.52±1.67	0.47	
Platelet		307.54±124.9	283.98±63.93	0.31	

Discussion

In the present study, age of the study subjects was 18.51±0.80years. In similar study by Subramaniyan K[6] et al., age was 19.41±2.78yrs.

In the present study, 56 (57.14%) were females and 42 (42.86%) were males. In study by Subramaniyan K[6] et al., 79.1% were females.

In the present study, anaemia was seen in 11 (11.22%) of the study subjects. All the subjects had mild anaemia. Similar studies done in different parts of India by Abilash Sasidharannair Chandrakumari[7] et al., P.M. Siva[8] et al., Subramaniyan K[6] et al., Bhuvaneshwari Kannan[9] et al., Anil Kumar[10] et al., anaemia was seen in 48.63%, 21%, 43%, 8%, 43% and 39.1% respectively.

In the present study, there was a statistically significant association between anaemia and sex, type of diet, consumption fruits, and presence of pallor, haemoglobin and haematocrit. In another study by Bhuvaneshwari Kannan[9] et al., there was an association between anaemia and symptoms of anemia and BMI. In another study by Saratha A[11] et al., there was an association between anaemia and consumption of green leafy vegetables, history of passing worms. In a study by Subramaniyan K[6] et al., there was an association between anaemia and sex of subjects, bleeding disorder, haemoglobin, WBC, RBC, platelet, haematocrit. In a study by P.M. Siva[8] et al., there was an association between anaemia and haematocrit, jiggery intake, hand washing after toileting & after food intake. In a study by Sanjeev M Chaudhary[12] et al., there was an association between anaemia and socio-economic status, mother's and father's education, mean weight and height. In a study by Premalatha T[13] et al., there was an association between anaemia and type of family, palptation, intake of non-vegetarian food & fruits, weight, mother's literacy.

Conclusion

In the present study, anaemia was seen in 11 (11.22%) of the study subjects. There was a statistically significant association between anaemia and sex, type of diet, consumption fruits, and presence of pallor. Socio economic factors have a significant role in occurrence of anaemia which later manifests itself as poor performance. Inculcating healthy food habits will prevent occurrence of anaemia.

Ethical Clearance- Taken from Institutional ethical committee of Sri Siddhartha Medical College, Tumkur, Karnataka

Source of Funding- Project was funded by Sri Siddhartha Academy of Higher Education, Tumkur, Karnataka.

Conflict of Interest - Nil

References

1. Framework for Weekly Iron and Folic Acid Supplementation Programme for Adolescents. [Online] Ministry of Health and Family welfare. Government of India. Available from: tripuranrhm.gov.in/Guidlines/WIFS.pdf Last accessed on 2017 May 15.
2. Premalatha T, Valarmathi S, Srijayanth P, Sundar JS, Kalpana S (2012) Prevalence of Anemia and its Associated Factors among Adolescent School Girls in Chennai, Tamil Nadu, INDIA. epidemiol 2:118. doi:10.4172/2161-1165.1000118.
3. Shanti Devi, Vidya Deswal, Ramesh Verma. Determination of factors for anaemia among school going adolescent girls in Haryana. International Journal of Basic and Applied Medical Sciences 2015 Vol. 5 (1) January-April, pp. 99-102.
4. Melkam Tesfaye, Tilahun Yemane, Wondimagegn Adisu, Yaregal Asres, and Lealem Gedefaw. Anemia and iron deficiency among school adolescents: burden, severity, and determinant factors in southwest Ethiopia. Adolesc Health Med Ther. 2015; 6:189–196.
5. Biradar SS, Biradar SP, Alatagi AC, Wantamutte AS, Malur PR; Prevalence of anemia among adolescent girls: a one year cross -sectional study. Journal of Clinical and Diagnostic Research, 2012;6(3):372-377.
6. Subramaniyan K, George M, Seshadri D, Jena A, Chandraprabha N. Prevalence of anemia among health science students of a university in South India. Int J Res Med Sci 2016;4:4598-601.
7. Chandrakumari AS, Sinha P, Singaravelu S, Jaikumar S. Prevalence of anemia among adolescent girls in a rural area of Tamil Nadu, India. J Family Med Prim Care 2019;8:1414-7.
8. P.M. Siva, A. Sobha, V.D. Manjula. Prevalence of Anaemia and Its Associated Risk Factors Among Adolescent Girls of Central Kerala. Journal of Clinical and Diagnostic Research. 2016 Nov, Vol-10(11): LC19-LC23.

9. Kannan B, Ivan EA. Prevalence of anemia among female medical students and its correlation with menstrual abnormalities and nutritional habits. Int J Reprod Contracept Obstet Gynecol 2017;6:2241-5.
10. Kumar A, Goyal A, Verma N, Mahesh A. Study of anemia among adolescent school girls and young adults. Int J Adv Med 2018;5:877-81.
11. Saratha A, Singh Z, Datta SS, Boratne AV, Senthilvel V, Joice S. Prevalence of Anaemia among Young Adult Female Students in a Medical teaching institution in Pondicherry. Prevalence of Anaemia among Young Adult Female Students in a Medical Teaching Institution in Pondicherry. Indian journal of maternal and child health 2010;12(4):1-8.
12. Sanjeev M Chaudhary, Vasant R Dhage. A Study of Anemia Among Adolescent Females in the Urban Area of Nagpur. Indian Journal of Community Medicine 2008;33(4):243-5.
13. Premalatha T, Valarmathi S, Srijayanth P, Sundar JS, Kalpana S. Prevalence of Anemia and its Associated Factors among Adolescent School Girls in Chennai, Tamil Nadu, INDIA. Epidemiol 2012; 2:118. doi:10.4172/2161-1165.1000118.

A Study to Find Out Relationship Between Q-Angle, Tibial Torsion and Leg-Heel Alignment amongst Osteoarthritis Knee Patients – A Cross Sectional Observational Study

Chandani Raiyani[1], Guddi Vaghasiya[1], Ashish Kakkad[2]

[1]Internee SPB Physiotherapy College, Surat, [2]Associate Professor, SPB Physiotherapy College, Surat

Abstract

Background: Osteoarthritis (OA) is the most frequent cause of disability in the India, with the medial compartment of the knee being most commonly affected. Osteoarthritis of knee joint is common musculoskeletal problem now days in Indian population. It is most disabling in day to day activities of life.

Purpose: Due to Osteoarthritis of knee joint, multiple changes occur in structure in and around knee joint. Due to these structural changes, biomechanics of knee joint is altered, which in turn leads to secondary changes in muscles, ligaments and other soft tissues also. So, energy cost of walking increases.

Objective: Objective of this study is to correlate Q angle, tibial torsion and leg heel alignment in OA knee patients.

Setting: Different physiotherapy centres of Surat city

Method: Co relational study was done in Surat city. Selection of OA knee patients was done as per selection criteria. Subjects were explained about the study. Informed consent forms were signed by the patient and/or relatives. Subjects selected by purposive sampling were assessed.

Participants: Total 63 male and female OA knee patients

Outcome measure: Q angle, Tibial torsion & Leg heel alignment

Results: Data were entered in Microsoft Excel for Microsoft Windows. Descriptive analysis and corelational test was applied by SPSS version 20 for Microsoft Windows. Moderate positive correlation was found between Q angle & Tibial torsion, between Tibial Torsion & Leg heel alignment, between Leg heel alignment & Q angle.

Conclusion: These findings may suggest that Q angle, Tibial torsion & Leg heel alignment are moderate positively correlated in OA knee joint. So any change in any of above three values may alter values of other remaining values.

Keywords: *Osteoarthrits, OA patients, Q angle, Tibial torsion & Leg heel alignment*

Introduction

Osteoarthritis (OA) is the most frequent cause of disability in the India, with the medial compartment of the knee being most commonly affected. OA is a condition with a multifaceted etiology that affects both load-bearing and non–weight-bearing joints. The risk of developing OA substantially increases with each decade after the age of 40 years. Among reported upper and lower extremity sites, the most common region for OA to manifest is the medial compartment of the knee.[1]

Osteoarthritis (OA) is defined as an idiopathic slowly progressive degenerative joint disease affecting the arthrodial joints mainly in elderly people.[2] It is a chronic localized joint disease and a leading cause of musculoskeletal pain and disability. Osteoarthritic process involves the whole joint including cartilage,

bone, ligament, muscle with changes such as joint space narrowing, bony osteophytes and sclerosis.[3]

Overall prevalence of knee OA was found to be 28.7% in India with age more than 40 years.[4] Andhra Pradesh reported as highly prevalent (68%) and Rajasthan as minimal prevalent (8.42%) state in India for Knee OA. Generally, in all studies from different regions females were reported to be more affected by OA knee than males.[5]

Osteoarthritis occurs when the cartilage that cushions the ends of bones in your joints gradually deteriorates. Cartilage is a firm, slippery tissue that permits nearly frictionless joint motion. In osteoarthritis, the slick surface of the cartilage becomes rough. Eventually, if the cartilage wears down completely, it may be left with bone rubbing on bone. The most common causes of knee OA is age (40 years and older) and gender (more in female). Osteoarthritis predominantly involves the weight-bearing joints, including the knees, hips, cervical and lumbosacral spine, and feet. Other commonly affected joints include the distal interphalangeal, proximal interphalangeal, and carpometacarpal joints.[6,7,8]

As OA progresses, however, the level of proteoglycans eventually drops very low, causing the cartilage to soften and lose elasticity and thereby further compromising joint surface integrity. Over time, the loss of cartilage results in loss of joint space. In major weight-bearing joints of persons with osteoarthritis, a greater loss of joint space occurs at those areas experiencing the highest loads.[8]

Individuals with knee OA experience pain, stiffness, and decreased range of motion of the joints. These symptoms significantly limit an individual's ability to rise from a chair, stand comfortably, walk, or climb stairs. Ultimately, these limitations lead to a loss of functional independence.[9] Risk factors are multifactorial and include older age, female gender, obesity (particularly in knee OA), previous joint injury, genetics and muscle weakness, repetitive use of joints, bone density, joint laxity. All play roles in the development of joint OA determination of risk factors particularly in the weight-bearing joints and their modification may reduce the risk of OA and prevent subsequent pain and disability.[3,10]

On examination, there is swelling due to synovial thickening and/or effusion, muscle wasting and prominence of the articular margins due to osteophytes. Movement are painful and restricted. Crepitus is felt on joint movement in late stage of the disease, loose bodies develop in the joint, which may cause recurrent joint effusion, pain, swelling and locking of the joint.[11]

At the knee, alignment (i.e., the hip knee-ankle angle) is a key determinant of load distribution. The load-bearing axis is represented by a line drawn from mid femoral head to mid ankle. In a Varus knee, this line passes medial to the knee and a moment arm is created, which increases force across the medial compartment. In a valgus knee, the load-bearing axis passes lateral to the knee, and the resulting moment arm increases force across the lateral compartment. These mechanical effects of alignment on load distribution make it biologically plausible that both varus and valgus alignment contribute to OA progression. The position and function of the foot and ankle affect the stresses transmitted to the knee. Foot problems are frequent because the interface between body and ground is subjected to high stresses and load. In weight bearing foot, subtalar motion and tibial rotations are interdependent.[12,13]

Q angle or patellofemoral angle is the angle between the quadriceps muscles and the patellar tendon, it is an important indicator of biomechanical function in the lower extremity.[12]

Tibial torsion is the measurement of angle of lateral rotation of the tibia.[12] It is an important morphological feature of human tibia and is defined as any twisting of the tibia on its longitudinal axis which produces a change in alignment of the planes of motion of the proximal and distal articulations.[14]

Leg-heel alignment is measuring angle between calcaneus and tibia.[12] It plays an important role in knee OA from a biomechanical perspective owing to rotational coupling between the rear foot and tibia.[15]

Osteoarthritis of knee joint is common musculoskeletal problem now days in Indian population. It is most disabling in day to day activities of life. Due to this, multiple changes occur in structure in and around knee joint. Due to these structural changes, biomechanics of knee joint is altered, which in turn leads to secondary changes in muscles, ligaments and other soft tissues also; So, energy cost of walking is more. Very few studies are done to correlate different measurements like Q angle, tibial torsion and leg heel alignment. So, the purpose of this study is to correlate Q angle, tibial torsion and leg heel in OA knee patients.

Materials and Methodology

- **Study design:** Co relational study
- **Source of data:** Different physiotherapy clinics in Surat city
- **Sampling technique:** Purposive
- **Study population:** OA knee patients

Age - ≥40 years

- **Sample size:** 63 OA knee patients

(40 unilateral involvement, 23 bilateral involvements)

- **Search duration :** 6 months

Patients were selected based on following inclusion and exclusion criteria:

- **Inclusion criteria[16]:**

1) Knee osteoarthritis diagnosed by orthopedic surgeon.

2) Subjective complain of knee pain with knee flexion and extension.

3) Morning stiffness ≤ 60 min.

4) Both sexes (male and female).

5) Unilateral or Bilateral knee involvement.

6) Age ≥ 40 years.

- **Exclusion criteria[16]:**

1) Previous knee arthroplasty, history of congenital/adolescent knee disease.

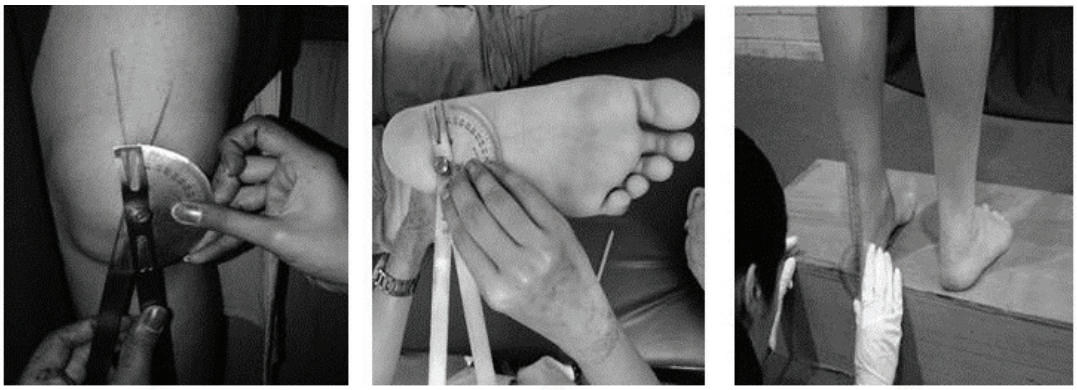
2) Clinical signs of hip and ankle joint disease.

3) Pregnancy

4) Knee fracture

5) Rheumatic disease.

- **Method:**



A B C

Q angle was measured with patient in standing position by placing lower limb at right angle to the line joining to ASIS (Anterior Superior Iliac Spine). A line was drawn from ASIS to base of patella. Second line was drawn from tibial tuberosity to base of patella. The angle formed by crossing these two lines was measured. (Figure A)

For measuring tibial torsion, patient was in prone position with affected knee in 90 degree flexed. A line was drawn between lateral and medial malleoli on the sole of foot. Second line was drawn between lateral and medial femoral condyle on the sole of foot. The angle formed by crossing these two lines was measured. (Figure B)

For measuring leg-heel alignment, patient was in standing position. A mark was placed over the midline of the calcaneus at the insertion of the Achilles tendon. Second mark was placed approximately 1 cm distal to the first mark and as close to the midline of calcaneus as possible. A calcaneal line was drawn to join the two marks. Then tibial line was drawn to make two marks on the lower third of leg in the midline. The angle formed

by crossing these two lines was measured. (Figure C)

Data Analysis & Result

The present study was done to study to find out relation among Q angle, Tibial torsion and Leg heel alignment in OA knee patients. The study comprised of total 63 subjects (19 males & 44 females). Data were entered in Microsoft Excel for Microsoft Windows. Mean ± Standard Deviation values for Q angle, tibial torsion and leg heel alignment found were $27.78^{o} \pm 4.64^{o}$, $13.5^{o} \pm 4.06^{o}$ and $12.86^{o} \pm 3.55^{o}$ respectively. 40 patients had unilateral osteoarthritis and 23 patients had bilateral osteoarthritis of knee.

Pearson co-relation test was applied by SPSS version 20 for Microsoft Windows among above measurements and results were found as below:

Table 1: Correlation Test between Q angle and Tibial torsion

Pearson Correlation	**.150**
Sig. (2-tailed)	.191
N	78

Table 2: Correlation Test between Tibial torsion and Leg heel alignment

Pearson Correlation	.048
Sig. (2-tailed)	.675
N	78

Table 3: Correlation Test between Q angle and Leg heel alignment

Pearson Correlation	.211
Sig. (2-tailed)	.064
N	78

Discussion

Purpose of the present study was to find out the relation among Q angle, Tibial torsion and Leg heel alignment in OA knee patients. In study, moderate positive correlation was found between Q angle and Tibial torsion; Tibial torsion and Leg heel alignment; Q angle and Leg heel alignment of the patients with knee joint OA, which suggest that as Q angle value increase, Tibial torsion value increase as well as Leg heel alignment value also increase and vice versa.

A study by Anand Heggannavar, et.al. (2016) previously done indicate that the Q angle increases with increased tibial external rotation. There is increased load of weight bearing joint, and also changes in compensatory gait patterns like slow walking and increased toe-out angle.[12] A study Anh D N, Michelle B C, et.al. (2009) previously done indicate that increased tibiofemoral angle, which represents the valgus angle formed by the anatomical axes of the femur and tibia, would move the patella medially relative to the anterior superior iliac spine and the tibial tuberosity laterally thus increasing the Q angle. When femoral anteversion is excessive, it may lead to more medial rotation of femur leading to displacement of patella medially. Femoral anteversion may be related to in toeing gait which is compensated with external rotation of tibia on femur causing tibial tuberosity to displace more laterally.[17]

A study by Anand Heggannavar, et.al. (2016) previously done indicate that the torsion is transmitted to hind foot and ankle joint. Increased anterior pelvic tilt and navicular drop result in rotational changes in the femur and tibia displacing the patella medially and the tibial tuberosity laterally. Increased medial joint loading, is evidenced by a greater knee-joint adduction moment, has also been frequently noted in individuals with OA.[12]

A study by Nüesch C, Barg A, et.al. (2013) previously done indicate that the asymmetric alignment of the ankle joint leads to changes in the intra-articular pressure distribution and the contact area. A varus alignment of the hind foot leads a shift of the pressure in anteromedial direction and a reduction of the contact area. For a valgus alignment a pressure shift in posterolateral direction and a reduced contact area. However, in the specimens with an intact fibula and ankle joint, opposite changes were seen: varus lead to posterolateral pressure shifts and increased contact areas, while valgus lead to anteromedial pressure shifts and decreased contact areas.[18]

Holister et. Al. (2011) suggested that in the externally rotated knee the coupled rotation of the femur and tibia in the screw home mechanism may be reversed. With the knee externally rotated, the bony attachments for the

extensor musculature are shifted.[19] G.C. Michael et. Al. (2016) found that with greater externally rotated legs, there was significant increase in calcaneal eversion.[12] Development of degenerative changes after ACL injury was associated with varus deformity knees in the cohort evaluation by McDaniel Jr. And Dameron Jr. (2015)[20] Hiroshi Ohi et. Al. (2017) suggested that the existence of a connection between altered frontal knee alignment and foot posture, which would be helpful to understand the pathogenesis of altered foot posture observed in patients with knee OA.[15]

It is observed in present study that measurement of Q angle, Tibial torsion and Leg heel alignment may be affected by difficulty to palpate bony prominence because of fat.

Limitations:

- Sample size was small
- Only knee joint arthritic patients were included in this study
- Limited age of patients were included in this study
- Females included were more than males in this study

Future recommendations:

- Study can be done with large sample size.
- Biomechanical markers other than Q angle, Tibial torsion and Leg heel alignment can be added.
- Study can be done including other arthritic joints like, hip and ankle.

Conclusion

From this study, it is concluded that Q angle, Tibial torsion & Leg heel alignment are moderate positively correlated in OA knee joint. So any change in any of above three values may alter values of other remaining values.

Ethical Clearance: Permission was taken from college and physiotherapy centres from where data collection was done. Ethical issues were cleared.

Conflict of Interest: None

Funding: None

References

1. Vincent KR, Conrad BP, Fregly BJ, Vincent HK. The pathophysiology of osteoarthritis: a mechanical perspective on the knee joint. PM&R. 2012 May 1;4(5):S3-9.
2. Sureshwar Pandey, Anilkumar pandey; Fundamental orthopedics and trauma; Jaypee; page-176.
3. Bennell KL, Hinman RS. A review of the clinical evidence for exercise in osteoarthritis of the hip and knee. Journal of Science and Medicine in Sport. 2011 Jan 1;14(1):4-9.
4. Pal CP, Singh P, Chaturvedi S, Pruthi KK, Vij A. Epidemiology of knee osteoarthritis in India and related factors. Indian journal of orthopedics. 2016 Sep;50(5), page-518.
5. Chandra Shekhar Azad, Alok Shingh, Poorti Pandey, et.al; osteoarthritis in India: an epidemiologic aspect; International Journal of Recent Scientific Research; vol. 8, Issue, 10, page-20918, October2017.
6. J. Maheshwari, Vikram A Mhaskar; Essential Orthopedics; Jaypee; 5th edition; page 295.
7. https://www.mayoclinic.org/diseases-conditions/osteoarthritis/doctors-departments/ddc-20351933
8. Carlos J Lozada, **Schartess S Culpepper Pace; Osteoarthritis; Rheumatology; Nov12-2018; Available at** https://emedicine.medscape.com/article/330487overview#showall
9. Kenton R. Kaufmana, Christine Hughesa, Bernard F. Morreya, et.al.; Gait characteristics of patients with knee osteoarthritis; Journal of Biomechanics 34 (2001); page- 907.
10. Behzad Heidari; Knee osteoarthritis prevalence, risk factors, pathogenesis and features: Part I; Caspian journal of internal medicine; 2011;2(2), page 207-8.
11. Jayant Joshi, Prakash P. Kotwal; Essentials of Orthopedics& Applied Physiotherapy;Elsevier Health Sciences; 3rd edition; Nov 02, 2016; page-335.
12. Anand Heggannavar, Laxmi Battula, Santosh Metgud**;** a correlation between leg-heel alignment, tibialtorsion and q angle amongst normal, overweight andobese individuals;Int J Physiother Res 2016, Vol 4(3); page-1531.
13. Sharma L, Song J, Felson DT, et.al. The role of knee

alignment in disease progression and functional decline in knee osteoarthritis. Jama. 2001 Jul 11;286(2):188-95.

14. Gandhi S, Singla RK, Kullar JS, Agnihotri G, Mehta V, Suri RK, Rath G. Human tibial torsion--morphometric assessment and clinical relevance. Biomed J. 2014 Jan 1;37(1):10-3.
15. Ohi H, Iijima H, Aoyama T, Kaneda E, Ohi K, Abe K. Association of frontal plane knee alignment with foot posture in patients with medial knee osteoarthritis. BMC musculoskeletal disorders. 2017 Dec;18(1):246.
16. French HP, Cusack T, Brennan A, White B, Gilsenan C, Fitzpatrick M, O'Connell P, Kane D, FitzGerald O, McCarthy GM. Exercise and manual physiotherapy arthritis research trial (EMPART): a multicenter randomized controlled trial. BMC musculoskeletal disorders. 2009 Dec;10(1), page-9.
17. Anh D N, Michelle B C, Beverly L, Sandra J S. Relationship between lower extremity alignment and quadriceps angle. Clin J Sport Med. 2009 May;19(3):201–206.
18. Nüesch C, Barg A, Pagenstert GI, Valderrabano V. Biomechanics of asymmetric ankle osteoarthritis and its joint-preserving surgery. Foot and ankle clinics. 2013 Sep 1;18(3):427-36.
19. Krackow KA, Mandeville DS, Rachala SR, Bayers-Thering M, Osternig LR. Torsion deformity and joint loading for medial knee osteoarthritis. Gait & posture. 2011 Apr 1;33(4):625-9.
20. Simon D, Mascarenhas R, Saltzman BM, Rollins M, Bach BR, MacDonald P. The relationship between anterior cruciate ligament injury and osteoarthritis of the knee. Advances in orthopedics. 2015

Improved Audit-based malevolent Node Detection and Energy Efficiency for Healthcare Applications

Deepa[1], M. Manju[1], Sathyaraj[1]

[1]Assistant Professor, RMK College of Engineering and Technology, Chennai, India

Abstract

Recently Wireless Body Area Sensor Networks (WBANs) are going more democratic and have revealed great possible in real time supervising of the human body. WBANs have involved a wide range of supervising applications for example sports activity, healthcare, and psychotherapy systems. However, WBANs contains more challenging issues should be resolved such as Quality of Service (QoS), energy efficiency and security and privacy issues are the most significant concerns. Because these systems manage life-critical data, they must be secure. To overcome the above issues, Improved Audit-based Malevolent Node Detection for Healthcare Applications is proposed. Audit-based malevolent Detection (AMD) is proposed for discovering and separating malevolent nodes in WBANs. The AMD system incorporates reputation management, trustworthy route discovery, and recognition of malevolent nodes based on behavioral audits. It integrates three critical functions: reputation management, route discovery, and identification of malevolent nodes via behavioral audits. An AMD can build paths consisting of highly entrusted nodes, subject to a desired path length constraint. In addition, the node fitness function is utilized for improving the energy efficiency in WBAN. The simulation result shows that AMD_EE successfully avoids malevolent nodes, even when a large portion of the network drops to forward packets and enhance the lifetime.

Keywords: *Malevolent node detection, trustable routing, Reputation System, Energy Efficiency, Wireless Body Area Network.*

Introduction

As wireless devices and sensors are growingly distributed on people, researchers have begun to focus on WBANs. The WBAN application areas are widely increasing day by day. Applications of WBAN contain sport activity, hobby, healthcare, and personal help, in which sensors gather data from people, physiological and their surrounds. WBAN system architecture has been shown in Figure 1. It contains sensors, actuators and control units. Wireless channels are used to communicate from sensor to user via internet.

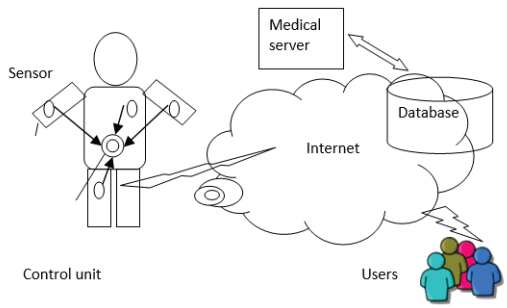


Fig. 1: WBAN System Architecture

The common benefits of WBAN health supervising systems for example unobtrusive, cost effective, and unobtrusive, they provide patients with continuous supervising of physiological signals that is useful particularly for the old peoples. WBAN enables patients to be supervised incessantly, and assisted rapidly by portable health teams while physiological signals illustrate that is required. Uninterrupted supervising of patients speeds up the patient retrieval progression, and minimizes death rate particularly in diabetic patients and cardiovascular.

Deficiency of security in WBANs may hamper the wide public acceptance of this technology, and more significantly can cause life-critical results and even death of patients. However, allowing for severe and scalable security system to prevent malevolent communications with WBANs is complex. Open wireless medium, makes the patient's information prostrate to being modified, eavesdropped, loss and injected. In addition, channel characteristics in WBANs such as very low Signal-to-Noise-Ratio situation and restriction of sensors in terms

of energy shortage, limited memory capacity, lacking computational and communication capability to create the opportunity of security attacks in WBANs. Hence, in WBANs, improving system performance and malevolent node detection is an important factor. Thus in this paper, Improved Audit-based malevolent Node Detection and Energy Efficiency is proposed.

The rest of this work is structured as follows. Section 2 presents a related work. In section 3 explains Improved Audit-based malevolent Node Detection and Energy Efficiency for Healthcare Applications. Section 4 discusses the simulation results and analysis. The final section is a conclusion.

Related Work

The WBAN is broadly predictable that a high stage privacy and system security meet a fundamental task in defending information while being utilized by the healthcare and during storage to make sure that patient's account are maintained secure from intruder's [1].The conventional security scheme that required inexhaustible resources, thus they cannot useful to the enormously resource restrained sensors. In addition, the WBAN security necessities like authentication, confidentiality, availability, data freshness, integrity, and non-repudiations. These are important security issues in healthcare applications in WBAN [2].Securing while Sampling in WBAN [3], rejects the requirement for a part encryption algorithm and the pre key distributed function thus it reduces the usage of sensor memory and other resources. This scheme provides a physical layer security. Also it isolates the eavesdropper present in the network.

Clique-Based WBAN Scheduling algorithm [4] is used to avoid interference. This scheduling method to schedule the sensors for working in a time slots manner. In this scheme, each node works by sleep or awake schedule during its own time slots thus extend the lifespan. Anonymous Authentication scheme [5] is used for reducing the computation burden of the client. This scheme provides the security against impersonation attack in WBAN.A Hybrid Key Management System (HKMS) [6] that introduced lightweight and scalable key management scheme for making resource-efficient WBAN. In this scheme, the one-way hash function builds a Merkle Tree for authentication purpose. This scheme addresses the compromised node also it reduces the network overhead. However, this scheme cannot handle the energy efficiency and QoS improvement in WBAN.

A secure cloud-based mobile healthcare system [7] is used to secure the among sensor communication by multi-biometric key design in WBANs. The e-medical reports are securely stored in the hospital society cloud and isolation of the patients' information is maintained. This scheme offers security resolution for omnipresent mobile healthcare applications.ECC with signature Hash Function scheme [8] is introduced for improving sensor authentication in WBAN. In this scheme, the hash-chain based key signature technique to secure information passing from sensor to user in WBAN. Also, Elliptical Curve Cryptography (ECC) algorithm is used to verifies the authenticate sensor. It extensively formulated to reduce the eavesdropping attack and get the patient information from the legitimate sensor. Secure Sensor Association and Key Management [9] is used to associate the sensor groups and offer a data integrity and confidentiality in WBAN. This scheme provides the data integrity by ECC algorithm. The authentication procedure and group key generation are very simple and efficient.

Revocable and Scalable Certificate less Remote Authentication Protocol [10] featured with client anonymity, key escrow resistance, non-repudiation, and revocability for WBANs. In this scheme, the certificate less encryption and a signature with proficient annulment against short-term key exposure, that considers independent interest. Also, a certificate less anonymous remote authentication with annulment is constructed by integrating the encryption scheme and signature scheme. This scheme is particularly suitable for the large-scale WBANs. However, this scheme creates complexity. Secure and efficient data communication protocol [11] is used to protect the information transmissions among sensors and the users by applying Ciphertext-Policy Attribute Based Encryption method. In this scheme, the sensor signature and patient information's are stored by the ciphertext format at user, thus assuring data security. However, this scheme increases the computational cost.

Improved Audit-based malevolent Node Detection and Energy Efficiency for Healthcare Applications

This AMD-EE provides a complete malevolent node isolation system for rejecting malevolent in WBAN. In this scheme, the AMD contains three phases such as a reputation module, a route discovery module,

and an audit module. Then isolate the malevolent nodes finally, the source transmit the data through the energy efficiency path without malevolent node in WBAN.

Reputation Phase:

In reputation module, the malevolent node is detected by direct trust and indirect trust. Here, every node direct trust is measured by reputation value. The node reputation value is calculated by the equation (1) given below.

$$RV_i^{\mathrm{j}}(\mathrm{t}) = \begin{cases} \beta * RV_i^{\mathrm{j}}(\mathrm{t}-1) \\ \min\{RV_i^{\mathrm{j}}(\mathrm{t}-1) + \beta, 1.0\} \end{cases} \quad (1)$$

Here, the trust factor β is present between $0 < \beta < 1$, t represent the time, i represents the source node and j represent the behavior checking node. If the node has a reputation value is above threshold value that node is a good behavior node. A node with a reputation value is below threshold factor in many time that node is chances for acting malevolent node.

The indirect trust information is used while the direct trust information becomes stale, otherwise is not accessible owing to the deficiency of prior communication among two nodes. The indirect trust is computed based on reputation value is given below.

$$RV_i^{\mathrm{j}}(\mathrm{t}) = \frac{\sum_{k \in \tau_i} RV_k{}^{j}(\mathrm{t})}{|\tau_i(\mathrm{t})|} \quad (2)$$

The direct trust information is failed when the source i collect the opinion of node j from k neighbor nodes. Assume τ_i represents the neighbor nodes report the information about node j to source node i.

Route Detection Phase:

In route detection phase, the source finds out reliable routes from a source to a destination. The trustworthiness of a path based on the reputation value from source to destination is given below.

$$RV_{S \to D} = \sqrt[m+1]{\prod_{i=1}^{m} (\mathrm{RV_s}^{\mathrm{i}} * \mathrm{RV_D}^{\mathrm{i}} * \prod_{j=1, j \neq i}^{m} RV_i^j)} \quad (3)$$

Here, calculate the path reputation value by multiplying individual intermediate node reputation value. Suppose malevolent node present, the path reputation value is cannot increase superior than its own reputation. Then the isolates the accused node and verified it is a malevolent node or not in audit phase.

Audit Phase:

In this phase, the accused node is confirmed by malevolent or authenticated by using the Renyi-Ulam Games. This game engages two players such as a questioner and a responder. Here, the questioner is a source or destination and the responder is a routing nodes. The questions stated by the questioner represent to the audits executed by the source to nodes in the path from source to destination. While replying to an audit, nodes state the set of packets sends to the next hop.

The source aggregates more audits to make cut or membership questions. The responder dishonesty when a malevolent node lies with regard to the packets forward to the next hop. Such as, node dishonesty by either taking to forward all packets established when in actuality it falls them, or not forward the data packets. Then, the source confirms that node is a malevolent node and then send notification message to the network.

Finally, the source transmits the data through the energy efficiency path. The energy efficiency path is selected based on the highest residual energy, minimum distance and minimum hop count. Thus, avoids the frequently utilization of energy in the network.

Simulation Analysis

The simulation analysis is done using the Network Simulator (NS-2). The existing scheme HKMS and the proposed AMD-EE scheme are analysed and compared with the simulation results. The network traffic in the simulation prototype is handled using traffic model Constant Bit Rate (CBR).The parameters used for the simulation of the proposed scheme are tabulated below. The performance of the proposed scheme is evaluated by the metrics packet delivery rate, delay, packet loss rate and throughput.

Packet Delivery Rate (PDR)

PDR is defined as the rate of packets delivered to the destination node. PDR is calculated by the Equation 4.

$$PDR = \sum_{0}^{n} \frac{PacketsDelv}{Time} \quad (4)$$

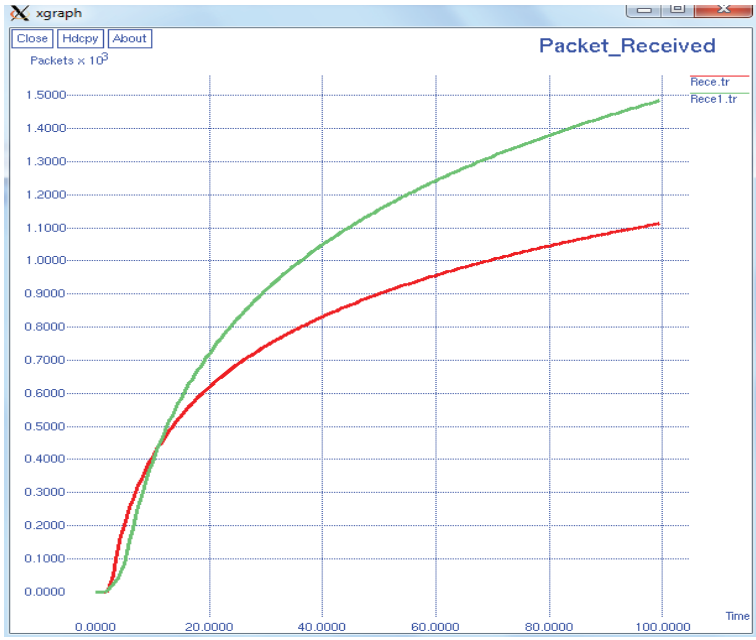


Fig.2 Packet Delivery Rate

Where n = number of nodes, green color line represents the AMD-EE mechanism and red color line represents the HKMS mechanism. The packet delivery rate of the proposed mechanism AMD-EE is higher than the packet delivery HKMS mechanism that is demonstrated in Figure 2. The more prominent estimation of packet delivery rate implies the better execution of the protocol.

Packet Loss Rate (PLR)

PLR is defined as the number of packets lost per unit time. PLR is measured by the Equation 5.

$$PLR = \sum_{0}^{n} \frac{PacketsLost}{Time} \qquad (5)$$

The packet loss rate of the proposed mechanism AMD-EE is lower than the HKMS mechanism that is explained in Figure 3. Lower the packet loss proportion demonstrates that higher execution of the network.

Fig. 3 Packet Loss Rate

Average Delay

Average Delay is defined as the time difference between the received and sent packets to the total number of nodes. It is measured by the Equation 6.

$$\text{Average Delay} = \frac{\sum_0^n \text{Pkt Recvd Time} - \text{Pkt Sent Time}}{n} \quad (6)$$

The delay value is low for the proposed scheme AMD-EE than the existing method HKMS is revealed in Figure 4. The base estimation of delay implies that higher estimation of the throughput of the system.

Fig. 4: Average Delay

Throughput

Throughput is defined as the average packets delivered to the destination successfully. The average throughput is estimated using Equation 7.

$$Throughput = \frac{\sum_0^n Pkts\ Received\ (n) * Pkt\ Size * 8}{1000} \quad (7)$$

The proposed scheme AMD-EE has higher average throughput when compared to the existing scheme HKMS is shown in Figure 5. It can be observed from the graph explains that the number of packets received successfully for every 1000 packets for AMD-EE is greater compared to that of the HKMS mechanism.

Fig.5: Throughput

Conclusion

In this scheme, we have proposed Improved Audit-based malevolent Node Detection and Energy Efficiency for Healthcare Applications. Audit-based Misbehavior Detection technique for identifying and isolating malevolent nodes that drops to forward packets in WBANs. The AMD_EE system integrates reputation management, trustworthy and Energy Efficiency route discovery, and identification of misbehaving nodes based on behavioral audits. The simulation result shows that AMD successfully avoids malevolent nodes, even when a large portion of the network drops to forward packets. Also it detects the selective dropping attacks over end-to-end traffic streams in WBAN. The simulation results indicates that our scheme to improve both the energy efficiency and network performance in the WBAN.

Ethical Clearance: RMK College of Engineering and Technology

Source of Funding: Self

Conflict of Interest: NA

References

1. Al-Janabi S, Al-Shourbaji I, Shojafar M, Shamshirband, S. Survey of main challenges (security and privacy) in wireless body area networks for healthcare applications. Egypt Inform J. 2017; 18(2):113-122, 2017.
2. Kumar P, Lee HJ. Security issues in healthcare applications using wireless medical sensor networks: A survey. Sensors. 2012; 12(1): 55-91.
3. Dautov R, Tsouri, G R. Securing while sampling in wireless body area networks with application to electrocardiography. J biomedical & health inform, 2016; 20(1):135-142.
4. Xie Z, Huang G, He J, Zhang Y. A clique-based WBAN scheduling for mobile wireless body area networks. Procedia computer science, 2014; 31: 1092-1101.
5. He, D, Zeadally S, Kumar N, Lee, J H. Anonymous authentication for wireless body area networks with provable security. IEEE Syst J. 2017;11(4): 2590-2601.
6. Meharia P, Agrawal D P. A hybrid key management scheme for healthcare sensor networks. IEEE Int Conf on Commun. 2016; p. 1-6, 2016.

7. Khan FA, Ali A, Abbas H, Haldar, NAH. A cloud-based healthcare framework for security and patients' data privacy using wireless body area networks. Procedia Comp Science. 2014; 34: 511-517.
8. Devasena GS, Kanmani, S. Robust Security for Health Information by ECC with Signature Hash Function in WBAN. Indonesian J of Elect Engg and Comp Science, 2018;11(1): 256-262.
9. Shen J, Tan H, Moh S, Chung I, Liu, Q, Sun X. Enhanced secure sensor association and key management in wireless body area networks. J of Commun and Net, 2015; 17(5): 453-462.
10. Xiong H, Qin, Z. Revocable and scalable certificateless remote authentication protocol with anonymity for wireless body area networks. IEEE trans on inform forensics & sec, 2015;10(7): 1442-1455.
11. Hu C, Li H, Huo Y, Xiang T, Liao X. Secure and efficient data communication protocol for wireless body area networks. IEEE Trans on Multi-Scale Comp Syst. 2016; 2(2): 94-107.

Medication Adherence of Hypertensive Patients: Impact of Clinical Pharmacist Intervention in Treatment of Hypertension in a Tertiary Care Hospital

D Sharma[1], DK Mehta[2], R Das[3], K Bhatti[4], K Mehta[5], RM Chidurala[6], A Petekar[7]

[1]Research Scholar, Pharm D, [2]Professor, [3]Associate Professor, M.M.College of Pharmacy, Maharishi Markandeshwar (Deemed to be) University, Mullana, Ambala, HR, [4]Hospitalist, Department of Medicine, Medstar southern Maryland hospital, 7503, Surratts Rd, Clinton, Maryland, 20735, USA,[5]Professor, Chitkara Business School, Chitkara University, Chandigarh, India, [6]Associate Chief Hospitalist, Department of Medicine, Hospitalist Medicine Physicians of Ohio, Mount Carmel East Hospital, 6001 E.broadstreet, Columbus, Ohio, USA., [7]Assistant Professor, M.M.College of Pharmacy, Maharishi Markandeshwar (Deemed to be) University, Mullana, Ambala, HR.

Abstract

Hypertension is well recognized as an important health risk factor. Adherence to medication is critically important for controlling blood pressure and reducing associated risk of cardiovascular complications in patients with hypertension. Patient counseling is instructing the patient about various aspects of prescribed medicines like; how to take, how long to take, what to avoid, precautions, common side effects, storage & any other relevant information about the illness. In order to achieve pharmaceutical care, pharmacists provide individualized care to patients. Hypertensive patients can benefit from interventions that focus on improving knowledge and adherence to drug treatment. Therefore, this study aims to assess the impact of an educational intervention provided to hypertensive patients from rural and urban areas in a tertiary care hospital by clinical pharmacists with the objective of improving their knowledge on hypertension and their adherence to the medication prescribed.

Key words: *Hypertension, Patient counseling, Clinical pharmacist, Medication adherence, Intervention, Morisky Medication Adherence Scale*

Introduction

Hypertension is well recognized as an important risk factor for cerebrovascular accidents (CVA), congestive heart failure (CHF) coronary artery disease (CAD), end-stage renal failure (ESRF) and sudden death.[1-7] It is a major health problem throughout the world because of its high prevalence and its association with increased risk of cardiovascular disease (1). According to the 7th report of joint national committee, in age ≥60 years' patients who don't have diabetes or chronic kidney disease, the goal blood pressure level is <150/90 mmHg and in age <60 years' patients' blood pressure goal is <140/90 mmHg, though risk appears to increase even above 120/80 mm Hg.[8]

Hypertension is a common chronic disease amenable to control by appropriate medication or adopting relevant lifestyle modifications. However, a lack of knowledge about the severity of the disease and the importance of adhering to the prescribed treatment, long term drug regimens, complex regimens that require numerous medications with varying dosing schedules, cost and a lack of motivation to make some lifestyle changes in terms of diet and physical exercise may constitute barriers to compliance behavior. Various studies conducted worldwide have documented non-adherence

Corresponding author:
Dr. Rina Das,
Associate Professor,
M.M.College of Pharmacy,
Maharishi Markandeshwar (Deemed to be) University,
Mullana, Ambala, HR, India.
e-mail ID: rinammu@gmail.com

to recommended medication therapy.[9-18] In patients with hypertension, adherence to medication is critically important for controlling blood pressure and reducing associated risk of cardiovascular complications.[19-25] Poor medication adherence, patients' beliefs about hypertension and its treatment, low health literacy and lack of social support are major patient-related barriers to achieving the desired control of blood pressure.[26]

In India patients receive medication as part of their treatment and due to heavy patient load; many prescribers have little time to explain the proper use of medication to their patient. Patient Counseling is instructing the patient about various aspects of prescribed medicines like; how to take, how long to take, what to avoid, precautions, common side effects, storage & any other relevant information about the illness. *The concept of patient counseling in its modern form originated in India in the mid 1990s. Since then, considerable growth and development occurred in the country in the area.* In order to achieve pharmaceutical care, pharmacists provide individualized care to patients. [27]

It has been reported that hypertensive patients can benefit from interventions that focus on improving knowledge and adherence to drug treatment.[28] Therefore, this study aims to assess the impact of an educational intervention provided to hypertensive patients from rural and urban areas by clinical pharmacists with the objective of improving their knowledge on hypertension and their adherence to the medication prescribed.

Method

A prospective, observational study was conducted in the outpatient department of Medicine at Maharishi Markandeshwar Institute of Medical Science and Research (MMIMSR), Mullana, Ambala, Haryana, India. The study duration was one year and was conducted from December 2018 to May 2019. The sampling method was convenient and sample size (n=300) included hypertensive patients surveyed during the study period.

Study participants

The study population consisted of 300 diagnosed hypertensive patients (147 men 153 women). The patients were recruited from medicine outpatient department after being diagnosed as hypertensive by the physicians as per JNC 7 guidelines. All the patients were screened for eligibility of inclusion and exclusion criteria designed for this study. The patients were informed and clarified about the purpose of study in the language understood by the patient, prior to enrollment. All patients provided written informed consent to participate in the study after full explanation of the study. Patient's demographic details were noted in case record form.

Hypertension control status

According to the 7th report of joint national committee in age ≥60 years' patients who don't have diabetes or Chronic Kidney Disease the goal blood pressure level is <150/90 mmHg and in age <60 years' patients' blood pressure goal is <140/90 mmHg, though risk appears to increase even above 120/80 mm Hg.[8]

Ethical Considerations

This study was designed to study the effect of counselling and pharmacist intervention on medication adherence of hypertensive patients. The clinical protocol was approved by institutional ethics committee (project No: IEC-1323) on 19/12/18 and was performed in accordance with the declaration of Helsinki and the code of Good Clinical Practice.

Qualification criteria

- **Inclusion Criteria:**

1. Patient newly and previously diagnosed hypertensive

2. Age >18 years

3. Patient initiated on therapy by the treating physician as per the routine clinical practices.

4. Patient able and willing to give written informed consent.

5. All the patients will be investigated under following: Fasting Lipid Profile, Random Blood Sugar, Fundus Examination, Liver Function Test, and Kidney Function Test & X-ray Chest

- **Exclusion Criteria:**

1. Patient with pre-existing renal failure, liver failure and cardiac disease.

2. Pregnant and lactating mothers.

3. Patients with the history of peptic ulcers,

pulmonary tuberculosis, uraemia, vitamin deficiency, and patients on steroid therapy were excluded.

Research tools

Blood pressure was measured with the help of Sphygmomanometer (Atico Sphygmomanometer) along with the stethoscope. Morisky Medication Adherence Scales MMAS-8 questionnaire was used to evaluate the impact of patient counselling provide by the pharmacists to the patients.[29]

Baseline analysis and randomization

At baseline, current knowledge on hypertension, and medication adherence was measured for all patients in addition to socio-demographic data. Blood pressure readings were taken from medical records. As baseline data were obtained and analyzed, patients attending the medicine and cardiology units for routine follow-up were randomly allocated either to a control group [(CG) usual care, where no pharmaceutical care was provided] or to an intervention group [(IG) pharmaceutical care, consisting of follow-up by the trained clinical pharmacist during a month period]. Participants were allocated to groups following simple randomization procedures using a computer generated list. The pharmaceutical care provided to the IG by a clinical pharmacist took approximately 15 min during the first visit, and the follow-up visits took approximately 10 min. The intervention was conducted with each patient once per week (or in accordance with their appointment schedule). At each visit, the hospital pharmacist conducted a thorough interview with the patient, identified problems leading to poor medication adherence and provided patient education. The CG had no clinical pharmacist involvement, and control patients received the traditional service provided by the hospitals (receiving prescription orders, counseling about medication use and information about follow-up visits).

Assessment of medication adherence

The patient adherence was assessed by using standard questionnaires, i.e. Morisky medication adherence scale (MMAS-8). [29] MMAS-8 is an 8-item questionnaire with 7 yes/no questions while the last question was a 5-point Likert scale. Based on the scoring system of MMAS, adherence was rated as follows: high adherence (=0 score), medium adherence (=1 to 2 score) and low adherence (=3-4 score). The patient's blood pressure values were noted at baseline and each time patient came for the follow-ups. Patients who had a low or a moderate rate of adherence were considered as non-adherent. Mean adherence scores at baseline and for each group (IG and CG) were calculated and presented for the final analysis.

Statistical analysis

Data recorded was entered in Microsoft excel version 2016. The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) was used for data analysis.

Results

A total of 357 patients attended the cardiac unit of MMIMSR hospital, Mullana, India during the recruitment period (from December 2018 to May 2019), and all were assessed for eligibility. Of these, 57 were excluded (42 did not meet the criteria and 15 refused to participate), and the remaining 300 patients (153 women and 147 men) with hypertension, aged from 18 to 66 years [mean (SD) = 46.0 ± 7.1] were included for the study. Patient were randomized into two groups, control group (150 CG) and intervention group (150 IG). Baseline assessment, demographic study and current medication adherence rate study was carried out for the whole cohort of 300 patients. The IG and CG were comparable with respect to age, gender, education, locality and duration of disease. At baseline, knowledge on hypertension and medication adherence was reported as low in both the IG and CG. Table 1 describes the baseline analysis of the entire cohort (n=300), IG (n=150) and CG (n=150). Evaluation of adherence using the Scales MMAS-8 questionnaire and the MMAS-8 scale data of the study is shown in Table 2. Table 3 highlights the post-intervention analysis of Medication adherence between intervention and control group upon completion of the study. A statistically significant difference was observed, when knowledge, adherence, and blood pressure were compared between IG and CG after completion of the intervention. Medication adherence improved in the IG, as the post-intervention analysis revealed. The CG was more or less the same in terms of medication adherence, and little difference was observed compared with the baseline analysis. Lower systolic and diastolic blood pressures were observed among the IG.

Table 1: Baseline characteristics of study population

Characteristics	Entire cohort n = 300 Frequency (%)	Intervention group n = 150 Frequency (%)	Control group n = 150 Frequency (%)	P value
Age, mean (SD) = 46.0 ± 7.1				0.812
18-42	96(32%)	45(30%)	51(34%)	
42-66	199(66.3%)	102(68%)	97(64.6%)	
Above 66	5(1.6%)	3(2%)	2(1.3%)	
Gender				0.541
Male	163(54.3%)	87(58%)	76(50.6%)	
Female	137(91.3%)	63(42%)	74(49.3%)	
Area				0.276
Rural	174(58%)	96(64%)	78(52%)	
Urban	126(42%)	54(36%)	72(48%)	
Habits				
Smoker	33(11%)	15(10%)	18(12%)	
Non-smoker/Non alcoholic	144(48%)	75(50%)	69(46%)	
Alcoholic	54(18%)	24(16%)	30(20%)	
Smoker/Alcoholic	69(23%)	36(24%)	33(22%)	
Baseline SBP, mean (SD) mmHg	164.9 (12.6)	163.5 (12.1)	163.5 (1.9)	
Baseline DBP mean (SD) mmHg	96.7±10.8	95.9 (10.1)	95.7 (9.9)	

Table 2: Medication Adherence of study population

S.NO.	MMAS-8 scale	DAY 1 Frequency (%) n = 150 Frequency (%)		DAY 30 Frequency (%)	
		Control Group n=150	Intervening Group n=150	Control Group n=150	Intervening Group n=150
1.	High Adherence (0)	36(24%)	33(22%)	38(25.5%)	82 (54.6%)
2.	Medium Adherence (1-2)	75(50%)	71(47.3%)	75(50%)	44 (29.3%)
3.	Low Adherence (3-4)	39(26%)	46(30.6%)	37(24.6%)	24 (16%)

Table 3: Post-interventional analysis of medication adherence between interventional and control group

Characteristics	Intervention group (n, %)		Control group (n, %)	
	Male	Female	Male	Female
Age				
18-42				
High Adherence (0)	15(10)	11(7.3)	8(5.3)	3(2)
Medium Adherence (1-2)	6(4)	5(3.3)	13(8.6)	17(11.3)
Low Adherence (3-4)	3(2)	5(3.3)	5(3.3)	5(3.3)
42-66				
High Adherence (0)	31(20.6)	22(14.6)	15(10)	12(8)
Medium Adherence (1-2)	24(16)	9(6)	24(16)	20(13.3)
Low Adherence (3-4)	6(4)	10(6.6)	10(6.6)	16(10.6)
Above 66				
High Adherence (0)	2(1.3)	1(0.6)	0(0)	0(0)
Medium Adherence (1-2)	0(0)	0(0)	1(0.6)	0(0)
Low Adherence (3-4)	0(0)	0(0)	0(0)	1(0.6)
Area				
Rural				
High Adherence (0)	30(20)	16(10.6)	8(5.3)	8(5.3)
Medium Adherence (1-2)	25(16.6)	10(6.6)	21(14)	16(10.6)
Low Adherence (3-4)	8(5.3)	7(4.6)	13(8.6)	12(8)
Urban				
High Adherence (0)	17(11.3)	19(12.6)	11(7.3)	11(7.3)
Medium Adherence (1-2)	5(3.3)	4(2.6)	19(12.6)	19(12.6)
Low Adherence (3-4)	2(1.3)	7(4.6)	4(2.6)	8(5.3)
SBP, mean (SD) mmHg	142.6 (10.2)		158.9 (14.98)	
DBP mean (SD) mmHg	82.04 (5.39)		90.64 (5.86)	

Discussion

Uncontrolled hypertension is one of a leading cause of heart disease and stroke. Controlling hypertension can prevent cardiovascular disease. Controlling hypertension is very challenging. Effectively managing hypertension includes both lifestyle changes and long term medication use.[13] Patient counseling and interventions generate opportunities for patients to understand their conditions better and clarify misapprehensions they have of their disease and its treatment.[30] Therefore, it can be hypothesized that imparting education to patients through a well designed intervention can result in better awareness of disease, and increased medication adherence and therefore better treatment outcomes. Other than reminding patients to take medication properly, regularly on time, we provided adequate knowledge regarding the weight loss and regular exercise, sodium and calorie restriction, restriction of saturated fats and increased intake of dietary fibers, total restriction of alcohol intake, leave the habit of smoking, caution while using cold remedies containing sympathomimetic, self-monitoring of blood pressure etc.

The day 1 and day 30 BP measurements are depicted in Table 1 and 3 respectively. The results of the blood pressure (both SBP and DBP values) show a very good improvement from the base line to the first follow-up. A better result was found in patients who received clinical pharmacist counselling sessions. This strongly indicated that there is a positive impact of clinical pharmacist counselling on hypertensive patients.

In our study medication adherence were found to be high in urban population compared to rural patients. Adherence to the medication were found more in male as compare to the females. As per answer given by the patient's major reasons for non-adherence are forgetfulness, cost of medication, lack of access to medication, travelling, fear of getting used to medicine. The assessment of medication adherence scores by MMAS-8 clearly showed that high adherence was found to be more in the intervention group and low adherence were found to be high in the control group. The intervention group patients were provided with counselling and frequent telephone reminding makes them too strongly adapts to think about disease management. As many of the patients were illiterate it was difficult for them to remember the name of the drug, but on repeated counseling they remembered it with the help of the strips, color, and covers of the medicines which made them adhere to their medication properly. This study strongly suggested that there is a need of continuous education to the patients to improve their medication adherence towards disease management.

Conclusion

The study showed that clinical pharmacist interventions had positive impact in improving the medication adherence and treatment satisfaction of the hypertensive patients and the intervention program was well accepted by the study population. The one-month patient follow-up had shown enhancement in their adherence and also treatment satisfaction. It was quite proved that participants with low treatment satisfaction are more likely to have lower adherence to antihypertensive medications. The results of our study suggested that the treatment satisfaction is consistent indicators of adherence to antihypertensive medications in hypertensive patients. Patients should be educated about the benefits of self-management of diseases, and the common perception that drugs are inherently unsafe has to be eliminated. Additional research is also recommended in order to identify appropriate and targeted interventions in an effort to improve treatment satisfaction in patients with hypertension.

This study also highlights that there is a need of patient counseling services for patients especially rural population in chronic disease maintenance. This study shows that pharmacist-initiated educational interventions increase patients' knowledge about their condition in a way that positively modifies their beliefs about medicines. Such changes are expected to result in increased adherence levels. Therefore, healthcare professionals in India should develop strategies that enlist the patient as a participant in the management of his/her health through the help of patient education and counselling. Although increase in adherence levels is apparent from our study, an important aspect to be considered is the long-term impact of the educational programme on the status of medication adherence. Therefore, it is recommended that continuous medical education (CME) should be applied even after the intervention, so that patients can retain maximum knowledge and obtain benefit from it.

Acknowledgement: The authors wish to thank M.M. College of Pharmacy, Maharishi Markandeshwar (Deemed to be) University, Mullana, India for all necessary facilities.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Aljarky F. Prevalence of hypertension in young and middle aged kuwaiti citizens in primary health care. *Kuwait Medica Journal*. 2007; 37(2):116-119.
2. Mohn EL and Burke KM. *Medical Surgical Nursing Care*. 3rd ed. New York, Pearson education: Saddle River; 2011.
3. Harrington R. Hypertension in elderly. *Journal of American College of Cardiology*. 2011; 57(20): 2-8.
4. Varon JO. Diagnosis and treatment of hypertensive crises in elderly patients. *Journal of Geriatric Cardiology*. 2007; 4(1):50-53.
5. Toutly T and Jett K. *Gerontological nursing healthy aging*. 3rd ed. USA: Mosby Co, 2010.
6. Babatsikou FO and Zavitsanou AS. Epidemiology of hypertension in elderly. *Health Science Journal*. 2010; 4(1): 24-26.
7. Meiner S. *Gerontological nusing*. 4th ed. USA: Mosby Co, 2011.
8. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. National High Blood Pressure Education Program. Bethesda (MD): National Heart, Lung, and Blood Institute (US); 2004.
9. Hyman DJ and Pavlik VN. Characteristics of patients with uncontrolled hypertension in the United States. *N Engl J Med*. 2001; 345(7): 479-486.
10. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hypertension*. 2014; 32(6):1170-1177.
11. Brown MT and Bussell JK. Medication Adherence: WHO Cares? *Mayo Clin Proc*. 2011; 86(4): 304-314.
12. Ramli A, Ahmad NS, Paraidathathu T. Medication adherence among hypertensive patients of primary health clinics in Malaysia. *Patient Prefer Adherence*. 2012; 6: 613-622.
13. Khalil SA and Elzubier AG. Drug compliance among hypertensive patients in Tabuk, Saudi Arabia. *J Hypertension*. 1997; 15(5): 561-565.
14. Elzubier AG, Husain AA, Suleiman IA, Hamid ZA. Drug compliance among hypertensive patients in Kassala, eastern Sudan. *East Mediterr Health J*. 2000; 6(1): 100-105.
15. Osamor PE and Owumi BE. Factors associated with treatment compliance in hypertension in Southwest Nigeria. *J Health Popul Nutr*. 2011; 29(6): 619-628.
16. Delamater AM. Improving patient adherence. *Clin Diabetes*. 2006; 24: 71-77.
17. Meichenbaum D and Turk DC. *Facilitating treatment adherence: a practitioner's Guidebook*. New York, NY: Plenum Press; 1987.
18. Ho PM, Bryson CL, Rumsfeld JS. Medication adherence: its importance in cardiovascular outcomes. *Circulation*. 2009; 119(23): 3028-3035.
19. Cramer JA, Roy A, Burrell A, Fairchild CJ, Fuldeore MJ, Ollendorf DA. Medication compliance and persistence: terminology and definitions. *Value Health*. 2008; 11(1): 44-7.
20. Okoro RN and Ngong CK. Assessment of patient's antihypertensive medication adherence level in noncomorbid hypertension in a tertiary hospital in Nigeria. *Int J Pharm Biomed Sci*. 2012; 3(2):47-54.
21. Biradar SS, Rajashekhar K, Srinivas R, Raju SA. Assessment of pharmacist mediated patient counseling on medication adherence in hypertension pateints of south Indian city. *International Research Journal of Pharmacy*. 2012; 3: 251-255.
22. Dennis T, Meera NK, Binny K, Sekhar MS, Kishore G, Sashidharan S. Medication adherence and associated barriers in hypertension management in India. CVD Prev Control. 2011; 6(1):9-13.
23. Santra G. Assessment of adherence to cardiovascular medicines in rural population: an observational study in patients attending a tertiary care hospital. *Indian J Pharmacol*. 2015; 47(6): 600-604.
24. Navya CJ, Naveen R, Ashwini GS, Manu A, Steve J, Singh J. Adherence to medication among patients

with hypertension and diabetes mellitus in selected tea estates in South India. *JIMSA*.2015; 28(1):16-17.

25. Venkatachalam J, Abrahm SB, Singh Z, Stalin P, Sathya GR. Determinants of patient's adherence to hypertension medications in a rural population of Kancheepuram District in Tamil Nadu, South India. *Indian J Community Med*. 2015; 40(1): 33-37.
26. Ogedegbe G. Barriers to optimal hypertension control. *The Journal of Clinical Hypertension.* 2008; 10: 644-646.
27. Tumkur A, Muragundi P, Shetty R, Naik A. Pharmaceutical care: need of the hour in India. *J Young Pharm*. 2012; 4(4): 282-286.
28. Amado GE, Pujo RE, Pacheco HV, Borras JM. Knowledge and adherence to antihypertensive therapy in primary care: results of a randomized trial. *Gaceta Sanitaria*. 2011; 25: 62-67.
29. Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care*. 1986; 24: 67-74.
30. Karakurt P and Kaşikçi M. Factors affecting medication adherence in patients with hypertension. *Journal of Vasc Nursing*. 2012; 30(4):118-126.

Breast Milk Components and Neurodevelopment of Children

Dangat Kamini[1], Khaire Amrita[2], Chavan-Gautam Preeti[3], Joshi Sadhana[4]

[1]Research Assistant, [2]Research Associate, [3]Associate Professor,[4] Professor, Mother and Child Health Department, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune, India

Abstract

Breast milk is considered the gold standard in pediatric nutrition. It contains a wide range of nutrients and other bioactive factors that support enteric and immunologic development of neonates. Some of these constituents have neurobiological properties that play vital role in early brain development and facilitate cognitive development. Understanding the role of these functional nutrients in modulating developmental processes in the brain is emerging area of research. These developmental events depend not only on availability of nutrients, but it also depends on a variety of growth factors and proteins. These components are transported from the mother to the fetus via the placenta prenatally and postnatally through milk. Many studies have highlighted a positive association between breastfeeding on structural brain development, such as increased white matter development and increased cortical thickness. Reports also suggest beneficial effects of breastfeeding on brain and cognitive development from infancy to in adolescence. This review discusses various components in breast milk components which can influence neurodevelopment in children.

Key words: *Brain development, Breastfeeding, Breast milk, Cognition*

Introduction

Early life nutrition is important for the growth and development of the infant. The World Health Organization and United Nations Children's Fund jointly developed the global strategy for exclusive breastfeeding during the first six months of life. [1] Many studies provide evidence of short and long-term benefits of breastfeeding during the critical periods of development. Breastfeeding is also shown to influence the long-term health of children.[2] Accumulating evidence suggests that breastfeeding reduces the risk of non communicable and neurodevelopmental disorders in childhood and adulthood.[3]

Breast milk provides optimal nutrition for the first six months of life. It is the only source of nutrients and bioactive components like growth factors, cytokines and hormones during infancy.[4] These components support brain, enteric and immunologic development of neonates.[5] The article describes the possible role of various nutrients and bioactive components in breast milk which influence neurodevelopment of the children.

Corresponding author
Kamini Dangat
Mother and Child Health Department,
Interactive Research School for Health Affairs (IRSHA), Bharati Vidyapeeth (Deemed to be University), Pune 411043, India, Tel: (020) 24366920
E-mail: dangat.kamini@gmail.com

Breastfeeding and Neurodevelopment in Children

The relationship between breastfeeding and neurodevelopmental outcome was first discussed in 1929 when Hoefer and Hardy examined the mental and physical outcomes of children at 7 to 13 yrs of age. They concluded that children who had been breastfed for 4 to 9 months outperformed in motor and language development.[6] Horwood and Fergusson also observed a positive relationship between breastfeeding and a variety of beneficial educational outcomes.[7] It has been reported that children who were breastfed for more than 6 months had higher test scores at 10 yrs of age as compared to non-breastfed children.[8] In a group of Asian and Greek toddlers, increased exposure to breastfeeding is reported to be associated with higher scores of cognitive and language development.[9,10] In school aged children (8-11 yrs) who were breast fed, a positive association was found between learning skills as compared to the never-breastfed children.[11]

The duration of breastfeeding is also shown to be associated with cognition. Longer duration of breastfeeding, particularly full breastfeeding is reported to have beneficial effects on child neuropsychological outcomes [12] and with higher verbal and nonverbal IQ at 7 yrs of age.[13] Increasing duration of breastfeeding showed gradual increase in cognitive developmental score from infancy through the preschool age. [14]

Breastfeeding in the first 2 months of life is shown to be associated with structural markers of brain development in infants. Breastfed children exhibited increased white matter development, upto 4 yrs of age.[15] A recent report reveals improved myelination in breastfed children compared to children who were exclusively formula-fed.[16]

The findings of the above studies indicating beneficial effects of breastfeeding on neurodevelopmental outcome could be possibly attributed to breast milk nutrients and bioactive components and is depicted in Fig 1. Human milk is suggested to improve cognition by providing vital components like fatty acids, amino acids, choline, lactose, iron, copper, vitamin A, creatine, and neurotrophic factors to the infant. The role of each of these components is discussed below.

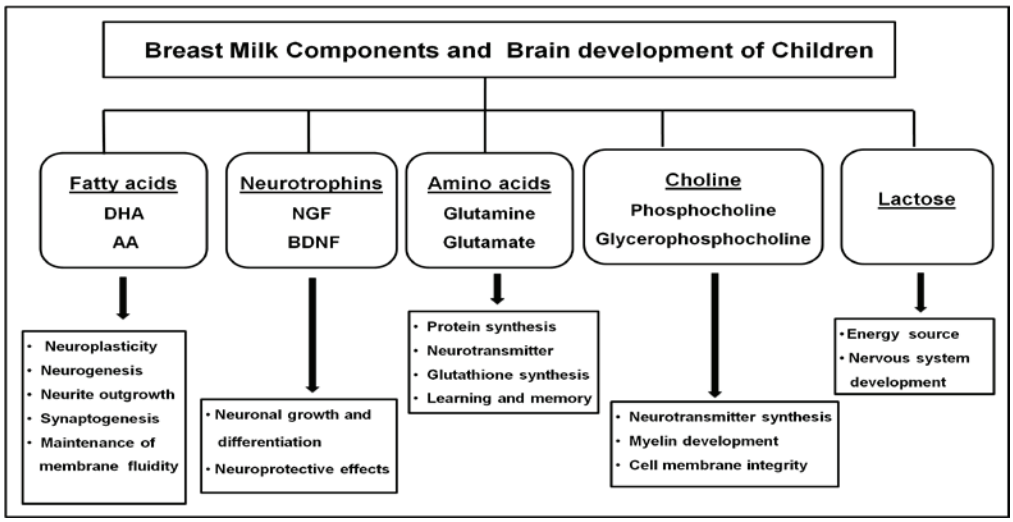


Figure 1: Breast Milk Components and Brain Development of Children

DHA - Docosahexaenoic Acid; AA - Arachidonic Acid; NGF - Nerve Growth Factor;

BDNF - Brain-Derived Neurotrophic Factor

Components of Breast Milk and Cognition in Children

Fatty Acids

Human milk contains 3-5 % of total fat. It is the main source of energy for the newborn. Essential fatty acids are the integral part of cell membranes and play a main role in mental and visual development. Two fatty acids are essential for humans: alpha-linolenic acid and linoleic acid. They are found in breast milk and serve as precursors for long chain polyunsaturated fatty acids (LCPUFA) like docosahexaenoic acid (DHA) and arachidonic acid respectively. These fatty acids are involved in many neurobiological processes like learning and memory. Many studies have shown that PUFA levels in the colostrum are associated with IQ in children up to 6 yrs of age.[17, 18] High content of DHA, in breast milk is reported to be associated with better school performance at 12 yrs of age. [19]

Amino Acids (AA)

AA in breast milk support growth of the infant during the first months of life. Glutamate, glutamine and taurine are the most abundant free AA in human milk. A number of AA like taurine, glutamate, glutamine and glycine, are recognized as precursors of neurotransmitters that play a key role in long-term potentiation, synaptic plasticity and are important for cognitive functions like learning and memory. In a randomized controlled trial, taurine supplementation showed more mature auditory-evoked responses in healthy infants as compared to infants who

did not receive taurine supplementation.[20] In follow up studies, enteral glutamine supplementation showed no effect on cognitive, and behavioural outcomes at 2 and 7.5 yrs of age.[21, 22] Limited studies have attempted to explore the relation between AA and neurodevelopment or cognition.

Choline

Milk contains a high concentration of choline, phosphocholine and glycerophosphocholine.[23] Choline is important for the synthesis of membrane phospholipids, specifically phosphatidylcholine. Choline can also be found in sphingomyelin, another membrane phospholipid formed from phosphatidylcholine. Choline is a precursor of acetylcholine, which is a neurotransmitter and is required for lifelong memory function. Choline supplementation during pregnancy is reported to improve memory in infants at 6 to 12 mo.[24] Recently, Caudill et al, reported that maternal choline supplementation during the third trimester of pregnancy improves infant information processing speed at 13 mo of age.[25]

Lactose

Lactose, a major component of human milk and it provides energy for the growth of the infants. Human milk contains higher quantity of lactose compared with milk of other species in order to meet high energy demands of the human brain.[26] It is relatively low in colostrum, and increases over time. The body breaks it down into two simpler sugars, glucose and galactose. Galactose is a valuable nutrient for brain tissue development. Taib et al. reported that the children who consumed lactose–isomaltulose-containing milk showed better cognitive performance at 5–6 yrs, [27] suggest carbohydrate composition has effects on some aspects of cognitive performance such as attention and memory. However, there is limited literature on role of breast milk lactose and cognitive performance in children.

Iron

The iron content of the breast milk is vital for the optimal survival of the newborn baby. Iron levels in the milk decreases with increase in lactation age. Iron is essential for myelination, and it has been demonstrated that iron-deficiency can cause altered myelination in infants.[28] It is also reported that in infants with iron-deficiency anemia is associated with poor mental developmental outcomes than children without iron deficiency.[29] Iron metabolism is interrelated to DHA and may be associated with suboptimal functional outcomes in infants.[30] Iron deficiency affects Δ-6-desaturase activity i.e., the synthesis of essential fatty acids and has a major impact on neurodevelopment.[31] Iron supplementation in LBW infants was reported to improve neurocognitive and motor development 5.3 yrs of age. [32]

Zinc

In first six months of life, breast milk is a sole source of zinc. Its concentration is high in colostrum than mature milk. Zinc is essential for the development of the central nervous system, particularly for formation and migration of neurons along with the formation of neuronal synapses. Both animal and human studies suggest that zinc deficiency can lead to delays in cognitive development.[33, 34] A study on zinc supplementation to children have shown no effect on motor development and cognitive functioning .[35]

Copper (Cu)

Cu is an element necessary for synthesising haemoglobin, forming myelin sheaths in the nervous system. The content of Cu in breast milk depends on the stage of lactation i.e. the highest content found in colostrum.[36] Most of the studies have found no effect of dietary intake on milk Cu levels.[37, 38] Bumoko et al reported lower serum levels of Cu with neuromotor impairments in children with konzo, a motor neuron disease.[39]

Vitamin A

Vitamin A is crucial for the normal growth and development of the infant. During the first 6 months of life, vitamin A is transferred through breast milk which is 60 times higher than the transfer occurring through the placenta.[40] Vitamin A is three times higher in colostrum than mature milk.. In animal study, vitamin A deficiency has been shown to be associated with neurodevelopmental delays [41] and learning and spatial memory deficits.[42] Low level of vitamin A in premature infants at birth can last through the entire infancy.[43] In contrast, preconceptional to postpartum maternal vitamin A supplementation is reported to impart no benefits on cognition at ages 10-13 yrs of age.[44]

Neurotrophins

Neurotrophins play a crucial role in the development

of the central nervous system and in the postnatal development of the enteric nervous system. [45] There are a variety of neurotrophic factors that have been identified. Among these, NGF (nerve growth factor), BDNF (brain-derived neurotrophic factor) and glial cell-line-derived neurotrophic factor are found in the breast milk.[46] NGF and BDNF control neuronal apoptosis during brain development and play an important role in neuronal differentiation, survival and growth of neurons and also modulate synaptic plasticity. BDNF is involved in different aspects of learning and memory processing, such as memory persistence and storage. NGF is also critical for enhancing memory formation and facilitating hippocampal long-term potentiation. These reports show the potential of breast milk components to enhance cognitive development. However, the role of breast milk neurotrophins in improving cognition in children is unclear.

Concluding Remarks

Breast milk is the primary source of nutrition to the newborn which contains a wide range of nutrients and other bioactive factors which play a vital role in the development of central nervous system. These components work in concert with each other and influence brain development. The current review provides some evidence on the beneficial roles of breast milk components on cognitive performance in children. It supports the existing policies to promote breastfeeding for 6 months to improve infant growth. Understanding of the molecular and cellular mechanisms through which breast milk nutrients and bioactive components influence neurodevelopmental pathways of the infant is an important step towards preventing adverse neurodevelopment in infants.

Conflict of Interest: Nil

Source of Funding: NA

Ethical Clearance: NA

References

1. World Health Organization (WHO) and United Nations Children's Fund (UNICEF). Global Strategy for Infant and Young Child Feeding. 2003.

2. Bernardo H, Cesar V and World Health Organization. Long-Term Effects of Breastfeeding: A Systematic Review. 2013.

3. Morris A. Risk Factors: Breastfeeding Reduces Risk of Type 2 Diabetes Mellitus. Nat Rev Endocrinol. 2018; 14: 128.

4. Mosca F, Gianni ML. Human Milk: Composition and Health Benefits. Pediatr Med Chir 2017; 39: 155.

5. Kumar et al. Optimizing Nutrition in Preterm Low Birth Weight Infants-Consensus Summary. Front Nutr 2017; 4:20.

6. Hoefer C, Hardy MC. Later Development of Breast Fed and Artifically Fed Infants: Comparison of Physical and Mental Growth. JAMA 1929; 92: 615-619.

7. Horwood LJ, Fergusson DM. Breastfeeding and Later Cognitive and Academic Outcomes. Pediatrics 1998; 101: e9- e9.

8. Oddy et al. Breastfeeding Duration and Academic Achievement at 10 Years. Pediatrics 2010; 127:e137-45.

9. Cai et al. Infant Feeding Effects on Early Neurocognitive Development in Asian Children. Am J Clin Nutr 2015; 101: 326-336.

10. Leventakou et al. Breastfeeding Duration and Cognitive, Language and Motor Development at 18 Months of Age: Rhea Mother–Child Cohort in Crete, Greece. J Epidemiol Community Health 2013; 69:232-239.

11. Kim et al. Breastfeeding is Associated with Enhanced Learning Abilities in School-Aged Children. Child Adolesc Psychiatry Ment Health 2017; 11:36.

12. Michaelsen et al. Effects of Breast- Feeding on Cognitive Function. Breast-Feeding: Early Influences on Later Health. Springer 2009; 199-215.

13. Belfort et al. Infant Feeding and Childhood Cognition at Ages 3 and 7 Years: Effects of Breastfeeding Duration and Exclusivity. JAMA Pediatr 2013; 167: 836-844.

14. Jedrychowski et al. Effect of Exclusive Breastfeeding on the Development of Children's Cognitive Function in the Krakow Prospective Birth Cohort Study. Eur J Pediatr 2012; 171: 151-158.

15. Deoni et al. Breastfeeding and Early White Matter Development: A Cross-Sectional Study. Neuroimage 2013; 82:77-86.

16. Deoni et al. Early Nutrition Influences

Developmental Myelination and Cognition in Infants and Young Children. Neuroimage. 2018; 178:649-659.

17. Bernard et al. The Association between Linoleic Acid Levels in Colostrum and Child Cognition at 2 and 3 Y in the Eden Cohort. Pediatr Res 2015; 77: 829-835.
18. Bernard et al. Breastfeeding, Polyunsaturated Fatty Acid Levels in Colostrum and Child Intelligence Quotient at Age 5-6 Years. J Pediatr 2017; 183:43-50.
19. Dalmeijer et al. Fatty Acid Composition in Breastfeeding and School Performance in Children Aged 12 Years. Eur J Nutr. 2016; 55: 2199-2207.
20. Tyson et al. Randomized trial of taurine supplementation for infants less than or equal to 1,300-gram birth weight: effect on auditory brainstem-evoked responses. Pediatrics 1989;83:406-415.
21. Van Zwol et al. Neurodevelopmental outcomes of very low-birth-weight infants after enteral glutamine supplementation in the neonatal period. Acta Paediatr 2008;97:562–567.
22. de Kieviet et al. Effects of neonatal enteral glutamine supplementation on cognitive, motor and behavioural outcomes in very preterm and/or very low birth weight children at school age. Br J Nutr 2012;108:2215-2220.
23. Ozarda et al. Breast Milk Choline Contents Are Associated with Inflammatory Status of Breastfeeding Women. J Hum Lact 2014; 30: 161-166.
24. Kable et al. The Impact of Micronutrient Supplementation in Alcohol- Exposed Pregnancies on Information Processing Skills in Ukrainian Infants. Alcohol 2015; 49: 647-656.
25. Caudill et al. Maternal choline supplementation during the third trimester of pregnancy improves infant information processing speed: a randomized, double-blind, controlled feeding study. FASEB J 2018 ;32:2172-2180.
26. Andreas et al. Human Breast Milk: A Review on its Composition and Bioactivity. Early Hum Dev 2015; 91: 629-635.
27. Taib et al. The effect of high lactose-isomaltulose on cognitive performance of young children. A double blind cross-over design study. Appetite 2012 ;58:81-87.
28. Beard J. Recent evidence from human and animal studies regarding iron status and infant development. J Nutr 2007;137:524S-530S.
29. Beard JL, Connor JR. Iron status and neural functioning.Annu Rev Nutr 2003;23:41-58.
30. Rioux et al. Does inadequate maternal iron or DHA status have a negative impact on an infant's functional outcomes? Acta Paediatr 2006;95:137-144.
31. Baumgartner et al. Providing male rats deficient in iron and n-3 fatty acids with iron and alpha-linolenic acid alone affects brain serotonin and cognition differently from combined provision. Lipids Health Dis 2014;13:97.
32. Steinmacher et al. Randomized trial of early versus late enteral iron supplementation in infants with a birth weight of less than 1301 grams: Neurocognitive development at 5.3 years' corrected age. Pediatrics 2007; 120:538–546.
33. Balck MM. Zinc deficiency and child development. Am J Clin Nutr 1998;68: 464.
34. Golub et al. Moderate zinc–iron deprivation influences behavior but not growth in adolescent rhesus monkeys. J Nutr 2000;130:354.
35. Warthon-Medina et al. Zinc intake, status and indices of cognitive function in adults and children: a systematic review and meta-analysis. Eur J Clin Nutr 2015;69:649-661.
36. Winiarska-Mieczan A. Cadmium, lead, copper and zinc in breast milk in Poland. Biol Trace Elem Res 2014;157:36-44.
37. Casey et al. Microminerals in human and animal milk In: Jensen RG, editor. Handbook of Milk Composition. San Diego: Academic Press 1995; 622–674
38. Lönnerdal B. Regulation of mineral and trace elements in human milk: exogenous and endogenous factors. Nutr Rev 2000; 58:223-229.
39. Bumoko et al. Lower serum levels of selenium, copper, and zinc are related to neuromotor impairments in children with konzo. J Neurol Sci 2015;349:149-153.
40. Matamoros et al. Vitamin A content in mature breast milk and its adequacy to the nutritional recommendations for infants. Arch Argent Pediatr 2018 ; 116:146-148.
41. Wagner et al. Retinoic acid synthesis in the

postnatal mouse brain marks distinct developmental stages and functional systems. Cereb. Cortex 2002;12:1244–1253.

42. Jiang et al.Vitamin A deficiency impairs postnatal cognitive function via inhibition of neuronal calcium excitability in hippocampus. J Neurochem 2012;121:932-943.
43. Tao EF, Yuan TM. Vitamin A level and diseases of premature infants. Zhongguo Dang Dai Er Ke Za Zhi 2016;18:177-82.
44. Buckley et al. Cognitive and motor skills in school-aged children following maternal vitamin A supplementation during pregnancy in rural Nepal: a follow-up of a placebo-controlled, randomised cohort. BMJ Open 2013;3(5).
45. Fichter et al. Breast Milk Contains Relevant Neurotrophic Factors and Cytokines for Enteric Nervous System Development. Mol Nutr Food Res 2011;55: 1592-1596.
46. Li et al. S100B Protein, Brain-Derived Neurotrophic Factor, and Glial Cell Line-Derived Neurotrophic Factor in Human Milk. PLoS One 2011;6: e21663.

To Assess the Incidence and Factors Predisposing to Surgical Site Infection (SSI) in Patients Who Have Undergone Caesarean Section in Tertiary Care Hospital of Udupi District, Karnataka- A Retrospective Study

Debalina Ghosh[1], Judith A Noronha[2], Laveena A Barboza[3]

[1]PG Tutor in Teerthanker Mahaveer College of Nursing, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India, [2]Professor and Head, Department of Obstetrics and Gynaecological Nursing, [3]Lecturer, Department of Fundamental Nursing, Manipal College of Nursing, Manipal University, Manipal, Udupi, Karnataka, India

Abstract

Caesarean Section (CS) is a life-saving surgical procedure when certain complications arise during pregnancy and labour. Currently, 18.6% of all births occur by cesarean section globally. **Aim:** To determine the incidence of surgical site infections in patients who have undergone Caesarean Section through record analysis and to identify the factors predisposing to surgical site infections (SSI) with Caesarean Section (CS). **Design:** Retrospective cross-sectional survey design was used for this study. The **s**tudy was conducted at tertiary care hospital of Udupi district, Karnataka from January 2017 to March 2017. Consecutive 305 post-operative case records of Caesarean Section were enrolled in the study. The sample is selected purposively as per their availability in record room. **Methods:** It was a retrospective study screening the records of pregnant women who underwent cesarean section in selected tertiary care hospital from 1st January 2015 to 31st December 2015 and came for followup or readmission with surgical site infection at the incision site or not got discharged due to surgical site infection for a period of 6 weeks. **Results:** A total of 305 record are viewed, about 35.8% (n=107) were performed in elective and 64.92% (n=198) undertaken on emergency list. A total of 20 post-operative cases diagnosed with Surgical Site Infection were studied during the specified period. Of these n=17 (85%) had superficial infection and n=2 (10%) deep SSI and n=1 (5%) had organ space SSI. Odds ratio calculation and *p*-value calculation shows that booking status and wound closing material are responsible to develop SSI.

Keyword- *Retrospective review, Incidence, Predisposing factor, SSI, CS.*

Introduction

[1]The word Caesarean Section is imitative from the Latin verb, 'caedere' meaning (supine stem cesium), 'to cut'. A Byzantine-Greek historical encyclopaedia says Caesarean Section name came from infamous Roman Ruler Gaius Julius Caesar. Currently, 18.6% of all births occur by caesarean section globally. America and Caribbean region has the highest caesarean section rates of 40.5%. In Asia, present rates of caesarean section are 19.2%. Between 1990 and 2014 the rate has increased 12.4% (from 6.7% to 19.1%).

[5]Surgical site infection is defined as an infection that occurs at the incision/operative site (including drains) within 30 days after the surgical operation if no implant is left in place/within 1 year if an implant is left in place. According to the CDC's National Nosocomial Infection Surveillance system, 38% of all nosocomial infections in surgical patients are surgical site infections. The rate

Dr. Judith A Noronha
Corresponding author:
Professor and Head, Department of Obstetrics and Gynaecological Nursing, Manipal College of Nursing, Manipal University, Manipal, Udupi, Karnataka, India. Pin- 576104. 0820 2923123. Judith.n@manipal.edu / juval12@gmail.com

of surgical site infection after Caesarean Section range from 3%- 5%.

[7]The incidence reported of surgical site infection following the caesarean section varies widely. Postpartum wound infection varies from approximately 2%- 10%. Surgical site infection arose more recurrently in women with poor nutrition, extremes of maternal weight (underweight or obese), little prenatal care, prolonged labor or rupture of membranes, long duration of surgery, general anaesthesia, multiple procedures, and young maternal age.

Background of the study:

[3]A retrospective cross-sectional study was done to assess the incidence of surgical site infection and identify risk factors, common bacterial pathogens and antibiotic sensitivity in Nizwa Hospital, Oman. A total number of 7923 caesarean section women's, 211 (2.66%) had developed surgical site infection. The study results suggest that the wound infection is highly associated with women with diabetes (P=0.001), premature rupture of membrane (P<0.001), mildly or moderately or severely anaemic (P=0.035). The overall study concluded that to reduce the number surgical site infection and prevent the risk factors it is necessary to maintain aseptic surgeries, implement infection prevention practices and give antibiotic prophylaxis to reduce morbidity in women undergoing caesarean section.

[4]Farret, Dalle, Monteiro, Wurdig Riche, & Antonello (2015) conducted a retrospective case-control observational study that was conducted in Femina hospital in Porto Alegre, Brazil to determine the risk factors and impact of antibiotic prophylaxis for surgical site infection on caesarean section. A total number of 8180 caesarean section records were reviewed and 118 (1.44%) were diagnosed as having surgical site infection. Among them 56 (70.9%) had a superficial skin infection, ten (12.6%) had a deep incisional and 14 (17.7%) had an organ/space surgical site infection.

[6]A prospective study was conducted as a part of the Scottish Surveillance Healthcare-Associated Infection Programme in a city hospital of Glasgow. The data was collected in two phases, during the inpatients stay and in the community setting until 30th postnatal day from 715 women. Among all 715 cases of caesarean section, 80 (11.2%) cases developed surgical site infection. Development of surgical site infection occurred within the hospital stay for 22 (27%) patients, 57 (71%) developed after discharge and one (2%) diagnosed after re-admission. The majority, 90% of the surgical site infection were superficial. The study concluded that an intensive surveillance program with engaged clinicians and infection control personnel was effective to reduce healthcare-associated infection.

[2]A prospective cross-sectional study was carried out by the Department of Gynaecology and Obstetrics, at Butare University Teaching Hospital. surgical site infection was identified during hospital stay or 30 days of the post-caesarean section following readmission. Data were collected by questionnaire and telephone interview. In this study among 323 mothers, 4.9% developed surgical site infections. Most of the surgical site infection was categorized as superficial skin infection 75%, deep 12.5% and organ space surgical site infection 12.5%. The study concluded that close monitoring of prolonged labor and routine visit on the 4th postnatal day can be a measure to control surgical site infection.

Even though the literature review was done on surgical site infection on caesarean section for assessing predisposing factors from 2007 to 2017 the investigator couldn't find any published article from the Karnataka state. The current study was planned to assess the incidence and factors predisposing to develop surgical site infection in the caesarean section to get the status of surgical site infection and adopt preventive measures.

The study wants to determine the incidence of surgical site infections in patients who have undergone caesarean section through record analysis and also to identify the factors predisposing to surgical site infections and antibiotics used in those patients with caesarean section.

Method

The retrospective cross-sectional survey design was found appropriate to meet the required objective of the present study. Formal administrative permission was obtained from the Institutional Research Committee and Institutional Ethical Committee. Permission was taken from the respective Head of the Department. Data were collected from January 6th, 2017 to 4th February 2017. All the hospital number was collected along with IP number from medical record department and 20 files per day were checked both IP and OP simultaneously. The purpose of the study was to find out the incidence of SSI and find out factors predisposing to SSI of those pregnant women underwent Caesarean Section in this particular

time period and data was collected in retrospectively from medical records and it was considered necessary to gather information directly from records of cesarean mothers.

Screening the records of pregnant women who underwent cesarean section in selected tertiary care hospital of Udupi district, Karnataka and pregnant women who underwent Caesarean Section from 1st January 2015 to 31st December 2015 and came for followup or readmission with surgical site infection at the incision site or not got discharged due to surgical site infection for a period of 6 weeks post-delivery through caesarean section.Data collection tools were personally obtained by the investigator from each record. The following data collection tools were developed by the investigator-demographic proforma, semi-structured tool to assess factors predisposing to surgical site infection among pregnant women who underwent caesarean section, semi-structured tool to assess the factors predisposing to surgical site infection among cesarean section women, structured antibiotic assessment tool. The time taken to complete the tools was approximately 20 minutes.

Through this study, we want to find out Obstetrical factor and Surgical factor related to development of SSI and antibiotic used to treat SSI in post-CS. For identifying each record demographic proforma was used. The semi-structured tool was used to assess factors predisposing to surgical site infection among pregnant women who underwent cesarean section and for assessing antibiotic used in post-Caesarean Section mother, the antibiotic assessment tool was formulated.

The data obtained from records were analyzed using "SPSS" 16 version. Here, data related to demographics, factor assessing to surgical site infection, cesarean section assessment tool, and the tool to assess antibiotic use practices were transferred directly to "SPSS" version 16. Missing data are coded as 999. Descriptive and inferential statistics were used to analyze the data. Frequency and percentage were used to calculate prevalence, univariate and multiple logistic regression wares used for analysis of data related to factors predisposing to surgical site infection among cesarean section. Total 305 mothers' data were included in this study.

Findings

The analysis of the study findings is categorized into the following sections:

Section 1: Incidence of occurrence of surgical site infection

Section 2: Description of sample characteristics

Section 3: Factors predisposing to the development of surgical site infection- Obstetric factors and Surgical factor

Section 4: Description of antibiotic usage among women after caesarean section

Section 1: Incidence of occurrence of surgical site infection.

This section describes the incidence of the occurrence of surgical site infection among 305 pregnant women who underwent caesarean section. The occurrence of surgical site infection was based on presence of one or more symptoms (tenderness, redness, discharge, pain, coping any other).

Section 2: Description of sample characteristics.

This section describes the characteristics of 305 pregnant women who underwent caesarean section. The sample characteristics include age, height, weight, BMI, parity, previous history of surgical site infection, previous abdominal surgery and premorbid disease condition. Frequency and percentage distribution were calculated for describing the sample characteristics of women who developed surgical site infection and who did not develop surgical site infection.

Mother who didn't develop SSI among them, majority 180 (63.2%) of the pregnant women who underwent Caesarean Section belonged to the age group of 25-32 years, 202 (77.7%) had height more than 150cm, 174 (66.9%) had weight between 50-70kg, 121 (47.5%) had BMI of 25.1-30.1, 167 (58.6%) were multigravida, 162 (56.8%) had Caesarean Section and other abdominal surgeries in the past, 196 (68.8%) had no previous premorbid disease condition.

Mother who develop SSI, among them majority 15 (75%) of the women belonged to age between of 25-32 years, nine (56.2%) of women's height was more than 150cm, eight (50%) had weight in between 50-70kg, seven (43.8%) had BMI of 20-25, 13 (65%) were multigravida, nine (45%) had no history of previous surgeries, ten (50%) had no previous premorbid disease condition.

Section 3: Factors predisposing to the development of surgical site infection.

Obstetrics and Surgical factors that are responsible for developing an infection. The univariate analysis and odds ratio of each factors are describing in Table 1.

Among women who had taken antenatal care from a tertiary care hospital odd depicts 3.572 {1.29-9.970 (95% CI) and p-value of 0.52} less chance of developing surgical site infection because of a routine investigation, antenatal high-risk assessment, proper timing of conducting delivery.

Suturing the wound with Ethilon and Vicryl will reduce the chance of developing surgical site infection 1.421 times i.e. OR 1.421 {1.084-24.159 (95% CI) and p-value 0.486}.

Conclusion

Based on the findings and interpretation of the present study, the following conclusion was drawn:

- The incidence of surgical site infection among women who underwent caesarean section was only 6.9%.

- The present study shows booking status, wound closing material have a significant associative risk factor in developing women's surgical site infection in who underwent caesarean section. However, to some extent patient above 25 years of age had more risk for developing surgical site infection.

Acknowledgment: To the authority for administrative permission during the study.

Source of funding: Self

Conflict of interest: Nil

Ethical clearance: Ethical clearance for the study was taken from the Institutional Ethical Committee (IEC No. 796/2016), Kasturba Hospital, Manipal.

References

1. Betrán AP, Ye J, Moller A, Zhang J, Gülmezoglu AM. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. 2016;1–12. Available from: http://dx.doi.org/10.1371/journal.pone.0148343
2. Bizimana JK, Ndoli J, Bayingana C, Baluhe I, Gilson GJ, Habimana E. Prevalence and Risk Factors for Post Caesarean Delivery Surgical Site Infection in a Teaching Hospital Setting in Rural Rwanda: A Prospective Cross Sectional Study. 2016;5(6):631–41.
3. Cícero T, Farret F, Dallé J, Monteiro S, Vinícius C, Riche W, et al. Original article Risk factors for surgical site infection following caesarean section in a Brazilian Women' s Hospital: a case – control study. Brazilian J Infect Dis [Internet]. 2014;19(2):113–7. Available from: http://dx.doi.org/10.1016/j.bjid.2014.09.009
4. Dhar H, Al-busaidi I, Rathi B, Nimre EA, Sachdeva V, Hamdi I. عمان، إحالة إقليمي في مستشفى دراسة عدوى اجلروح ما بعد الوالدة القيصرية. 2014;14(May):211–7.
5. Gur R, Duggal SD, Rongpharpi SR, Srivastava R, Kumar A, Gupta V, et al. iMedPub Journals Post Caesarean Surgical Site Infections Abstract. 2015;1–6.
6. Johnson A, Young D, Reilly J. Caesarean section surgical site infection surveillance. 2006;30–5.
7. Killian CA, Graffunder EM, Vinciguerra TJ, Venezia RA. R ISK F ACTORS FOR S URGICAL -S ITE I NFECTIONS. 2017;22(10):613–7.

Type of article: ***Review article***

Comparison of the Action of Various Pulpotomy Agents on Pulpal Histology – A Monograph

Deepti Anna John[1], Jaiganesh Ramamurthy[2]

[1]Undergraduate Student, [2]Reader, Department of Periodontics, Saveetha Dental College, Saveetha University, Saveetha Institute of Medical and Technical Sciences, Chennai, Tamil Nadu, India.

Abstract

Pulpotomy is the removal of the diseased or affected part of the pulp with the aim of maintaining the vitality of the tooth by a placement of a medicament. Throughout the years, various therapeutic agents have been used to ensure the vitality of the pulp such a Formocresol, ferric sulphate, calcium hydroxide and zinc oxide eugenol. But also, different alternatives such as electro surgery, laser, collagens, glutaraldehyde and Freeze-dried bone have been used to maintain pulpal vitality. Out of all the agents studied on, freeze dried bone was concluded to be superior as most teeth treated with it, had vital pulps and increased dentin bridge growth. Hence, the aim of this review to study the action of the various pulpotomy agents on the pulpal histology and understand which pulpotomy agent gives the best result.

Key words: *Pulpotomy, freeze dried bone, formocresol, ferric sulphate, histology*

Introduction

The dental pulp is the soft connective tissue which is the vital part of the tooth. It forms a part of the dentin- pulp complex. Histologically, the pulp is composed of four distinct zone: (1) odontoblastic zone (2) cell free zone of Weil (3) cell rich zone (4) pulp core. The main cells that the pulp is composed of are the odontoblasts, fibroblasts, undifferentiated ectomesenchymal cells, macrophages and other immunocompetent cells. The odontoblastic zone is formed by odontoblasts that line the periphery of the pulp with processes extending into the dentin. The cell free zone of Weil is found beneath the odontoblasts is prominent in the coronal pulp. The cell rich zone has a high density of cells composed of mainly the fibroblasts along with undifferentiated ectomesenchymal cells, dental pulp stem cells and inflammatory cells. The pulp core is made up of blood vessels and nerves which is responsible for the sensibility and sensitivity of the pulp[1]

Pulp has a potential to self-regenerate, when exposed due to absence of the overlying dentin with the help of various vital pulp therapy options which can allow the pulp to form new dentin "dentin bridge"[2]. In the cases where certain parts of the pulp have been affected by infection, partial removal of pulp tissue is indicated, this process is called Pulpotomy. This procedure is based on three lines: Devitalization which is focused on the mummification of the entire tissue which obliterates the infection and internal resorption, second is Preservation which is to maintain the vitality of majority pulp with minimum insult and no formation of reparative dentin, the last is Regeneration which aims to maintain vitality of pulp along with formation of the dentin bridge[3].

The various pulpal agents used in pulpotomy are Formocresol, glutaraldehyde, Zinc oxide eugenol, glutaraldehyde, ferric sulphate, calcium hydroxide, Mineral trioxide aggregate, freeze dried bone that shows bone morphogenic protein (BMP 2,3,4,5,6 and 7), collagen and newer materials such as lyophilized freeze-dried platelet, enamel matrix derivative, propolis, sodium hypochlorite and bioactive glass[4].

Action of Formocresol on Pulpal Histology:

Formocresol was one of the most common pulpotomy agents used in the earlier days. The function of formocresol was based on the Devitalization principle of the pulp through mummification, but recently questions have been raised regarding carcinogenicity, mutagenicity and immune sensitization.

When the pulp tissue is exposed to formocresol, a layer of dense homogenous eosinophilic tissue was seen indicating a thick but poorly calcified dentin bridge formation, along with a large inflammatory infiltrate consisting of neutrophils, lymphocytes and macrophages[5].

Action of Ferric Sulphate on Pulpal Histology:

Ferric sulphate has been commonly used as a coagulative and haemostatic agent in the retraction cord used for crown impressions. The mechanism is based on the agglutination of the blood proteins when it meets ferric and sulphate ions.

It is used as a pulpotomy agent based on Preservation, as it is said to control haemorrhage hence reducing the chances of inflammation and internal resorption. Also, the clot formed could also act like a barrier to irritative agents.

Based on a study conducted on 15 baboons which compared Ferric sulphate with Formocresol and it was found that necrosis was seen but recognizable pulp was seen in least 2/3rd the length of the root, inflammatory infiltrate was seen in recognizable pulp along with slight secondary dentin bridge formation and there was a decrease in internal resorption[6].

Action of Freeze-Dried Bone on Pulpal Histology:

Allografts are bone grafts that are taken from one individual to another for transplantation. Bone allografts have been widely used in dentistry especially in the field of craniofacial surgery. Bone allografts are of three types: (1) Fresh bone (2) Freeze dried bone (FDB) (3) Demineralized freeze-dried bone (DFDB).

Freeze dried bone was initially used in the orthopaedic therapy as it provides an osteoconductive scaffold for bone growth and shows resorption when implanted in mesenchymal tissues. It also shows Bone morphogenic proteins (BMPS) which stimulate osteoinduction. Studies also claim that FDB may act as a inducer of a calcific barrier over a wound site. These allogenic grafts show advantages such as availability, predictable results and elimination of donor site surgery. But certain disadvantages such as host incompatibility, contaminated specimens still raise certain questions about freeze dried bone[7].

A study was conducted on two cynomolgus monkeys with their teeth restored with Freeze dried bone, Calcium hydroxide and Zinc oxide eugenol, out of the 32 teeth, 4 were extracted since they failed to show the requirements and 28 teeth were histologically analysed.

From the studied it was obtained that the teeth treated with FDB had vital pulps after 6 weeks, dentin bridges were formed in 87.5% compared to others and inflammatory cells were absent in all those teeth, lack of periapical, furcal and necrotic involvement was seen. The initial hypothesis was that FDB would act like Calcium hydroxide but the results show its superiority over Ca (OH)[8].

Conclusion

Formocresol and Ferric sulphate based on the studies, show similar results but with Ferric sulphate more favourable due to its non-toxicity compared to Formocresol. But Freeze-dried bone proves to be an appropriate alternative as a biological agent for pulp therapy. It is being employed extensively in periodontal osseous defects, as it proven to show both clinical and histological benefits to bone and cementum. FDB has also shown to be superior to Calcium hydroxide but furthermore clinical studies on pulpotomies are required to get a better understanding of the material.

Source of Funding: A self-funded project.

Ethical Clearance: Taken from the Institutional Ethics Committee of Saveetha Dental College**.**

Conflict of Interest: Nil

References

1. 1.N. Antonio. Dentin-Pulp complex. Tencate's Oral Histology 8th Edition.165-204
2. Olsson H, Rohlin KPM. Formation of a hard tissue barrier after pulp capping in humans. A systemic review. International Endodontic Journal.2006;39:429-442.
3. D.M Ranly. Pulpotomy therapy in primary teeth: new modalities for old rationales.Paed Dent 1994;16 (6):403 -409
4. NH Kumar Praveen, R Nayak, K Bhaskar Vipin, P Mopkar Pujan. Pulpotomy Medicaments: Continued Search for New alternatives- A review. OHDM- 2014;13(4)

5. N Ratnakumari, Bijimol Thomas. A Histopathological Comparison of Pulpal Response to Chitra-CPC and Formocresol used as Pulpotomy Agents in Primary Teeth: A Clinical Trial. Int J Clin Paed Dent 2012;5(1):6-13
6. P.Cleaton Jones,M.Duggal,R.Parak,S.Williams. Ferric sulphate and formocresol pulpotomies in baboon primary molars: histological responses.Eur Jou Paed Dent.2002.
7. G Vishaka, K Anoop, M Ranjan, S Sonia. Bone Allografts: A review of safety and efficacy. IJDR.2011;22(3)
8. F Shahrbanoo, W.A Allen. A comparison of the pulpal response to freeze dried bone, calcium hydroxide and zinc oxide eugenol in primary teeth in two cynomolgus monkeys. AAPD-1996;18(1)

Child Feeding Practices and Stunting: A Case-Control Study in Jember Regency of Indonesia

Devi Arine Kusumawardani[1], Nurul Ulya Luthfiyana[1]

[1]Lecturer in Department of Public Health, University of Jember, 42th Kalimantan Street, East Krajan, Sumbersari, Jember City, East Java

Abstract

Stunting becomes the main nutritional problem which is a consequence of long-term, cumulative inadequacies of health and nutrition. Child feeding practices by good parents can prevent stunting in children from an early age. Child feeding practices include early breastfeeding initiation, exclusive breastfeeding, complementary feeding practice, and frequency of feeding. The purpose of this study is to analyze the effects of child feeding practices on stunting in children aged 12-36 months in Jember Regency. The sample was selected using a simple random sampling technique, totaling 220 mothers. The data were analyzed using chi-square statistic tests and multiple logistic regression tests. The results of the test discovered that most of the respondents were low educated mothers and low-income families. The significant determinants associated with stunting were exclusive breastfeeding (OR = 3.30; 95%CI 1.85-5.90), complementary feeding practices (OR = 1.86; 95%CI 1.04-3.33), and frequency of feeding (OR = 1.95; 95%CI 1.84-3.51). Exclusive breastfeeding is the major determinant for stunting in toddlers and therefore should be a priority program to improve the nutritional status of children in early ages of life.

Keywords: *stunting; exclusive breastfeeding; complementary feeding practice; frequency of feeding*

Introduction

Globally World Health Statistic 2014 of the World Health Organization (WHO) reported that in 2012 more than 162 million of the world's children, particularly in developing countries, were categorized as stunting[1]. Stunting or low height-for-age is a reduced growth rate in human development or a slowing down of skeletal growth and height. It reflects a process of failure to reach linear growth potential. It is a largely irreversible outcome of inadequate nutrition and repeated bouts of infection during the first 1000 days of a child's life[2].

Stunting has short-term and long-term effects on individuals and societies. In the case of short-term effects, when a child is malnourished during the first 1000 days of life, it results in a weaker immune system and a higher risk of severe infectious diseases, including diarrhea and pneumonia[3], which often end with mortality, morbidity, and disability. In the case of long-term effects, stunting has long-term effects on individuals and societies, including diminished cognitive and physical development, reduced productive capacity and poor health, and an increased risk of degenerative diseases such as diabetes[4]. Also, they are more likely to suffer from chronic diseases, such as high blood pressure, heart disease, and obesity. These health impacts have devastating consequences for social and economic outcomes. Poorly nourished children are more likely to complete fewer years of school and have lower productivity as adults, including 10 percent lower earnings over their lifetime[5].

In Indonesia the problem of stunting is stagnant but it is significantly a critical problem. As reported by Riskesdas (2013), stunting prevalence reached 37.2% in composing of 18% of very stunting and 19.2% of moderate stunting, 35.6% in 2010, and 36.80% 2007. In some provinces, the prevalence of stunting exceeds national prevalence. These figures made serious in stunting prevalence; consequently, it requires much

Corresponding author:
Devi Arine Kusumawardani
E-mail: deviairin@gmail.com

more attention and intervention[6].

Child feeding practices are a critical determinant to support the child's growth and development according to the stage of age. Inappropriate child feeding practices specifically indirect early breastfeeding initiation in one hour after birth, non-exclusive breastfeeding, and inappropriate complementary food can be increased risk of stunting in children. However, inadequate child feeding practices in terms of variety, frequency, and quality can depress the child immunity system. Furthermore, lack of immunity system leads to an increase in disease and the probability that a child will grow inadequately and child can be stunted[7].

Jember Regency still occupies the second position of districts with the highest stunting prevalence in East Java (39.3%)[8]. Therefore, Jember Regency has become one of the stunting priority districts in East Java. Arjasa and Kencong sub-districts of Jember Regency are the highest prevalence stunting areas (39.30% and 38.78%)[8]. The objective of this study is to analyze the effects of child feeding practices on stunting in children aged 12-36 months in Jember Regency, Indonesia.

Material and Method

The design of the study was a case-control study that determined if an exposure is associated with an outcome by compared the cases and the controls. The study was conducted in Arjasa and Kencong sub-districts of Jember Regency in March till April 2018. A simple random sampling was used to select a sample of 220 mothers with children aged 12-36 months (110 stunting children as a case group and 110 non-stunting children as a control group).

Data of child feeding practices were obtained from structured interviews with questionnaires and observations. All of the questionnaires were calculated by the validity and reliability test. Furthermore, to examine the effect of child feeding practices on stunting, the data were submitted to the bivariate analysis with chi-square and multivariate analysis with multiple logistic regression with 95% confidence interval and significance level p <0.05.

Findings

Table 1 shows that most of the stunting children were male (60.0%) while most of the non-stunting children were female (50.9%). Maternal age in stunting and non-stunting children were mostly between 26-35 years (48.6%). Most mothers of children (63.2%) had low education (elementary schools and junior high schools). Furthermore, most of the fathers were unskilled workers (40.9%).

Table 1. Characteristic of Respondent

Characteristics	Stunting		Normal		Total (n,%)
	N	%	n	%	
Sex					
Male	66	60,0	54	49,1	120 (54,5)
Female	44	40,0	56	50,9	100 (45,5)
Mother's Age (years)					
17-25	27	24,5	35	31,8	62 (28,2)
26-35	56	60,0	51	46,4	107 (48,6)
36-46	27	24,5	20	18,2	47(21,4)
47-55	0	0	4	3,6	4 (1,8)

Cont... **Table 1. Characteristic of Respondent**

Mother's Education					
Primary Education	66	60,0	73	66,4	139 (63,2)
Secondary Education	34	30,9	32	29,1	66 (30,0)
Tertiary Education	10	9,1	5	4,5	15 (6,8)
Father's Occupation					
Unemployed	0	0	3	2,7	3 (1,4)
Farmer/Fisherman/Unskilled Worker/Carpenter	52	47,3	38	34,5	90 (40,9)
Public Servants/Policeman/Army	8	7,3	5	4,5	13 (5,9)
Private Servants	8	7,3	20	18,2	28 (12,7)
Freelance	42	38,2	44	40,0	86 (39,1)

Table 2. Summary of bivariate analyses the investigated variables for stunting

Variables	Stunting status				Total n (%)	OR	p	OR (95% CI)
	Yes		No					
	n	%	n	%				
Early breastfeeding initiation								
No	33	15.0	39	17.7	72 (32.7)	0.78	0.389	0.44 – 1.37
Yes	77	35.0	71	32.2	148 (67.3)			
Exclusive breastfeeding								
No	75	34.1	40	18.2	115 (52.3)	3.75	<0.001	2.14 – 6.55
Yes	35	15.9	70	31.8	105 (47.7)			
Complementary feeding practice								
Poor	72	32.7	49	22.3	121 (55.0)	2.36	0.002	1.37 – 4.06
Good	38	17.3	61	27.7	99 (45.0)			
Frequency of feeding								
< 3 times/day	51	23.2	34	15.5	85 (38.6)	1.93	0.019	1.11 – 3.35
≥ 3 times/day	59	26.8	76	34.5	135 (61.4)			

Table 2 shows that the number of children who had early breastfeeding initiation was higher than children who did not get early breastfeeding initiation. Most of the stunting children did not get exclusive breastfeeding from the mothers. The majority of complementary feeding practices in children whose stunting are poor. However, the frequency of feeding in stunting and normal group was largely more than equal to three times a day.

The result of statistical analysis with the Chi-square tests showed that three independent variables significantly affect the incidence of stunting in children. It shows the results of Chi-Square test between exclusive breastfeeding and the risk of stunting was significant (p=<0.001), complementary feeding practice was significantly affected stunting (p=0.002), and frequency of feeding, have significantly related to the risk of stunting in children (p=0.019). While the early breastfeeding initiation not significantly affected stunting in children (p=0.389).

Table 3. Summary of the results of multiple logistic regression

Independent Variable	OR	CI (95%)		p
		Lower	Upper	
Get exclusive breastfeeding	3.30	1.85	5.90	<0.001
Poor complementary feeding	1.86	1.04	3.33	0.037
Frequency of feeding < 3 times/day	1.95	1.84	3.51	0.026

Table 3 shows the results of multiple logistic regression on the risk factors of stunting in children. Factors that increased the risk of stunting in children under five did not get exclusive breastfeeding, poor complementary feeding, and frequency of feeding < 3 times/day. Children who were not given exclusive breastfeeding had a higher risk for experiencing stunting 3.30 times compared with children who given exclusive breastfeeding (OR = 3.30; 95% CI = 1.85 to 5.90; p = <0.001). Children with poor complementary feeding had 1.86 times higher risk of developing stunting compared with those with good complementary feeding (OR = 1.86; 95% CI = 1.04 to 3.33; p = 0.037). The results also indicated that children who had feeding < 3 times/day were at risk of stunting 1.95 times greater than children who had feeding ≥ 3 times/day (OR = 1.95; 95% CI = 1.84 to 3.51; p = 0.026). Based on the test, the results indicated that exclusive breastfeeding was the dominant factor in the risk of stunting in children.

Discussion

The respondents of this study were dominated by low educated mothers and low-income family. Mother's education and household condition have important influences on children's health status irrespective of the stage of development. Education is the key to further improvement in child nutrition, which can influence the child feeding practice of the mother. Low educated mothers commonly have less ability and less opportunity to maintain better child feeding practice in their children. Furthermore, low-income family has to lack access to information and health facilities, so they tend to perform poor child feeding practice than middle and high-income family[9,10].

The result of the present study has shown that exclusive breastfeeding, complementary feeding practice, and frequency of feeding had a significant effect on stunting. Nevertheless, early breastfeeding initiation did not have a significant effect on stunting. Early breastfeeding initiation can allow the children to get colostrum as the protection factor for the children's health in the future. The result of this study was inconsistent with other studies showing that there is a negative correlation between early breastfeeding initiation and stunting[11]. Other studies showing that early breastfeeding initiation can prevent stunting specifically in one thousand early days of life[12,13].

Exclusive breastfeeding affects stunting in children. Exclusive breastfeeding has many benefits such as the best nutritious food for the baby until six months old, antimicrobial agents and hygiene. The longer duration of the breastfeeding showing that can protect children from many serious health problems and degenerative disease that cause of death in the future such as gastrointestinal infection and respiratory tract infection[14]. Another study shows that the duration of breastfeeding has a negative correlation with stunting. The children who had exclusive breastfeeding for six months until twelve months have less risk of stunting than the children that had breastfeed less than six months. These differences

can be caused by culture, social-economic dynamic, and the mother's education[15,16].

Complementary feeding practice is a complex behavior that includes timing of complementary feeding, variety of complementary food, food preparation methods, quantity and quality of food, responsive feeding, safe food preparation, and food storage. The result of this study showing that complementary feeding practice has a significant effect on stunting. Poor complementary feeding practice can cause an inadequate intake of macronutrient and micronutrient. Inadequate intake of food in the early days of life of children can impair growth so that children have a higher risk to be stunting[17].

The frequency of feeding also affects stunting in children. Most respondents performed three or more feeding for their children in one day. The result of this study is consistent with other studies showing that children who feed less than three times a day have a higher risk to be stunted than children who feed three times a day or more. Children who feed less than three times a day associated with a higher risk of inadequate intake of nutrition[18]. Furthermore, the children are not susceptible to certain malnutrition which in turn can aggravate health conditions and a higher risk of infectious diseases[7,19].

Conclusion

Exclusive breastfeeding, complementary feeding practice, and frequency of feeding affect stunting in children. Based on these conclusions, it is suggested to Community Health Center to improve mother's capability specifically in child feeding practice to prevent stunting with comprehensive counseling. Further research is needed on other factors that affect stunting in children specifically the identification of intake of nutrient consumption in other micronutrients.

Conflict of Interest: There was no conflict of interest in the study.

Ethical Clearance: The study was received ethical approval from the Health Research Ethics Committee, Faculty of Public Health, Airlangga University

Source of Funding: Self

References

1 WHO. *World Health Statistics 2014*. WHO Press.2014

2 Adekanmbi, V.T., Uthman, O.A., & Mudasiru, O.M. Exploring variations in childhood stunting in Nigeria using league table, control chart and spatial analysis. *BMC Public Health,* 2013. (13):361

3. Black, R.E., Allen, L.H., Bhutta, Z.A., Caulfield, L.E., de Onis, M., et al. Maternal and child undernutrition: global and regional exposures and health consequences. *Lancet.* 2008 (9608), 243-260

4. UNICEF. *The State of the World's Children 2013: Children with Disabilities*. United Nations Children's Fund. 2013

5. Hunt, J.M. The potential impact of reducing global malnutrition on poverty reduction and economic development. *Asia Pacific Journal of Clinical Nutritino.* 2005(14):10-38.

6. Kementerian Kesehatan Republik Indonesia. 2013. Riset Kesehatan Dasar Indonesia 2013. http://www.depkes.go.id/resources/download/general/Hasil%20Riskesdas%202013.pdf. [cited 2017 Des 10].

7. Darsene H, Geleto A, Gebeyehu A, Meseret S. Magnitude and predictors of undernutrition among children aged six to fifty nine months in Ethiopia: a cross sectional study. *Archives of Public Health.* 2017(75):29-40

8. Dinas Kesehatan Kabupaten Jember. Gambaran Masalah Gizi Kabupaten Jember tahun 2016-2017. Jember: Dinas Kesehatan Kabupaten Jember. 2018

9. Demilew Y.M, Tafere T.E, Abitew D.B. Infant and young child feeding practice among mothers with 0-24 months old children in Slum areas of Bahir Dar City, Ethiopia. *International Breastfeeding Journal*. 2017;12(26):1-9

10. Khanal V, Sauer K, Zhao Y. Determinants of complementary feeding practice among Nepalese children aged 6-23 months: findings from demographic and health survey 2011. *BMC Pediatrics*. 2013(13):131-139

11. Fosu-Brefo R, Arthur E. Effect of timely initiation of breastfeeding on child health in Ghana. *Heal Econ Rev*. 2015(5):8-19

12. Patil CL, Turab A, Ambikapathi R, Nesamvuni C, Chandyo RK, Bose A, Islam MM, Ahmed AM, Olortegui MP, de Moraes ML, et al. Early interruption of exclusive breastfeeding: results from the eight-country MAL-ED study. *J Health Popul Nutr*. 2015(34):10-18

13. Kuchenbecker J, Jordan I, Reinbott A, Herrmann J, Jeremias T, Kennedy G, Muehlhoff E, Mtimuni B, Krawinkel MB. Exclusive breastfeeding and its effect on growth of Malawian infants: results from a cross-sectional study. *Paediatr Int Child H*. 2015(35)1:14–23

14. Ahsan S, Mansoori N, Mohiuddin S.M, Mubeen S.M, Saleem R, Irfanullah M. Frequency and determinants of malnutrition in children aged between 6 to 59 months in district Tharparkar, a rural area of Sindh. *JPMA*. 2017(67):1369-1373

15. Ulak M, Chandyo RK, Mellander L, Shresta PS, Strand TA. Infant feeding practices in Bhaktapur, Nepal: a cross sectional, health facility based survey. *Int Breastfeed J*. 2012(7)1:1-17

16. Akombi B.J, Agho K.E, Hall J.J, Merom D, Astell-Burt T, Andre M.N, Renzaho. Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatrics*. (2017)17:15-21

17. Stewart CP, Iannoti L, Dewey KG, Michaelsen KF, Onyango AW. Contextuallsing complementary feeding in a broader framework for stunting prevention. *Matern Child Nutr*. 2013(9):27-45

18. Hien N, Hoa N. Nutritional status and determinants of malnutrition in children under three years of age in Nghean Vietnam. *Pak J Nutr*. 2009(8)7:958-964

19. Panjwani A dan Heidkamp R. Complementary Feeding Interventions Have a Small but Significant Impact on Linear and Ponderal Growth of Children in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *The Journal of Nutrition*. 2017(13):1-10

Validation of Association Between Breastfeeding Duration, Facial profile, Occlusion of Children in Chennai Population:-A Cross Sectional Study

Devika Warrier. E[1], Deepa Gurunathan[2], Ganesh Jeevanandan[2]

[1]BDS Graduate Student, [2]Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical sciences, Chennai

Abstract

Introduction: Malocclusion is not a disease and is considered as a developmental disorder of the craniofacial complex.It may cause functional and esthetic disturbances in affected individuals.Environmental factors like dietary habits,nonnutritive sucking habits, bottlefeeding, and reduced duration of breastfeeding have often been implicated with various developmental disorders[1]. The .increased breastfeeding duration in preventing the development of malocclusion,and establishing a correct occlusal relationship by stimulating the facial muscles during suckling have a great importance.

Aim: The aim of this study is to assess the relationships among breastfeeding duration,nonnutritive sucking habits,convex facial profile,nonspaced dentition,and distoclusion in the deciduous dentition.

Materials and methods: A sample of 250 children aged 4 to 6 years from south Indian population was clinically examined. Information about breastfeeding duration and nonnutritive sucking habits was obtained from the parents and data was compiled.

Results: From this study it was found that a statistically significant association was observed between breastfeeding duration and nonnutritive sucking habits. Nonnutritive sucking habits had a statistically significant association with distoclusion and convex facial profile. But the occurrence of convex facial profile and distoclusion was not associated with breastfeeding duration.

Conclusion: Thus this study hypothesize that nonnutritive sucking habits may act as a dominant variable in the relationship between breastfeeding duration and occurrence of convex facial profile and distoclusion in deciduous dentition.

Keywords: *Breastfeeding duration, Facial profile, Non nutritive sucking,Occlusion.*

Introduction

In addition to the well-recognized nutritional, immunological and psychological benefits, breastfeeding promotes adequate development of the oral myofunctional structures.Moreover, the association between decreased breastfeeding duration and increased prevalence of non-nutritive sucking habits has already been demonstrated.Several authors have alsoreported the close relationship between the non-nutritive sucking habits and the development of malocclusions[2].

Although shorter breastfeeding practices play an indirect role in the etiology of malocclusions, the extent to which breastfeeding duration periods and the development of malocclusions in primary dentition are associated still remains a matter of concern. Warren and Bishara in the year 2002 compared of mean dental arch measurements and occlusal traits of non-breastfed children and those who were breastfed over three

Corresponding author:
Dr. Deepa Gurunathan
Department of Pedodontics, Saveetha Dental College and Hospitals, Saveetha University, Chennai-77.
Email id: drgdeepa@yahoo.co.in, Ph:9994619386

periods: shorter than 6 months, from 6 to 12 months, and longer than 12 months[3].

The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life to achieve optimal growth, development and health[4]. These recommendations are supported by a systematic review which states the benefits of breastfeeding for six months for minimizing the risk of gastrointestinal infection and growth deficits in young children. Despite the medical benefits of breastfeeding, no systematic review has evaluated the long-term benefits of breastfeeding for oral health, especially related to malocclusion in the primary dentition[5].

When analyzing malocclusion in the primary dentition the interaction between genetic and environmental factors has to be considered. The most frequently reported environmental factors are changes in feeding habits. Furthermore, it is known that early sucking activity might influence the growth of the craniofacial complex.It is important to keep in mind that malocclusions have negative effects on oral health-related quality of life, predominantly in the dimensions of social and emotional wellbeing[6].

Breastfeeding is reported to be a nutritive sucking habit that protects against malocclusion in the primary dentition.Nevertheless, a consensus on this subject has not been established in the literature. Some authors report that prolonged breastfeeding decreases the risk of malocclusion others have not found such an association[7]. Moreover, there is no consensus on the length of time newborn children should be breastfed to protect against malocclusion, as some studies report that six months are sufficient and others report the need for longer periods (6 to 12 months).

Non-nutritive sucking is a common behaviour among young children in various populations.Its prevalence is quite variable and depends on several factors, including gender, age, feeding method and socioeconomic status[8]. There is an agreement among a number of authors that non-nutritive sucking habits can be a consequence of industrialisation and modernisation, with more women working and a shorter breastfeeding period, which favours the adoption of digital and pacifier sucking[9,10].

Controversial findings may be related to a positive history of persistent non-nutritive sucking habits while breastfeeding. The present study evaluated the association between different breastfeeding patterns and prevalence of non nutritive sucking habits,convex facial profile and distoclusion.

Materials and Method

A sample of 150 children in the age group 2-6 years in South Indian population was clinically examined. Information about breast feeding duration, Dental Occlusion, sucking habits was obtained.The information such as name, age, sex were also noted. The collected data was compiled to calculate the percentage and graphs were drawn for the individual data.

Information about mother's health during pregnancy and type of delivery was also gathered and only full-term and normally born children were included in the study. The inclusion criteria formulated for the study was as under:

-Age 2 to 6 years

-A student studying at one of the two chosen schools for the study

-Normal number, size, and shape of teeth present

-Absence of root stumps and teeth with poor prognosis

-Unerupted or partially erupted permanent first molars not in occlusion

The exclusion criteria formulated was as under:

-Presence of any local or systemic disease in the child which may affect bone metabolism

-Any anomaly in the number, shape, or size of the teeth

-Presence of rampant caries and teeth with poor prognosis

-Fully erupted permanent first molars

-Parental refusal to fill the written questionnaire.

Based on the above-mentioned criteria, 150 children (50 males and 100!females) were finally selected for the study. The children were divided into two groups: Group 1 (children exclusively breastfed $\geq$ 6 months (n = 55)) and group 2 (children exclusively breastfed $\leq$ 6 months (n = 95)). A retrospective investigation was made for the length of time that children were exclusively breastfed in the study. Information on nonnutritive sucking

habits was also included.Data were accumulated from the questionnaires as well as findings of the clinical examination and recorded in excel sheets. A chi-square test ($p < 0.05$) was performed to verify associations between (1) breastfeeding duration and prevalence of nonnutritive sucking habits, (2) breastfeeding duration and convex facial profile, (3) breastfeeding duration and distoclusion of deciduous second molars, (4) breastfeeding duration and nonspaced dentition, and (5) nonnutritive sucking habits and all the above mentioned parameters..

Results

The prevalence of distoclusion, convex facial profile, and nonnutritive sucking habits was 37.3,8 and 72% respectively. The frequency of breastfeeding for < 6 months duration was 55(36.6%), and the frequency of breastfeeding > 6 months duration was 95(63.3%) (Table-1).On statistical analysis it was found that there was no significant association was observed between breastfeeding duration and convex facial profile and there was a small significance association between breastfeeding duration and distoclusion.A higher incidence of malocclusion was observed with reduced breastfeeding duration. However, the association between breastfeeding duration and nonnutritive sucking habits was statistically significant.

Table:-1 Frequency of breastfeeding duration

Breastfeeding duration	Number	Percentage
Below 6 months	55	36.6%
Above 6 months	95	63.30%

Table :-2 Type of occlusion

OCCLUSION	Number	Percentage
Distoclusion	56	37.3%
Non distoclusion	94	62.5%

Table:-3 Type of sucking habit

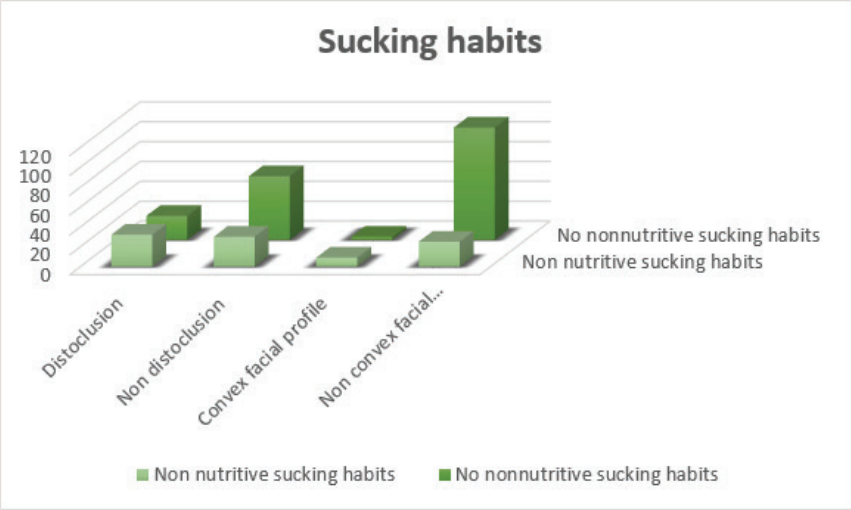
Sucking habits	Number	Percentage
Non nutritive	72	48.6%
No nonnutritive	78	52%

Table:-4 Association between breast feeding nutrition and occlusion,facial profile and sucking habits.

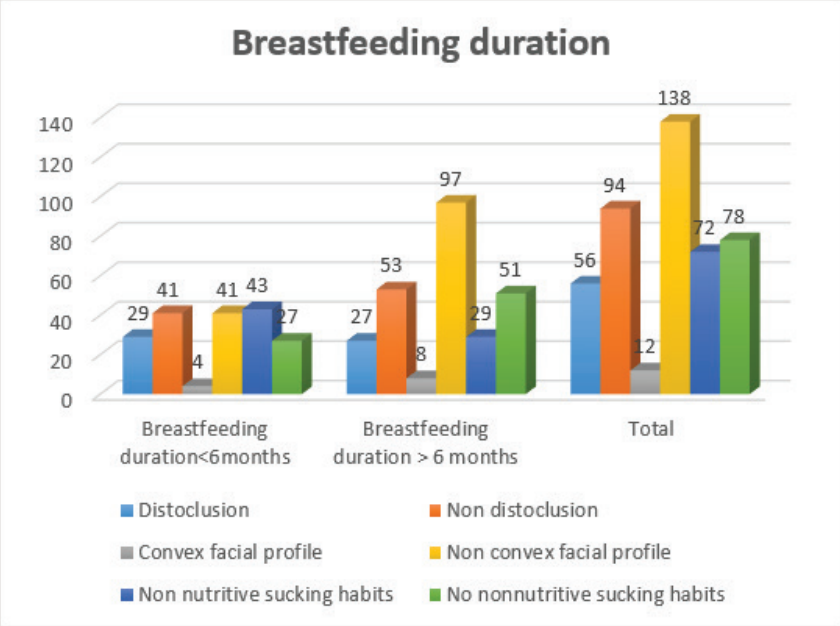
	Breastfeeding duration<6months	Breastfeeding duration > 6 months	Total
Distoclusion	29	27	56
Non distoclusion	41	53	94
Convex facial profile	4	8	12
Non convex facial profile	41	97	138
Non nutritive sucking habits	43	29	72
No nonnutritive sucking habits	27	51	78

Table:-5 Association between sucking habits and occlusion, facial profile

	Non nutritive sucking habits	No nonnutritive sucking habits
Distoclusion	32	24
Non distoclusion	30	64
Convex facial profile	9	3
Non convex facial profile	25	113



Graph:-1 Association between sucking habits and occlusion, facial profile



Graph:-2 Association between breast feeding nutrition and occlusion,facial profile and sucking habits.

Discussion

Breastfeeding positively affects physiological as well as the psychological development of children. Mother's milk provides all required nutrition which could promote proper immunological protection and therefore prevent chronic diseases and respiratory infections[11]. It is also associated with growth and development of the maxillomandibular complex by the act of sucking which induces perioral muscle activity[12,13].

On the other hand, nonnutritive sucking habits could cause occlusal abnormalities especially if it is prolonged for longer duration[14]. Some authors showed that the prevalence of non nutritive sucking habits is influenced by many factors such as sex, birth order, feeding method, and socioeconomic status[15]. The results of the present study could not identify such relationship but it was found that the reduced duration of breastfeeding was related to the non nutritivesucking habits below the year of four.Though information regarding breastfeeding relating to Non nutritive sucking habits is somewhat contradictory,the Results of this study indicated that the prevalence of non nutritivesucking habits were lower in children who were breastfed longer which might suggest this assumption that breastfeeding time has a preventive effect on non nutritivesucking habit development. An explanation is that the less time of breastfeeding induces more time of bottle feeding which in turn increases the chance of other external object sucking. In other words, bottle feeding gives children this opportunity to be addicted in sucking other external objects[16].

In the current study the dental examination was also performed and the association between non nutritive sucking habits and malocclusion prevalence was documented. Numerous studies identified significant association between sucking habits and anterior open bite, class II occlusion, increased overjet, and posterior crossbite [17].

In this study a significant association between breastfeedingduration and nonnutritive sucking habits and also between nonnutritive sucking habits and convex facial profile and distoclusion were observed. In a study conducted by Bishara et al a higher incidence of malocclusion associated with breastfeeding duration of less than 6 months was observerd[18]. This was similar to our study in which 29 children had distoclusion with a duration of breastfeeding less than 6 months and 27 children had distoclusion with a duration of breastfeeding more than 6 months. Comparing the facial profile it was observed that 97 of children had nonconvex facial profile with a breastfeeding duration more than 6 months.Out of 72 children with non nutritive sucking habits 43 patients were with a breastfeeding duration of less than 6 months and 29 were with a breastfeeding duration of more than 6 months.

There is no doubt that breastfeeding has benefits for general health; nevertheless, the relationship of breastfeeding on oral health is still inconclusive[19]. Although the growth and development of the facial bones is strongly associated with genetic factors [20], it is also believed that environmental factors such as breastfeeding and oral parafunctional habits also affect facial growth[21]. Our findings also point to a hypothesis that nonnutritive sucking habits may act as a dominant factor in the relationship between breastfeeding duration and convex facial profile and distoclusion of the dentition.

Conclusion

From this study it was observed the occurrence of convex facial profile and distoclusion was not associated with breastfeeding duration but with non nutritive sucking habits.However,there was a significant association between reduced breastfeeding duration and nonnutritive sucking habits.Nonnutritive sucking habits may be hypothesized as a dominant variable in the relationship between breastfeeding duration and convex facial profile and distoclusion of the dentition.

Ethical Clearance: Department of research, Saveetha Dental college

Source of Funding: Self

Conflict of Interest: Nil

References

[1] Lopez Del Valle LM, Singh GD, Feliciano N, Machuca M, Del C. Associations between a history of breastfeeding, malocclusion and para functional habits in Puerto Rican children. PR Health Sci J. 2006 Mar;25(1):31–34. [PubMed]

[2]. Bishara SE, Hoppins BJ, Jakobson JR, Kohout FJ. Changes in the molar relationship between the deciduous and permanent dentitions: a longitudinal study. Am J Orthod Dentofacial Orthop. 1988 Jan;93(1):19–28. [PubMed]

[3] Agarwal SS, Sharma M, Nehra K, Jayan B, Poonia

A, Bhattal H. Validation of Association between Breastfeeding Duration, Facial Profile, Occlusion, and Spacing: A Cross-sectional Study. Int J Clin Pediatr Dent 2016;9(2):162-166.

[4] Kobayashi HM, Scavone H, Jr., Ferreira RI, Garib DG. Relationship between breastfeeding duration and prevalence of posterior crossbite in the deciduous dentition. American Journal of Orthodontics and Dentofacial Orthopedics. 2010; 137: 54-8.

[5] Farsi NM, Salama FS. Sucking habits in Saudi children: prevalence, contributing factors and effects on the primary dentition. Journal of Pediatric Dentistry. 1997; 19: 28-33.

[6] Moimaz SA, Zina LG, Saliba NA, Saliba O. Association between breast-feeding practices and sucking habits: a cross- sectional study of children in their rst year of life. Journal of Indian Society of Pedodontics and Preventive Dentistry. 2008; 26: 102-6.

[7] Viggiano D, Fasano D, Monaco G, Strohmenger L. Breast feeding, bottle feeding, and non-nutritive sucking; effects on occlusion in deciduous dentition. Archives of Disease in Childhood. 2004; 89: 1121-3.

[8] Enlow DH, Hans MG. Essentials of facial Growth. 2nd ed. Ann Arbor: Needham Press; 2008. p. 234–5.

[9] Legovic M, Ostric L. The effects of feeding methods on the growth of the jaws in infants. ASDC J Dent Child. 1991;58(3):253–5.

[10] Caramez da Silva F, Justo Giugliani ER, Capsi Pires S. Duration of breastfeeding and distoclusion in the deciduous dentition. Breastfeed Med. 2012 Dec;7(6):464-8. doi: 10.1089/bfm.2011.0123. Epub 2012 Sep 10

[11] Melink, Stasa et al. Posterior crossbite in the deciduous dentition period, its relation with sucking habits, irregular orofacial functions, and otolaryngological findings. American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics 138 1 (2010): 32-40.

[12]John J Warren, Barbara A. Broffitt and Steven M. Levy. "Changes in the prevalence of nonnutritive sucking patterns in the first 8 years of life." American journal of orthodontics and dentofacial orthopedics : official publication of the American Association of Orthodontists, its constituent societies, and the American Board of Orthodontics 130 1 (2006): 31-6.

[13] Fasano, D., Monaco, G. & Strohmenger, L. Breast feeding, bottle feeding and non-nutritive sucking; effects on occlusion in deciduous dentition. Arch Dis Child. 89, 1121–3 (2004).

[14] Galan-Gonzalez, A. F., Aznar-Martín, T., Cabrera-Dominguez, M. E. & Dominguez-Reyes, A. Do breastfeeding and bottle feeding influence occlusal parameters? Breastfeed Med. 9, 24–9 (2014).

[15] Lopes-Freire, G. M. et al. Exploring the association between feeding habits, non-nutritive sucking habits, and malocclusions in the deciduous dentition. Prog Orthod. 16, 1–7 (2015).

[16] Raftowicz-Wojcik, K., Matthews-Brzozowska, T., Kawala, B. & Antoszewska, J. The effects of breast feeding on occlusion in primary dentition. Adv Clin Exp Med. 20, 371–5 (2011).

[17] Warren, J.J., Bishara, S.E. Duration of nutritive and nonnutritive sucking behaviors and their effects on the dental arches in the primary dentition. Am J Orthod Dentofacial Orthop. 2002;121:347–356.

[18] Melsen, B., Stensgaard, K., Pedersen, J. Sucking habits and their influence on swallowing pattern and prevalence of malocclusion. Eur J Orthod. 1979;1:271–280

[19] Fukuta, O., Braham, R.L., Yokoi, K., Kurosu, K. Damage to the primary dentition resulting from thumb and finger (digit) sucking. J Dent Child. 1996;63:403–407.

[20] Larsson, E. The prevalence and aetiology of prolonged dummy and finger-sucking habits. Eur J Orthod. 1985;7:172–176.

[20] Dogramaci EJ, Rossi-Fedele G. Establishing the association between nonnutritive sucking behavior and malocclusions: a systematic review and meta-analysis. JADA. 2016;147(12):926–34. e6

[21] Tibolla C, Rigo L, Nojima LI, Estacia A, Frizzo EG, Lodi L. Association between anterior open bite and pacifier sucking habit in schoolchildren in a city of southern Brazil. Dental Press J Orthod. 2012;17(6):89–96

Quality of life in Women with Adverse Pregnancy Outcome in Karad

Dimpal Anil Bajaj[1], G.Varadharajulu[2]

[1]Final year BPTh Student, [2]Professor and Dean, Department of Neurosciences, Krishna College of Physiotherapy, KIMS "Deemed to be University" Karad, Maharashtra, India

Abstract

Pregnancy is a period from conception to birth. During this period several physical and emotional changes occurs in women. Women should be physically and more over mentally prepared to have a baby in her womb. Miscarriage is spontaneous loss of the fetus before 20 weeks of gestation. The rate of miscarriage increases with a maternal age of less than 18years or an age of 35 years or more, an increasing number of previous miscarriage, and increasing parity. In rural population women are forced to marry at an early age.

Objective: To study the quality of life on SF-36 questionnaire of women having adverse pregnancy outcomes.

Materials and Methodology: The study was conducted in krishna institute of medical sciences 'deemed to be' university Karad. Subjects were selected according to inclusion and exclusion criteria. The subjects underwent test using quality of life questionnaire- SF36**.**

Conclusion: The present study provided evidence to support the decline in quality of life of women with adverse pregnancy outcome.

Key words: *adverse pregnancy, miscarriage, quality of life, SF-36*

Introduction

Women is a creative force of the universe in almost all its expression. Life begins in her womb and it is in her guiding hands and tender care that it finds expression. Being a mother is one of the most blessed and the challenging job in the world. Giving birth to a new life and making it walk through the new world holding its hands showing a good trial makes a mother victorious in her life.[1]

Pregnancy is a period from conception to birth. During this period several physical and emotional changes occurs in women. Women should be physically and more over mentally prepared to have a baby in her womb. Even before women gives birth, pregnancy thinkers with the very structure of the brain.[2]

Corresponding Author:
Dr. G. Varadharajulu
Professor and Dean, Department of Neurosciences
Krishna College of Physiotherapy Kims Deemed To Be University, Karad 415110, Maharashtra, India

In today's generation modern women are enjoying more freedoms than ever before in almost all the field. Today women's don't like to sacrifice anymore. They don't want to work at anything that takes more time. It takes time to invest in people and they want it easy. Fast-food, fast internet, fast coffee, and fast checkout lines. Anything outside of this crumbles their universe. Women today behave very much more like man. They drink alcohol and do drugs. In this modern era women's attitude against pregnancy and being a mother is changing. With the changing attitude of pregnant women and life style there is increase in number of adverse pregnancy outcomes such as miscarriage, fetal death, still births etc. [2,3]

Miscarriage is spontaneous loss of the fetus before 20 weeks of gestation. The rate of miscarriage increases with a maternal age of less than 18years or an age of 35 years or more, an increasing number of previous miscarriage, and increasing parity. In rural population women are forced to marry at an early age. With such marriages the pressure of getting pregnant as soon as possible is also high. Endocrine disorders,

immunological disorders, infection, maternal medical illness, uterine fibroids, alcohol consumption, smoking, drugs are some of the common causes of miscarriage[5]

Quality of life is a general well-being of individuals and societies, outlining negative and positive features of life. Quality of life is an overarching term for the quality of various domains in life. It is subjective, multidimensional concept that defines a standard level of emotional, physical, material and social well-being.

The loss of fetus leads to stressful or traumatic events which can have a lifelong effect. Traumatic experiences involve a various series of physiological and psychological reactions such as depression, anxiety, frustration, sleep disorders, grief, excess fatigue, irritability, pain and lack of concentration. Denial and repression of such feelings can lead to adverse health effects and disorders such as posttraumatic stress. Many studies have shown high rates of symptoms of depression, anxiety and fatigue following perinatal loss.[6]

It is important to understand the effect of this type of loss on the quality of life of women in order to develop intervention to reduce physical and mental stress of mother.

Materials and Method

The subjects in Krishna institute of medical sciences deemed to be university campus were screened and those fulfilling the inclusion and exclusion criteria were involved. 55 subjects were selected for the study. Participants were informed about the study and consent was taken. The subjects underwent test using quality of life questionnaire SF-36.

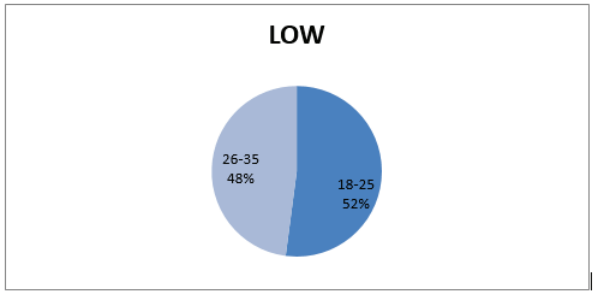
Statistical Analysis

Statistical analysis was done by using the statistics software INSTAT so as to verify the results derived. Arithmetic mean and standard deviation was calculated for the outcome measure MS Excel was used for drawing graph.

Results

Table 1: Age distribution.

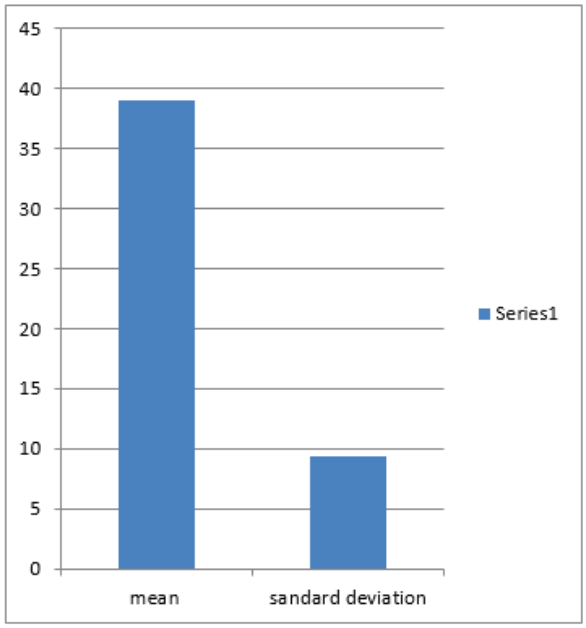
Age	Low QOL	HIGH QOL
18-25	25	4
26-35	23	2



Graph 1: Age Distribution

2. Outcome Measures.

Outcome Measure	Mean	Standard Deviation
Quality of Life Sf36	39.019	9.311



Graph 2: Mean And Standard Deviation of Total Scoring of Sf-36.

Discussion

Child birth is one of the most heavenly things in this universe. Women is a creative force of the universe in almost all its expression. Life begins in her womb and it is in her guiding hands and tender care that its finds expression. Being a mother is one of the most blessed and the challenging job in the world. Giving a birth to new life and making it walk through the new world holding its hands showing a good trial makes a mother

victorious in her life.

Pregnancy is the period from conception to child birth. During this stage many emotional and physical changes occur in the women. In this modern era women's attitude against pregnancy and being a mother is changing. With the changing attitude of pregnant mother and life style there is increase in number of adverse pregnancy outcomes such as miscarriage, fetal death, still births etc.

Miscarriage is spontaneous loss of the fetus before 20 weeks of gestation. Endocrine disorders, immunological disorders, infection, maternal medical illness, uterine fibroids, alcohol consumption, smoking, drugs are some of the common causes of miscarriage.

The loss of fetus can lead to traumatic or stressful events which have a lifelong effect. It involves various series of physiological and psychological reactions such as depression, anxiety, frustration, sleep disorders, grief, excess fatigue, irritability, pain and lack of concentration.

The objective of this study was to see the quality of life of women with adverse pregnancy outcome in rural population using SF-36 questionnaire.

This study was conducted in KIMS, where subjects were selected as per the criteria and underwent a study where they had to answer the questions of SF-36 questionnaire. Subjects were informed about the study and prior consent was taken.

The results of this study showed that there was significant decline in the quality of life of the women with adverse pregnancy outcome.

Women's with age group18-25 has 52% of quality of life and age group 26-35 showed48%of quality of life.

Conclusion

The present study provided evidence to support the decline in quality of life of women with adverse pregnancy outcome.

Funding

Funding was provided by Krishna institute of medical sciences deem to be university.

Conflict of Interest: There was no conflict of interest.

Ethical Clearence: Ethical clearance was obtained from the protocol committee and institutional ethical committee of Krishna institute of medical sciences deemed to be university.

Refrences

1. DC Dutta's, textbook of OBSTETRICS 8edition
2. Evelyn Regina Couto1, Egle Couto2, Bruna Vian1, Zoraide Gregório3, Marcelo Luis Nomura2, Renata Zaccaria4, Renato Passini Junior2 Quality of life, depression and anxiety among pregnant women with previous adverse pregnancy outcomes Sao Paulo Med J. 2009; 127(4):185-9
3. Armstrong DS. Impact of prior perinatal loss on subsequent pregnancies. J Obstet Gynecol Neonatal Nurs. 2004;33(6):765-73.
4. D. Ware Branch, M.D., Mark Gibson, M.D., and Robert M. Silver, M.D. Recurrent Miscarriage The New England Journal of Medicine october 28, 2010
5. NORMAN BRIER, Ph.D. Grief Following Miscarriage: A Comprehensive Review of the Literature JOURNAL OF WOMEN'S HEALTH Volume 17, Number 3, 2008
6. M.C.J. Cuisinier*", J.C. Kuijpersb, C.A.L. Hoogduin", C.P.H.M. de Graauwc, H.J.E.M. Janssena Miscarriage and stillbirth: time since the loss, grief intensity and satisfaction with care European Journal of Obstetrics & Gynecology and Reproductive Biology 52 (1993) 163- 168

Study of Morbidity Pattern and Its Associated Factors among Migrant Workers Residing in the Field Practise Area of a Tertiary Care Hospital in Mangalore: A Cross-Sectional Study

G. Rakesh Maiya[1], G. Shiny Chrism Queen Nesan[1], Sanjeev Badiger[2], K. G. Kiran[3], Timsi Jain[4]

[1]Assistant Professor, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai, [2]Professor and Head, Department of Community Medicine, K. S. Hegde Medical Academy, Mangalore, [3]Professor and Head, Department of Community Medicine, Kanachur Institute of Medical Sciences, Mangalore, [4]Professor and Head, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai

Abstract

Introduction: Migration is a process of social change due to which a person moves from one cultural setting to another to settle for a longer period or permanently. The collapse of rural livelihood forces the workers to migrate. As migrants do several types of jobs, there are high chances of morbidities. **Methods:** A cross-sectional study was done on 392 people selected using simple random sampling in Lingapayyakadu using pre-tested and semi-structured questionnaire. SPSS software was used for data analysis. **Results:** 68.7% were males and rest females. 80.9% had some form of acute morbidity in previous 3 months whereas 16% were suffering from chronic morbidities. Age ($p = 0.046$), working hours per day ($p = 0.017$) and occupation ($p = 0.047$) had significant association with acute morbidity while age, ($p < 0.01$) sex ($p = 0.046$) and education level ($p < 0.01$) had significant association with chronic morbidity. **Conclusion:** Major acute morbidity was musculo-skeletal disorders and age, working hours and occupation had significant association while hypertension was the major chronic morbidity with age, sex and education level having significant association with chronic morbidity.

Key words: *Migration, Musculo-skeletal disorders, Acute morbidity, Chronic morbidity, Risk factors*

Introduction

The word 'Migration' is derived from the Latin word 'Migrate', which means to change one's residence[1]. Migration is a process of social change due to which a person moves from one cultural setting to another to settle for a longer period or permanently[2]. The collapse of rural livelihood in many parts of India forces the workers to migrate from their native places in search of employment. The urbanization level has increased from 27.81% in 2001 to 31.16% in 2011 in India as per census with main reasons being population explosion and poverty induced rural to urban migration[3]. In India, according to 2011 census there is an average of 14 million internal migration every year[4]. Migrants often live in a social context where new social, political and language realities result in great demands on their coping skills and adaptability[5,6]. The relationship between disease, travel and migration have historical roots that continue to influence modern medical activities[7]. Migration is a very stressful process with various factors like job insecurity, poverty, social and geographical isolation, time pressures, poor living conditions, separation from family, lack of recreational activities etc. Knowledge about the health status of migrants is often limited due to lack of data. This is because migrants are often excluded from surveys. As migrants do several types of jobs, there are high chances that they are exposed to different types of physical, chemical and biological agents making them vulnerable to health problems. Migrants from disease-endemic area often settle in urban slums in unprotected houses which is highly vector receptive thus introducing

Corresponding Author:
Dr G. Shiny Chrism Queen Nesan,
Assistant Professor, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India
Email: shinynesan75@gmail.com

new and drug resistant strains[8]. Unique health problems of migrant workers are i) Spread of communicable diseases ii) Reproductive and Child Health iii) Child labour iv) Adaptation, adjustment and psychological disorders v) Occupational diseases etc[9]. Migration phenomenon will continue to increase anyways in coming years. Addressing their issues mainly relating to health is a matter that affects both the nation and the migrants. While available studies have primarily focused on TB and AIDS, or reproductive health of female migrants, limited research is done on over-all morbidity pattern. In this quest a cross-sectional study was planned to study the baseline socio-demographics, morbidity pattern and its associated factors.

Objectives

1. To assess the morbidity pattern of the migrant workers.

2. To determine the associated factors for the morbidity pattern.

Method

A cross-sectional study was conducted in Lingapayyakadu, that comes under the coverage area of Community Health Centre, Mulki, which was a health provision area of the Department of Community Medicine, K. S. Hegde Medical Academy, Mangalore from May 2017 to May 2018. Sample size was calculated based on previous study where the prevalence was 43% using $4pq/d^2$ formula which comes to 392[10]. Migrants working for more than 3 months and those who were above 18 years were included and among them those who were not willing to participate were excluded. The house list (sampling frame) of migrant workers was taken from the Mulki Town Panchayath. The households of the migrant workers were selected using lottery method of simple random sampling and all the migrant workers in the house who satisfied eligibility criteria and were present physically during the visit were considered. Pre-tested and semi-structured questionnaire containing socio-demographic factors, acute morbidity pattern in last 3 months and chronic morbidity pattern was used to collect the data by interview method. Morbidity pattern was assessed based on self-reported symptoms and hospital/laboratory records if available with the study participants during data collection. Informed consent was taken from participants and Institutional Ethics Committee clearance was taken from the institution. Data was entered into excel sheet and analysed using SPSS software version 16. Proportions and percentages were used for descriptive statistics. Chi-square test was used for inferential statistics. P-value less than 0.05 was considered significant.

Results

Socio-demographic factors:

Table 1 shows the socio-demographic factors depicting the distribution of study participants based on age, sex, education, occupation and working hours per day.

Acute morbidity:

Major acute morbidity among study participants (393) was musculoskeletal disorders (41.5%). Other acute morbidities include skin related problems (29.5%) , Gastrointestinal problems (19.3%), Respiratory problems (12.2%) and Fever of any origin (10.2%).

Over all 318 (80.9%) had some form of acute morbidity at least once in the past 3 months. **(Figure 1)**

Chronic morbidity:

37(9.4%) of the 393 study participants had Hypertension, 27(6.9%) were suffering from Diabetes Mellitus and 7(1.8%) were suffering from chronic heart disease other than hypertension. There was no reporting of any other chronic diseases like thyroid disorder, cancer etc. Overall, 63(16%) participants have some form of chronic morbidity. **(Figure 2)**

Associated factors:

Acute morbidity had significant association with age($p=0.046$), working hours per day ($p=0.017$) and occupation ($p=0.047$). It did not have any significant association with gender though acute morbidity was high among females **(Table 2).**

Table 3 depicts that chronic morbidity had significant association with age ($p<0.01$), gender ($p=0.046$) and education (<0.01). Chronic morbidity did not have any significant association with working hours per day, but it was high among participants whose working hours per day was less than 8 hours and participants who did not have debt.

Table 1: Socio-demographic factors of the study participants (N = 393)

Characteristic	Frequency (n)	Percentage(%)
Respondents	393	100
Age (in years)		
18-20	42	10.7
21-30	197	50.1
31-40	68	17.3
41-50	53	13.5
>50	33	8.4
Sex		
Male	270	68.7
Female	123	31.3
Education		
Illiterate	52	13.2
Primary	127	32.3
Secondary	161	41
PUC	42	10.7
Graduation	11	2.8
Occupation		
Skilled worker	5	1.3
Semi-skilled worker	167	42.5
Unskilled worker	221	56.2
Working hours per day		
<8	46	11.7
8-10	161	41
10-12	152	38.7
>12	34	8.6
Debt		
Yes	39	9.9
No	354	90.1

Table 2: Association of acute morbidity pattern with socio-demographic factors (N=393)

Age (in years)	**Acute morbidity**		**Total (N=393, 100%)**	**p-value**
	Yes (N=318, 80.9%)	**No (N=76, 19.1%)**		
18-20	34 (81%)	8 (19%)	42 (100%)	
21-30	149 (75.6%)	48 (24.4%)	197 (100%)	
31-40	60 (88.2%)	8 (11.8%)	68 (100%)	0.046
41-50	44 (83%)	9 (17%)	53 (100%)	
>50	31 (93.9%)	2 (6.1%)	33 (100%)	
Working hours per day				
<8	30 (65.2%)	16 (34.8%)	46 (100%)	
8-10	129 (80.1%)	32 (19.9%)	161 (100%)	0.017
10-12	131 (86.2%)	21 (13.8%)	152 (100%)	
>12	28 (82.4%)	6 (17.2%)	34 (100%)	
Occupation				
Skilled worker	2 (40%)	3 (60%)	5 (100%)	
Semi-skilled worker	133 (79.6%)	34 (20.4%)	167 (100%)	0.047
Unskilled worker	183 (82.8%)	38 (17.2%)	221 (100%)	
Sex				
Male	212 (78.5%)	58 (21.5%)	270 (100%)	0.073
Female	106 (86.2%)	17 (13.8%)	123 (100%)	

Table 3: Association between chronic morbidity pattern with socio-demographic factors (N=393)

Age (in years)	**Chronic Morbidity**		**Total (N=393, 100%)**	**p-value**
	Yes (N=63, 16%)	**No (N=330, 84%)**		
18-20	2 (4.8%)	40 (95.2%)	42 (100%)	
21-30	4 (2%)	193 (98%)	197 (100%)	
31-40	14 (20.6%)	54 (79.4%)	68 (100%)	<0.01
41-50	24 (45.3%)	29 (54.7%)	53 (100%)	
>50	19 (57.6%)	14 (42.4%)	33 (100%)	
Sex				
Male	50 (18.5%)	220 (81.5%)	270 (100%)	0.046
Female	13 (10.6%)	110 (89.4%)	123 (100%)	

Cont... **Table 3: Association between chronic morbidity pattern with socio-demographic factors (N=393)**

Education				
Illiterate Primary Secondary PUC College	26 (50%) 16 (12.6%) 15 (9.3%) 4 (9.5%) 2 (18.2%)	26 (50%) 111 (87.4%) 146 (90.7%) 38 (90.5%) 9 (81.8%)	52 (100%) 127 (100%) 161 (100%) 42 (100%) 11 (100%)	<0.01
Working hours per day				
<8 8-12 12-14 >14	9 (19.6%) 29 (18%) 19 (12.5%) 6 (17.6%)	37 (80.4%) 132 (82%) 133 (87.5%) 28 (82.4%)	46 (100%) 161 (100) 152 (100%) 34 (100%)	0.499
Debts				
Yes No	4 (10.3%) 59 (16.7%)	35 (89.7%) 295 (83.3%)	39 (100%) 354 (100%)	0.30

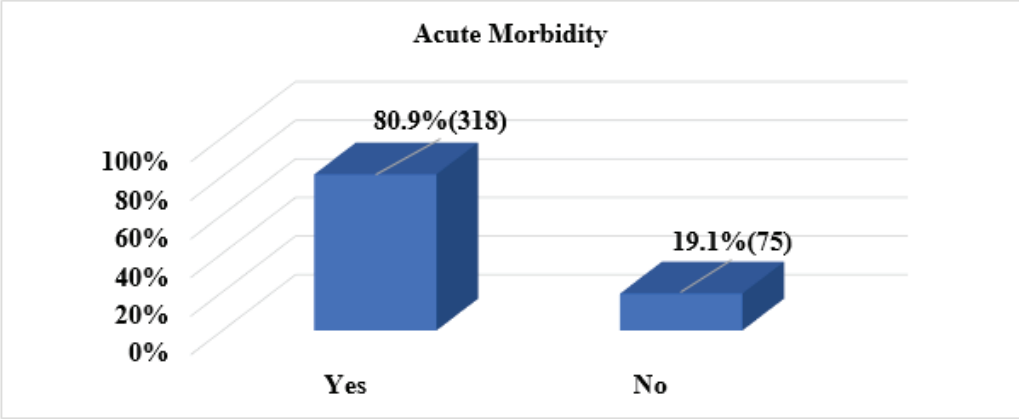


Figure 1: Proportion of acute morbidity in past 3 months among the study participants (N=393)

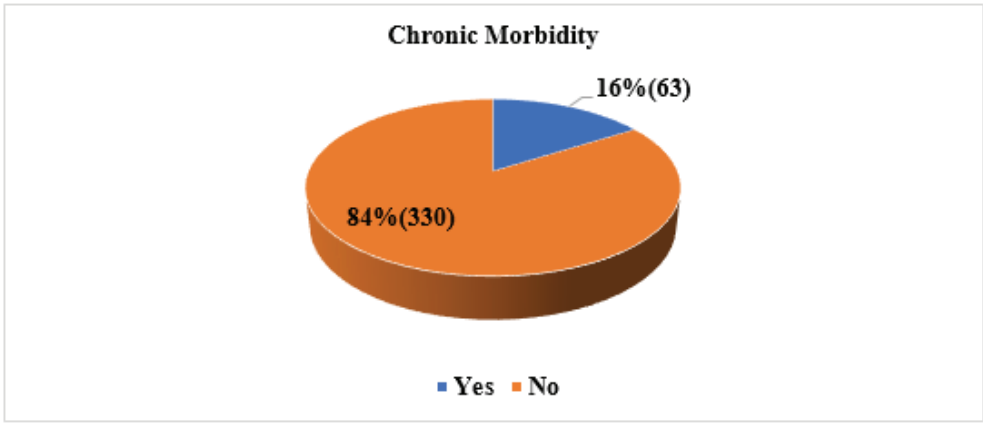


Figure 2: Proportion of chronic morbidity among study participants (N=393)

Discussion

According to this study among 393 migrants 68.7% were males indicating that the share of male migrants is more which is similar to a study done by Mitra A et al[13]. In the present study, majority of the study participants literacy status was primary (32.3%) and secondary (41%) which is similar to a study done by Trupti Bodhare et al[14]. In the present study, 11.7% of the study participants worked for less than 8 hours per day whereas majority of them (88.3%) worked for more than 8 hours per day with 41% working for 8-10 hours per day, 38.7% working for 10-12 hours per day and 8.6% working for more than 12 hours per day. This is similar to a study done by Guddi Tiwary et al[15]. In the present study, 56.2% were un-skilled workers, 42.5% were semi-skilled worker and only 1.3% were skilled worker. This is dissimilar to the studies done by Pratik K. Jasani et al[16] where 76% were un-skilled and 24% were skilled workers and Balakrishna B. Adsul et al[17] where 79.4% were un-skilled workers and 20.6% were skilled. This might be because of the difference in the categorization of the occupation of the study participants (Semi-skilled category was not used in both the above-mentioned studies). In the present study 41.5% had musculo-skeletal problems This is similar to studies done by Mohopatra R[18] where 40% of the migrant workers had musculo-skeletal problems and Dr K. G. Kiran et al[10] where 43.3% had musculo-skeletal problems. In this study 19.3% of the study participants had Gastro-intestinal problems. This finding is similar to a study done by Sandeep H et al[19] where 23.6% have gastro-intestinal problems. Skin conditions have contributed 29.5% which is similar to studies done by Pratik K Jasani et al[16] (25.6%) and Dr K. G. Kiran et al[10] (22.6%). 10.2% of the study participants in the present study had fever of any origin in the past 3 months. This is similar to a study done by Hiteshree C Patel et al[20] where 12.9% of the study participants had fever. Overall 80.9% of the study participants had some form of acute morbidity in the past 3 months. This is similar to studies done by Sithara R. S. et al[21] where 79.1% of the study participants had some form of acute morbidity in past 3 months and Surabhi KS et al[22] where 87% of the study participants had acute morbidity. The prevalence of hypertension among the study participants was 9.4%. In the studies done by Utsav Raj et al[23] and Balakrishna B. Adsul et al[17] the prevalence of hypertension was 4.4% and 3.4% respectively. The prevalence of hypertension was high in the present study. This could be because of a greater number of younger study participants in the former studies and there are various studies which show significant relationship between age and hypertension[24]. In the present study, 6.9% were diabetics and 1.8% had heart diseases (other than hypertension). In a study done by Safraj Shahul Hameed et al[25] 15.1% of male study participants were diabetics and 10.1% of female study participants were diabetics whereas 7.1% males and 4.4% females had cardiac conditions. In the present study acute morbidity was more among study participants aged more than 50 years (93.9). This could be because as the age progresses the capacity to work decreases. The study participants who worked for more than 10 hours per day had more acute morbidity as it involves lot of strenuous work and exposure to dust and harm physical and chemical agents. Unskilled workers were the majority population to have acute morbidity (82.8%) as they have to work in difficult conditions and for longer periods. Chronic morbidity was highest among study participants aged above 50 years (57.6%). There are well known studies which show that the chronic morbidities increase as age progresses. In the present study males (18.5%) had more chronic morbidity than compared to females (10.6%).

Conclusion

This study concludes that majority of the study participants had acute morbidity (80.9%). Musculo-skeletal problem was the most common compliant followed by dermatological problems, gastrointestinal problems and respiratory problems. Small proportion of participants had chronic morbidity like hypertension (9.4%), diabetes mellitus (6.9%) and cardiovascular problems except hypertension (1.8%).

Acknowledgement: We thank all the study subjects for their cooperation in this study.

Source of Funding: Nil

Conflict of Interest: None declared

Ethical Clearance: Taken from the Institutional Ethics Committee

References

1. Definition of MIGRANT [Internet]. Merriam-webster.com. 2018 [cited 28 January 2020]. Available from: http://www.merriam-webster.com/dictionary/migrate
2. Health and Migration: A Review [Internet]. Oslo University Hospital. 2013 [cited 28 January 2020]. Available from: http://www.

nakmi.no/publikasjoner/dokumenter/Public-Health-Challenges-of-Immigrants-in-Norway-nakmireport-2-2010.pdf

3. Sharma K. India has 139 million internal migrants. They must not be forgotten [Internet]. World Economic Forum. 2018 [cited 28 January 2020]. Available from: https://www.weforum.org/agenda/2017/10/india-has-139-million-internal-migrants-we-must-not-forget-them/
4. D Cruz N. [Internet]. Rgics.org. 2018 [cited 29 January 2020]. Available from: https://www.rgics.org/wp-content/uploads/policy-watch/PW_6.7-september-2017.pdf
5. Parutis V. "Economic Migrants" or "Middling Transnationals"? East European Migrants' Experiences of Work in the UK. International Migration. 2011;52(1):36-55.
6. Schaeffer P. Refugees: On the Economics of Political Migration. International Migration. 2010;48(1):1-22.
7. Gensini G. The concept of quarantine in history: from plague to SARS. Journal of Infection. 2004;49(4):257-2.
8. Kristiansen M, Mygind A, Krasnik A. Health effects of migration. Dan Med Bull. 2007;54:46-7.
9. Health equity for internal migrant labourers in India: an ethical perspective | Indian Journal of Medical Ethics [Internet]. Ijme.in. 2018 [cited 29 January 2020]. Available from: http://ijme.in/articles/health-equity-for-internal-migrant-labourers-in-india-an-ethical-perspective/
10. Kiran KG, Kumar N, Kiran NU, Alva ABR, Swathi HN, Badiger S. Study of morbidity pattern among migrant workers in a coastal city of Karnataka, India: a cross-sectional study. International Journal of Current Research. 2016;8(7):34078-34080.
11. Mitra A, Murayama M. Rural to Urban Migration: A District-Level Analysis for India. International Journal of Migration, Health and Social care. 2009;5(2):35-52.
12. Bodhare T, Valsangkar S, Bele S. An epidemiological study of work-related musculoskeletal disorders among construction workers in Karimnagar, Andhra Pradesh. Indian Journal of Community Medicine. 2011;36(4):304-7.
13. Tiwary G, Gangopadhyay P. A review on the Occupational Health and Social Security of Unorganized Workers in the Construction Industry. Indian Journal of Occupational and Environmental Medicine. 2011;15(1):18-24.
14. Jasani P, Nimavat J, Joshi J, Kartha G. A study of morbidity profile amongst construction workers at selected construction sites in Surendranagar city. International Journal of Medical Science and Public Health. 2017;6(2):382-387.
15. Adsul BB, Laad PS, Howal PV, Chaturvedi RM. Health problems among migrant construction workers: A unique public–private partnership project. Indian Journal of Occupational and Environmental Medicine. 2011;15(1):29-32.
16. R Mohapatra. Occupational Health Hazards and Remedies. Jaypee Brother Medical Publishers Pvt Ltd. New Delhi. Edition 2nd 2002. Pg 54-5.
17. Sandeep H, Shashikala M, Ramya KS. Morbidity profile of construction workers aged above 14 years in selected areas of Bangalore Urban District. Journal of Evolution of Medical and Dental Sciences. 2015;4(49):8552-8560.
18. Patel H, Moitra M, Momin M, Kantharia S. Working Conditions of Male Construction Workers and Its Impact on Their Life: A Cross Sectional Study in Surat City. National Journal of Community Medicine. 2012;3(4):652-56.
19. RS Sithara, Sebastian A. Health Needs, Health Seeking Behaviour of Interstate Migrants and Health System Response: A Case Study. Journal of Social Work Education and Practice. 2017;2(2):58-66.
20. Surabhi KS, Kumar N. Labour Migration to Kerala: A Study of Tamil Migrant Labourers in Kochi [Internet]. Centre for Socio-economic & Environmental Studies. Csesindia.org. 2007 [cited 11 September 2018]. Available from: sesindia.org/admin/modules/cms/docs/publication/16.pdf
21. Raj U, Pracheth R, Nischith KR. Are workers in construction sites of Mangalore city healthy? a cross-sectional study. International Journal of Community Medicine and Public Health. 2018;5(3):1122-6.
22. Buford T. Hypertension and Aging. Ageing Research Reviews. 2016;26:96-111.
23. Shahul Hameed S, Kutty V, Vijayakumar K, Kamalasanan A. Migration status and Prevalence of Chronic Diseases in Kerala State, India. International Journal of Chronic Diseases. 2013;2013:1-6.

Prevalence of Heel Pain in Farmers

Gayatri Sunil Landge[1], Pragati Salunkhe[2]

[1]Final Year Student, Faculty of Physiotherapy, KIMS Deemed To Be University Karad, Maharashtra, India,
[2]Assistant Professor of Department of Neuroscience , Krishna College of Physiotherapy, Karad, Maharashtra, India

Abstract

Objectives: The objective of this study was to find out prevalence of heel pain in farmers.

Method: Study was conducted with 100 subjects in and around Karad. Subjects were selected as per inclusion and exclusion criteria and consent was taken. Both males(56) and females(44) subjects were included for study. Then they were assessed with help of foot pain questionnaire, study was done according to results obtained the conclusion was given.

Result: After analyzing the data, it was found that there is a prevalence of heel pain in farmers. 24% of subjects are having heel pain & 76% of subjects do not have heel pain. It is found that prevalence of heel pain is more in females than males and pain distribution is more in age group of 41 to 51.

Conclusion: The prevalence of heel pain is more in females and precautions should be taken by farmers by modifying their work strategies to avoid further damage.

Keywords: *Heel pain, Farmers, Musculoskeletal Condition.*

Introduction

Foot and ankle health is important because pain in this region can make it difficult to accomplish day to day jobs. Heel pain is also can impair the quality of daily activities, state of mind and performance of an individual. Most common causes of heel pain are:

1. Plantar fasciitis
2. Retrocalcaneal bursitis
3. Achilles tendinopathy and some other conditions also can cause heel pain.[1,2]

• **Plantar fasciitis-**It is a major cause of heel pain. It is mainly seen in occupations which are included prolong standing or walking. It can worsen when repeated stresses are given to them leading to worsening of heel pain. It is a result of inflammation of plantar aponeurosis at the point of it's attachment to calcaneal tuberosity. In this condition early morning pain is common.[1,9] Tightness and pain is experience in early morning and pain improves after walking and doing some activities. Self stretching can improve the pain but worsening can cause calcaneal spur.

• **Retrocalcaneal bursitis-**Retrocalcaneal bursa is situated behind the Achilles tendon where it is attaches to heel bone. When this bursa is inflamed then it is called as retrocalcaneal bursitis. It causes swelling around the back of heel area, pain and stiffness, loss of movements, redness and warmth of back of heel. It is also caused by overuse of heel and ankle area.[3,8]

• **Achilles tendinopathy**-It is a condition which can occur because of greater amount of strain produce on Achilles tendon and it can be due to old or poor quality footwear. And it also can occur because of walking on uneven surfaces. This condition also produces morning stiffness, tenderness of Achilles tendon to touch or gently squeezed. Audible clicking when ankle is moved

Corresponding Author:
Dr. Pragati Salunkhe
Assistant Professor of Department of Neuroscience, Krishna College of Physiotherapy, Karad, Maharashtra, India. Pin 415110. Phone Number- 9730830011
Email ID- drpragatisalunkhe94@gmail.com

is also seen sometimes. [10]

All these conditions can occur due to occupation related to foot overuse such as agricultural industry prolong standing.

Major population in India work for agricultural industry but this is most hazardous industry as it requires various processes that can lead to injuries. In agricultural industry there are more chances of foot and ankle injuries because of nature of their work.[4,5,6] As farmers have to work on uneven lands and slippery areas, sometimes on larger fields and hard surfaces.[12] It is suggested in studies that frequent deep dorsiflexion movements can cause retrocalcaneal bursitis and farmers are doing frequent foot dorsiflexion in altered way, because of that they can suffer from such conditions.[1,7] And because of barefoot walking, standing for long time, walking on uneven surfaces they are also more likely to suffer from heel pain.[10,11]

Method

This study is cross sectional study undertaken to find out prevalence of heel pain in farmers and to create awareness about it in them. Farmers with age group of 30 to 60, both males and females were included. Farmers already undergone from foot and ankle related injuries and those who are unwilling to participate are excluded. Written consent of the patient was taken. The study is ethically approved. The Foot Pain Questionnaire is used as study tool.

The sample size was calculated by foot/leg pain taken at 50%(as a study has shown as prevalence of leg/foot pain in rice farmers is 48.7% therefore 50% was taken into consideration for heel pain. Hence for calculation of sample size p=50% and q=100-p=50% sample size $n=4pq/L^2$ therefore n=100.The simple random sampling is used to select the subjects for study and it is conducted in and around Karad Taluka.

Result

The study was conducted among 100 participants in Karad of Satara District in Maharashtra. 44 females and 56 males participated among which 30 farmers belong to age group of 30 to 40 years, 50 farmers to 41 to 50 years and 20 farmers are of 51 to 60 years.

According to this study it was found that 34(68%) subjects have pain since last 2 years, 9(18%) have pain since 2-4 years, 4(8%) have pain since 4-6 years and 3(6%) have pain since 6-8 years. Side of the pain was also asked and it was found that 12(24%) subjects have pain in only right side, 15(30%) subjects have pain in only left side and 23(46%) subjects having pain in both the sides. Level of pain is measured by giving the subjects a 10 point numerical scale in which 0 is no pain and 10 is absolutely intolerable pain. 34(68%) subjects rated their pain in between 3-6 that is moderate pain and 16(32%) subject have pain above 6 that is severe pain. Standing is affected in 40(80%) subjects and both sitting and standing positions were affected in 10(20%).

3(6%) subjects have improvement from their pain but 25(50%) subjects worsened their pain and pain remained same in 22(44%) subjects. Standing and walking are the most affected activities in which standing was affected in 26(52%) subjects and walking is affected in 24(48%) subjects. Different remedies were used by the subjects to reduce the pain such as 35(53%) subjects used rest as a treatment, 3(4%) subjects bought new shoes, 15(23%) subjects applied ice, 8(12%) took injections and 5(8%) took anti-inflammatory medications. 24(24%) subjects show positive results for heel pain and 76(76%) does not have pain.

Farmers also face some major issues which are the main cause of difficulty in daily work and those are represented in following graph with further details.

Issues of farmers and their distribution

Graph 1: According to the graph above 50(60%) subjects have pain as a main problem for approaching the doctor and in those subjects 26(52%) subjects had pain in hindfoot, 10(20%) had pain in midfoot and 14(28%) subjects had pain in ankle. 12(14%) have uncomfortable shoe wear as a main issue , 2(2%) have instability, 17(20%) have sprain and 3(4%) have recent injuries.

Based on this study it was found that heel pain in farmers is statistically significant ($p< 0.0001$).

Discussion

The aim of this study was to find out the prevalence of heel pain in farmers. The farmers with age group of 30-60 years, both males and females and participants those are willing to participate are included. The patients with red and yellow flags, Farmers already undergone from foot and ankle related surgeries were excluded.

Study was conducted with 100 subjects in and

around Karad. Subjects were selected as per inclusion and exclusion criteria and written consent was taken. Both males(56) and females(44) subjects were included for study. Subjects were explained about procedure of study and written consent was taken from them and they were also asked if they suffered any musculoskeletal problems. Then they were assessed with help of foot pain questionnaire, survey was done according to results obtained the conclusion was given.

Farming Industry require a lot of work which is done bare foot in our country. This is the major cause of ankle and foot related injuries. Farmers are prone to develop these conditions as they have to work on uneven fields, slippery surfaces and hard grass.

Work in farms put a lot of stress to ankle and foot structures and it leads to injuries like ankle sprains, instability, heel pain and sometimes deformity. Many studies are conducted for overall musculoskeletal injuries in farmers and studies related to instabilities and malalignments. But very few studies are conducted only in heel related problems.

In previous studies are carried out to see prevalence of and characteristics of musculoskeletal pain in Korean farmers by **David Min,** the purpose of this study was to investigate the prevalence and characteristics of musculoskeletal pain in results it shows that 43.3% farmers has leg or foot related condition.

So in farmers there may be significant heel pain, that's why it is necessary to find prevalence of heel pain in farmers. This study is even help to create awareness amongst farmers about heel pain and its risk factors which can affect their work and benefit for betterment of their lifestyle.

In this study we came to know that females are primarily affected by foot conditions. Heel pain was also found statistically significant in present study. It was shown that 24% subjects are having heel pain and they are in the age group of 41-51 years.

Conclusion

After analysing the data, it was found that there is a prevalence of heel pain in farmers. 24% of subjects are having heel pain and 76% of subjects do not have heel pain. 46 % of males and 54% of females have heel pain. 29% pain distribution in 30 to 40 yrs population, 54% pain distribution in 41 to 50 yrs population,17% pain distribution in 51 to 60 yrs population is seen.

Conflict of Interest: There were no conflicts of interest in this study.

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna Institute of Medical Sciences, Deemed to be University, Karad.

Source of Funding: Self

References

1. Maheshwari J, Mhaskar AV. Essential Orthopaedics(Including Clinical Methods).Jaypee Brothers, Medical Publishers Pvt. Limited; 2019 Feb 28.
2. Campanelli V, Piscitelli F, Verardi L, Maillard P, Sbarbati A. Lower Extremity Overuse Conditions Affecting Figure Skaters During Daily Training. Orthopaedic journal of sports medicine. 2015 Jul 28;3(7): 2325967115596517.
3. Retrocalcaneal bursitis: Symptoms, Causes, and Treatment Healthline nhttps://www.healthline.com/health/retrocalcaneal-bursitis
4. Vyavahare RT, Kallurkar S. Anthropometric and strength data of Indian agricultural workers for equipment design: a review. Agricultural Engineering international: CIGR Journal. 2012 Dec 19; 14 (4):102-14.
5. Min D, Baek S, Park HW, Lee SA, Moon J, Yang JE, Kim KS, Kim JY, Kang EK. Prevalence and characteristics of musculoskeletal pain in Korean farmers. Annals of rehabilitation medicine. 2016 Feb; 40(1):1.
6. Kar SK, Dhara PC. An evaluation of musculoskeletal disorder and socioeconomic status of farmers in West Bangal, India. Nepal Med Coll J. 2007 Dec ;9(4): 245-9.
7. Willems C, Stassijns G, Cornelis W, D'Août K. Biomechanical implication of walking with indigenous footwear**.** American journal of physical anthropology. 2017 Apr; 162(4): 782-93.
8. Lohrer H, Nauck T. Retrocalcaneal burcitis but not Achilles tendinitis is characterized by increased pressure in retrocalcaneal bursa. Clinical Biomechanics. 2014 Mar 1;29(3):283-8.
9. Thompson JV, Saini SS, Reb CW, Daniel JN. Diagnosis and management of plantar fasciitis. The Journal of the American Orthopathic Association.

2014 Dec 1;114 (12): 900-1.

10. Achilles tendinopathy: Advice and management. Ouh.nhs.uk https://www.ouh.nhs.uk/patient-guide/leaflets/files/11924Ptendinopathy.pdf
11. Karukunchit U, Puntumetakul R, Swangnetr M, Boucaut R. Prevalence of risk factor analysis of lower extremity abnormal alignment characteristics among rice farmers. Patient preference and adherence. 2015; 9:785.
12. Rautiainen RH, Ledolter J, Donham KJ, Ohsfeldt RL, Zwerling C. Risk factors for serious injury in Finnish agriculture. American journal of industrial medicine. 2009 May; 52 (5): 419-28.

Psychosocial Health Status of Adolescent Girls in a Rural Area of Guntur District

Geethika Koneru[1], Samson Sanjeeva Rao Nallapu[2], Swapna B[3], T.S.R.Sai[4]

[1]PG, [2]Professor, [3]Professor, [4]Professor & HOD, Dept. of Community Medicine, NRI Medical College, Guntur District, Andhra Pradesh

Abstract

Background: Adolescence is a distinct phase of complex developmental and psychological needs. UNICEF states that suicide is the second leading cause of death in this age group of young girls. A myriad of social, economic and health factors undermine the ability of the adolescents to lead full and productive lives. There is a need to study these factors as they are bound to health-related outcomes.

Objective: To assess the psycho-social health of adolescent girls (15-19 years) living in a rural area using WHO HEEADSSS questionnaire and to compare their psychosocial risk profiles and demographic profiles to identify important risk factors.

Methodology: This cross-sectional study was conducted from April to August 2017 on a convenient sample of 180 adolescent girls of 15-19 years residing in the rural field practice area of NRI Medical College, Guntur. The WHO's HEEADSSS (Home and Environment, Education and Employment, Activities, Drugs, Sexuality, Suicide & Depression and Safety) questionnaire was used to assess the psychosocial risk profile of the subjects. The findings were subjected to multiple regression and chi-square test at 5% level of significance.

Results and Discussion: Only 6.11% of the girls had scores within the normal range. 10% were at severe risk and 1.11% were in the very severe risk category. The following factors accounted for 75% of the psycho-social risk: Age, Marital Status, Occupation, Positive History of Smoking or Alcohol intake in Family, Having Sleep Problems, Thoughts of inflicting self-hurt and Thoughts of inflicting physical hurt on others.

Conclusion: HEEADSSS questionnaire is a useful tool to assess the psycho-social health of adolescent girls. Most girls didn't have adequate knowledge regarding family panning methods or STDs. Qualitative methods would give further insight into these issues.

Keywords: *Adolescent girls, HEEADSSS, psychological, social, health, rural*

Introduction

Adolescence is a phase separate from both early childhood and adulthood. It is a transitional period that requires special attention and protection. Children go through several transitions physically while they mature. The brain also undergoes considerable development in early adolescence affecting emotional skills as well as physical and mental abilities [1].

In India, adolescents constitute around 22% of the population[2]. Though adolescents are generally considered as adults, they are known to suffer significant morbidity due to their risk-taking behaviour and inadequate access to healthcare[3]. In India, a myriad of social, economic and health factors undermine the ability of the adolescents to lead full and productive lives [4].

Corresponding Author:
Dr Geethika Koneru
Mob.: 9246473553
E-mail: geethikakoneru@gmail.com

Amongst the adolescent girls, the age group of 15-19 years is commonly involved in teenage pregnancies. 11% of all births worldwide are to girls aged 15-19 years[5]. However, these girls are not physically or psychologically ready to bear the burden of motherhood.

The HEEADSSS Assessment is a systematic process for assessing a young person's psychosocial status and identifying underlying health concerns and risk factors. One can obtain a profile of the young person's psychosocial health, the overall level of risk of the young person, specific risk factors in their lives – as well as protective factors and areas for possible intervention[6].

Objectives

To assess the psycho-social health of adolescent girls (15-19 years) living in a rural area using WHO HEEADSSS questionnaire and to compare their psychosocial risk profiles and demographic profiles to identify important risk factors.

Methodology

This cross-sectional study was conducted from April to August 2017 and involved a convenient sample of 180 adolescent girls of 15-19 years residing in the villages Venigandla and Pedaparimi, which fall under the rural field practice area of NRI Medical College, Guntur. All the adolescent girls available in the villages during the study period were included. The World Health Organization's HEEADSSS (Home and Environment, Education and Employment, Activities, Drugs, Sexuality, Suicide and Depression and Safety) psycho-social interview / questionnaire was used to assess the psychosocial risk profile of the subjects. The questionnaire also included demographic questions pertaining to age, marital status, socioeconomic status, religion and caste. The findings were subjected to statistical tests such as multiple regression and chi-square test at 5% level of significance. Microsoft Excel and R software, with EZR package were used to carry out the statistical analysis.

Results

Out of the 180 girls included in the study, 27.8%, 13.9%, 13.9%, 15.6% and 28.9% were 15, 16, 17, 18 and 19 years respectively. The majority were Hindus 31.6% were Christians and 11.6% Muslims. 15% of the girls were married. Analysis using Kuppuswamy Socioeconomic Scale revealed that 2.22% belonged to Class I, 28.33% to Class II, 22.22% to Class III, 43.33% to Class IV and 3.89% to Class V. 31.11% belonged to Backward Castes, 28.88% to Scheduled Castes, 17.77% to Scheduled Tribes and 22.22% to Other Castes.

Table 1 shows the distribution of the average HEEADSSS scores obtained in the study in each of the components. The categorization of the study subjects according to the risk of developing future mental health issues has been enumerated in Table 2.

Home: 98.9% had satisfactory relationships with all the members of their homes and 83.9% felt they were closest to their parents. 31.11% had to live away from home for more than six months. None of the girls had ever run away from home. 7.22% said there were subjected to physical violence at home. 3.33% girls did not feel safe in their home.

Education & Employment: 24.45% girls had dropped out of school due to their own reason or due to pressure from family. 6.43% had to repeat a class. 44.29% had changed schools recently. 85.7% were attending a co-education school. 6.43% of the girls currently attending school had considered dropping out. 5.04% did not have future educational or employment goals. 5.56% were working 4-6 hours per day.

Eating: 68.9% girls said they ate meals in front of TV or computer. 22.8% reported having had a decrease in their weight. 3.33% felt their eating was out of control. 17.8% had done dieting in the past year in order to reduce their weight. 86.11% of the girls did not do regular exercise. 32.2% girls said they would like it if they decreased 5 kgs.

Activities: 59.4% did not participate in sports. 81.7% did not have hobbies. 30.6% watched TV for more than 4 hours per day. 57.2% did not know how to use a computer and internet. 88.9% did not have any productive activity they did when they met with their friends. 52.8% just gossiped with family members during leisure time.

Drugs & Alcohol: None of the girls had ever smoked or taken alcohol or drugs. 40% had a family member who smoked or drank alcohol or both.

Sexuality:17.78% had a romantic relationship or used to have one. 16.67% had been involved in sexual relations. 10.56% were aware of safe sexual practices. 11.67% had been pregnant or were currently pregnant.

7.14% were using a scientifically sound method of birth control. 29.63% admitted to not being satisfied with the birth control they were using. 73.89% had inadequate knowledge of sexually transmitted diseases (STDs).

A significant association was found between married and unmarried girls regarding romantic and sexual relations and satisfaction with birth control.

Suicide & Depression: 27.22% girls said they felt sad constantly. 27.78% said they felt bored most of the time and had comparatively increased risk scores. 18.33% admitted to having sleeping problems and having disturbed sleep patterns. 11.11% stated they had lost interest in things they used to enjoy before.

None of the girls admitted to trying to kill herself. 3.33% admitted to having wanted to hurt themselves in the past. 9.44% said they had wanted to hurt others in the past.

Safety: 4.44% girls had been injured in the past. 10.56% said there was violence at home. None of the girls admitted to having been subjected to repeated physical abuse or sexual abuse. Four girls said they had gotten into physical fights in the neighborhood. Two girls said they still got into physical fights in the neighborhood.

The factors found to have a significant association with the HEEADSSS scores obtained have been listed in Table 3, along with the Chi-Square values and p values obtained. Multiple Linear regression showed that the following seven factors accounted for 75% of the HEEADSSS psycho-social risk scores: Age, Marital Status, Occupation, Positive History of Smoking or Alcohol intake in Family, Having Sleep Problems, Thoughts of inflicting self-hurt and Thoughts of inflicting physical hurt on others.

Table 1 : Distribution of HEEADSSS score by components (n=180)

S.No.	Components of HEEADSSS	Maximum possible score*	Study group average score
1	Home	13	1.51
2	Education & Employment	14	4.14
3	Eating	8	2.7
4	Activities	8	4.58
5	Drugs	15	0.4
6	Sexuality	12	3.4
7	Suicide	16	2.09
8	Safety	14	0.62

**Contribution of each parameter to the HEEADSSS total score of 100*

Table 2 : Categorisation of the adolescent girls by HEEADSSS psychosocial score (n=180)	
Psycho-Social Risk Categories (Scores)	**No. of study subjects (%)**
Normal (0 -10)	11 (6.11)
Mild risk (10.1 - 20)	101(56.11)
Moderate risk (20.1 - 30)	48 (26.67)
Severe risk (30.1 - 40)	18 (10)
Very severe risk (>40)	2 (1.11)
Total	180

Table 3 : Significant factors affecting adolescent girls

S.No	Significant Risk Factors in adolescence	Average HEEADSSS Score	Chi Sq	p Value
1	Age - 18 & 19 years	21.92	21.72	< 0.0001
2	Religion - Christian	21.45	6.98	0.03
3	Caste - ST	27.11	40.65	< 0.0001
4	SES – Lower socio-economic class	25.04	16.07	0.007
5	Marital Status - Married	29.09	42.98	< 0.0001
6	Occupation – school drop out	27.45	65.78	< 0.0001
7	Not participating in Sports	21.89	27.21	< 0.0001
8	Not having Hobbies	20.54	9.98	0.02
9	Experienced Forced sex	33.75	4.68	0.03
10	Having sleep problems	25.02	15.48	< 0.0001
11	Have hurt themselves	36.55	9.52	0.002
12	Wanted to hurt others	31.45	23.49	< 0.0001
13	Get into physical fights	35.44	6.28	0.01
14	Family History of Alcohol	22.08	5.59	0.01

Discussion

The commonly found psychiatric disorders found in adolescents are anxiety and depressive disorders and behavioural issues[7,8]. However, reporting systems for adolescent psychiatric disorders are mostly inadequate[9]. Only 6.11% of the girls had scores within the normal range. 82.78% fell under the mild and moderate risk categories. 10% were at severe risk and 1.11% were in the very severe risk category. In a similar study, 40%, 43.6% and 11.75% girls were categorized as mild, moderate and severe risk respectively for psychological problems [10].

7.22% of the girls said that they were subjected to physical violence and 3.33% girls did not feel safe in their home. Home is meant to be a safe haven for every individual and this finding is of great concern.

Educating the girl child would play a major role in averting adolescent maternal deaths [11]. In this study, it has been found that the girls who had dropped out of school on their own due to family pressure had much higher risk scores. However, the drop out percentage was lower than what has been found in other similar studies; 30.64% [12] and 37.4% [13].

Higher risk scores were seen in girls attending a co-education school (85.71%), those who had considered dropping out (6.43%) and those who did not have future educational or employment goals (5.04%).

There wasn't much difference between the risk scores of the girls who worried about their weight and those who did not, probably due to influence of other components of the questionnaire. Most of them did not do regular exercise. It was seen that the girls in this study

had more body image issues than was found in a study conducted in urban slum in northern India [14].

The difference in risk scores between the girls having hobbies and playing sports and those who were not was found to be statistically significant. Higher risk scores were seen in girls who stated that they did domestic work during leisure time.

Only 10.56% of the girls were aware of safe sexual practices. Many did not feel the need to understand or practice safe sex. It has been found that 56% of abortions of adolescents were carried out by unqualified personnel at unapproved centres[15]. Adolescent girls contribute to 17% of the total fertility rate and are most of these births are unplanned. In this study, only 7.14% were using a scientifically sound method of birth control. Unable to discuss birth control with their partners was an important cause for not using birth control, as has been suggested in other studies[16]. Three girls had been forced to have sexual relations and they had very high risk scores. The sexual abuse was by their husbands or family members as has been found in other studies [17]. When probed further, it was clear that these encounters had a major effect on the girls' trust in adults.

The girls had poor knowledge of STDs. 26.11% of the girls were aware of HIV/AIDS which is lower than findings in similar studies [17,15,18,19]. Urban adolescents have better knowledge regarding HIV/AIDS compared to their rural counterparts[18]. A similar picture was seen in a study conducted in rural adolescent girls in Bangladesh[20]. There is a need to correct this as 2.2 million adolescents are living with HIV world-wide and 60% of them are girls [21].

Girls who had higher risk scores said they felt sad constantly, felt bored most of the time, had sleeping problems, and had lost interest in things they used to enjoy before. In India, suicide among adolescents is higher than other age groups[9]. Pre-marital sex, sexual abuse and physical abuse have been found to be important pre-determinants for suicidal behaviour in a study done in Goa[10].

10.56% of the girls said there was physical violence at home. The victim was usually the mother. None of the girls admitted to having been subjected to repeated physical abuse.

Girls in rural India shoulder a disproportionate burden of domestic work and childcare. They are denied equal participation in decision-making. There is a need to transform societal structures that tolerate discrimination against girls in homes and other places [22].

Conclusion

HEEADSSS questionnaire is a useful tool to assess the psycho-social health of adolescent girls. It was found that age, marital status, occupation, positive history of smoking or alcohol intake in family, having sleep problems, thoughts of inflicting self-hurt, thoughts of inflicting physical hurt on others were the factors that contributed to 75% of the psycho-social risk scores. Thus, an adolescent girl having these findings should be given special attention and counselled. Most girls didn't have adequate knowledge regarding family panning methods or STDs. Qualitative methods would give further insight into these issues.

Ethical Clearance: Taken from Institutional Ethics Committee of NRI Academy of Sciences

Source of Funding: Self

Conflict of Interest: Nil

References

1. WHO, Adolescents: health risks and solutions, 2018. http://www.who.int/en/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions - last accessed on 1-12-18
2. WHO, The Reproductive Health of Adolescents: A strategy for Action; A joint WHO/UNFPA/UNICEF Statement, Geneva, 1989:7
3. UNICEF Press Release – Investing In Adolescents Can Break Cycles of Poverty and Inequity, 2011, UNICEF India. http://www.unicef.org/india/media 6785.html – last accessed on 1-12-18
4. UNICEF India, Adolescents in India: A desk review of existing evidence and behaviours, programmes and policies." 2013. New Delhi: Population Council & UNICEF. http://4dj7dt2ychlw3310xlowzop2.wpengine.netdna-cdn.com/wp-content/uploads/2016/09/Adolescents_in_India.pdf - last accessed on 1-12-18
5. Plan International (2011). Weathering the Storm: Adolescent Girls and Climate Change. Woking: Plan International. https://plan-international.org/publications/weathering-storm
6. Chapter 3, Section 2, Youth Health Resource Kit,

NSW Government: Health https://www.health.nsw.gov.au/kidsfamilies/youth/Documents/youth-health-resource-kit/youth-health-resource-kit-sect-3-chap-2.pdf

7. Das JK, Salam RA, Thornburg KL, Prentice AM, Campisi S, Lassi ZS, Koletzko B, Bhutta ZA, Nutrition in adolescents: physiology, metabolism, and nutritional needs.Ann N Y Acad Sci. 2017;1393(1):21.
8. Alavi M, Eftekhari MB, Noot R, Rafinejad J, Chinekesh A. Dietary habits among adolescent girls and their association with parental educational levels, Glob J Health Sci. 2013;5(5):202-6. Published 2013 Jul 23. doi:10.5539/gjhs.v5n5p202
9. Bhagavatheeswaran L, Nair S, Stone H, Isac S, Hiremath T, Raghavendra T, Vadde K, Doddamane M, Srikantamurthy HS, Heise L, Watts C. The barriers and enablers to education among scheduled caste and scheduled tribe adolescent girls in northern Karnataka, South India: A qualitative study. International journal of educational development, 2016;49: 262-70.
10. Chauhan MG, Solanki HM, Patel HM, Singh MP. A study of reproductive health needs of adolescent girls of UHTC Field Practice Area, Govt. Medical College, Bhavnagar, National Journal of Integrated Research in Medicine, 2018; 6 (6):15-8.
11. Janssen I, LeBlanc AG. Systematic review of the health benefits of physical activity and fitness in school-aged children and youth. International journal of behavioural nutrition and physical activity. 2010 Dec; 7(1):40.
12. Singh PK, Rai RK, Alagarajan M, Singh L. Determinants of maternity care services utilization among married adolescents in rural India. PloS one. 2012; 7(2):e31666.
13. Kumar R, Prinja S, LakshmiPVM, Health Care Seeking Behavior of Adolescents: Comparative Study of Two Service Delivery Models, Indian Journal of Pediatrics,2008; 75: 895 to 99
14. Verguet S, Nandi A, Filippi V, Bundy DA. Maternal-related deaths and impoverishment among adolescent girls in India and Niger: findings from a modelling study. BMJ open. 2016 Sep 1; 6(9):e011586.
15. Dhingra R, Kumar A, Kour M, Knowledge and practices related to menstruation among tribal (Gujjar) adolescent girls. Studies on Ethno-Medicine, 2009; 3(1):43-8.
16. Launch of Rashtriya Kishor Swasthya Karyakram and National Consultation on Adolescent Health. Ministry of Health and Family Welfare. Available from:http://www.rksklaunch.in/rksk-strategy.html. – last accessed on 21-11-18
17. Dryfoos J, Santelli J. Involving parents in their adolescents' health: a role for school clinics, J Adolesc Health, 1992; 13 (4):259-60.
18. Maliye C, Garg BS. Adolescent health and adolescent health programs in India. J Mahatma Gandhi Inst Med Sci 2017;22:78-82
19. Kishori Shakti Yojana, Ministry Of Women & Child Development, GOI, HTTP://WWW.WCD.NIC.IN/KISHORI-SHAKTI-YOJANA
20. Mishra SK, Dasgupta D, Ray S. A study on the relationship of sociocultural characteristics, menstrual hygiene practices and gynaecological problems among adolescent girls in Eastern India. International journal of adolescent medicine and health, 2016; 29(5)
21. World Health Organization. Health for the world's adolescents: a second chance in the second decade: summary 2014. http://apps.who.int/adolescent/second-decade/section2
22. UNICEF: Beijing +5, Women 2000: Equality, Development and Peace https://www.unicef.org/publications/files/pub_equality_en.pdf

Case Report on Medial Swivel Dislocation of Ankle

Gireesh Khodnapur[1], Dayanand B. B[2], Abhishek Shenoy[3], Siddhant Gandhi[4]

[1]Senior Resident, [2]Professor, [3]Junior Resident, [4]Junior Resident, Department of Orthopedics, Shri B M Patil Medical College Hospital and Research Centre, BLDE (Deemed to be University), Vijayapura

Abstract

A rare type of Chopart dislocation called swivel dislocation has been reported. This injury presents as dislocation of the talonavicular joint, but the calcaneocuboid joint remains unaffected. There is a typical rotational movement without inversion or eversion in the foot. The axis of rotation is the interosseous talocalcaneal ligament, which remains unaffected. We report the case of an 18-year-old male who had experienced a medial swivel dislocation of the talonavicular joint associated with displaced fracture of the base of fifth metatarsal. The occurrence, features, and method of treatment of this rare injury are presented.

Key Words : *Swivel Dislocation, Talonavicular Joint Dislocation, 5Th Metatarsal Base Fracture,Tarsal Dislocation*

Introduction

Midtarsal dislocations of the foot are unusual injuries, talonavicular dislocations occurring without an associated fracture of this joint or of the calcaneocuboid joint are very unusual.

Main and Jowett [(1)] found that injuries normally occur to the talonavicular and calcaneocuboid joints together. However, they also identified a "swivel dislocation" (12% of their series) in which the talonavicular joint dislocates, usually medially, and the calcaneus swivels under the talus, with the calcaneocuboid joint intact. The axis is the interosseous talocalcaneal ligament [(1)]. We report a case of medial swivel dislocation of talonavicular joint caused by a laterally directed force applied to the forefoot after the fracture fifth metatarsal

Isolated dislocation of talonavicular joint without associated subtalar joint dislocation or fracture of tarsal bones is rare. These injuries are caused by severe abduction or adduction force applied to the forefoot. A case of medial swivel dislocation treated by open reduction k-wire fixation is reported here.

Case Report

An 18-year-old male had injured his right foot during a motorcycle accident. He accepted emergency service and complained of pain along the medial aspect of talonavicular joint and on fifth metatarsal. Physical examination revealed an obvious deformity with medial displacement of the foot on the head of talus with severe edema and hematoma with the fifth metatarsal. A neurovascular deficit was not found.

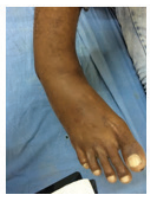


FIG 1

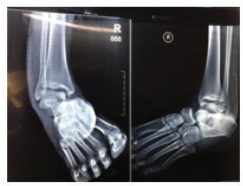


FIG 2

FIG. 1 AND FIG. 2: PRE OP PICTURE AND RADIOGRAPH

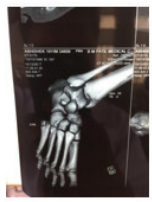


FIG 3

FIG. 3: 3D RECONSTRUCTION OF ANKLE

Under spinal anesthesia, closed reduction was attempted, but it failed. Hence, open reduction was done. Under tourniquet control, a 6 cm anteromedial longitudinal incision was made centering the talonavicular joint. Extensor hallucis longus tendon and dorsalis pedis artery were retracted medially, and extensor digitorum long-us tendons were retracted laterally, exposing the dislocated talonavicular joint. The impacted fracture in talus was visualized, which

was less than 1 cm size, in all dimensions.

The talonavicular joint dislocation was reduced by traction and lateral rotation of the forefoot. The talonavicular joint was stabilized with 2-mm k-wires introduced from the dorsum of the foot transfixing the talonavicular joint. The wound was closed in layers. The foot was immobilized using below knee cast for 6 weeks. After 6 weeks, k-wires were removed, and weight-bearinFIG. 5 FIG.6

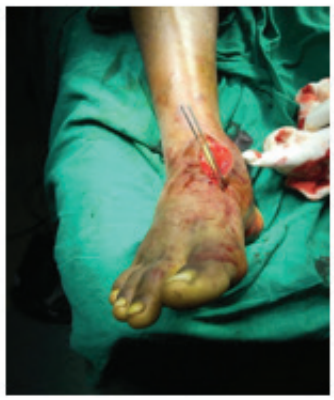


FIG. 4
FIG.4: INTRA OPERATIVE PICTURES

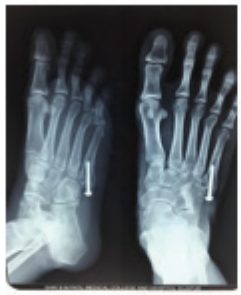


FIG. 5 **FIG.6**

FIG. 5 AND 6 : SHOW PATIENT AT 6 MONTHS FOLLOW UP AND X-RAY AT 6 MONTHS FOLLOW UP

Discussion

The midtarsal joint includes talonavicular and calcaneocuboid joints, which lie in a transverse plane across foot. Main and Jowett[1] classified midtarsal injuries according to direction of deforming force and displacement into five groups (medial, longitudinal compression, lateral, plantar, and crush).[1,2] Medial and lateral midtarsal injuries are further divided into fracture, sprain, fracture subluxation or dislocation, and swivel dislocation.[1]

In the swivel injuries, the deforming force applied to the forefoot disrupts talonavicular joint, rotating the foot, causing rotatory subluxation of subtalar joint on the axis of intact interosseous talocalcaneal ligament. In medial swivel injuries, the deforming force is directed medially and talonavicular joint dislocates medially rotating the foot medially, whereas the calcaneocuboid joint is intact. In lateral swivel injuries, the deforming force is directed laterally, dislocating talonavicular joint laterally and rotating foot laterally. It is usually associated with impacted fracture of calcaneocuboid joint (nut cracker fracture)[3]. Swivel injuries differ from subtalar joint dislocation in that the deforming force probably falls more anterior to that which produces subtalar and ankle injuries.[1,2]. The talocalcaneal interosseous ligament is

intact.

Pehlivan et al[4] reported a single case of isolated medial dislocation of the talonavicular joint. They treated the deformity using open reduction and percutaneous fixation. At the last follow-up visit, they found that the patient had a small residual functional defect; however, lateral column pain with long distance ambulation was the only significant complaint[4].

It is important to distinguish between medial subtalar dislocation and swivel dislocation of medial type. Medial subtalar dislocation is reduced by traction and eversion, whereas swivel dislocation is reduced by traction and lateral rotation of foot. Obstruction to closed reduction in subtalar dislocation can be caused by interposed tibialis posterior tendon or interlocked or impacted fracture of articular surfaces of talus/navicular bone, which is not found in swivel type of dislocation.

In general, most investigators have advocated the use of internal fixation stabilization of the acutely dislocated Chopart joint because of the potential for vascular compromise [5,6,7,8]. Williams et al [9] described closed reduction without the need for percutaneous fixation in a single case report of a medial swivel dislocation. In their case, the dislocation was reduced intraoperatively and, under stress radiograph evaluation, was determined to be stable. The patient was placed in a cast after the reduction [9]According to the published data, swivel type injuries are associated with fewer complications than pure dorsal dislocations because of the lower degree of ligamentous structure involvement. Thus, very few attempts should be made at closed reduction of the deformity

Conclusion

We recommend closed reduction of medial swivel dislocation of the talonavicular joint first, with open reduction only after failure of an attempt at closed reduction. We suggest anatomic reduction for fracture of the fifth metatarsals if a medial swivel-type talonavicular dislocation is also present, such as in our case. The present case was reported because of its rarity, to report the features of treatment, and because of the excellent treatment outcome.

Conflict of Interest : Nil

Funding : Self Funded

Ethical Clearance: Is not required as it is a case report

References

1. Dutt 1.Main BJ, Jowett RL. Injuries to the midtarsal joint. J Bone Joint Surg Br. 1975;57:89–97. [PubMed]
2. Rockwood CA, Green DP, Bucholz RW, Heckman JD. Fractures in adults. (5th ed) Vol 2:2124–5.
3. Pillai A, Chakrabarti D, Hadidi M. Lateral swivel dislocation of the talo-navicular joint. Foot Ankle Surg. 2006;12:39–41.
4. Pehlivan O, Akmaz I, Solakoglu C, Rodop O. Medial peritalar dislocation. Arch Orthop Trauma Surg 2002 122: 541-543.
5. Miller CM, Winter WG, Bucknell AL, Jonassen EA. Injuries to the midtarsal joint and lesser tarsal bones. J Am Acad Orthop Surg 1998 6: 249-258
6. Richter M, Thermann H, Huefner T, Schmidt U, Goesling T, Krettek C. Chopart joint fracture-dislocation: Initial Open reduction provides better outcome than closed reduction. Foot Ankle Int 2004 25: 340-348.
7. Garofalo R, Moretti B, Ortolano V, Cariola P, Solarino G, Wettstein M, Mouhsine E. Peritalar dislocations: A retrospective study of 18 Cases. J Foot Ankle Surg 2004 43: 166-172.
8. Richter M, Wippermann B, Krettek C Schratt HE, Hufner T, Thermann H. Fractures and fracture dislocations of the midfoot: Occurrence, causes and long-term results. Foot Ankle Int 2001 22: 392-398.
9. Williams DF, Hanoun A, Hakimi M, Ali S, Khatri M. Talonavicular dislocation with associated cuboid fracture following low-energy trauma. Foot Ankle Surg. 2009 15: 155-157.

The Impact and Perspicacity of National Eligibility cum Entrance Test among Dental Undergraduates in India

Guruprasath Selvakumar[1], N. DivyaLalitha[2], Prabu.D[3], Sunayana Manipal[4], Rajmohan[4]

[1]Undergraduate, [2]Postgraduate, [3]Professor & Head, [4]Reader, [5]Senior Lecturer, Department of Public Health Dentistry, SRM Dental College, Ramapuram, Chennai

Abstract

Background: National eligibility cum entrance test (NEET) was first proposed in the Vision 2015 by Board of Governors (BOGs) in India. This exam was supposed to be a single window for admissions into medical colleges and dental colleges. NEET-UG (Undergraduate) was put into action in order to reduce stress of multiple examinations which was conducted in different states within India. **Aim:** The aim of this study is to assess the impact of National eligibility cum entrance test (NEET) among the first and second year undergraduates studying in various dental colleges in Chennai, India, qualified through the NEET examination. **Materials and Method:** A cross sectional questionnaire study was conducted among 17 to 22 year old dental undergraduate students. 110 participants were recruited by simple random sampling. A pre tested self- administered questionnaire was distributed to all the participants and data were obtained about NEET. Data was collected during the period of September to October 2017.Descriptive statistics and SPSS version 23.0 was used to analyze the data. **Results:** Out of the total 110 participants, 55 (50%) were males and 55 (50%) were females. 71(64.5%) chose dentistry by choice. 75 (68.2%) studied state board syllabus. A significant p value (0.005) was obtained while assessing the association between difficulty of NEET and efficiency of syllabus. **Conclusion:** It is evident to a certain extent that the system has attained stability and the admission procedures have become easy and transparent for the students as well as for the institutions.

Keywords: *Dentistry, NEET, Syllabus, Career*

Introduction

The choice of dentistry or rather career is one of the most important decisions of one's life. The students have many career options and it is extremely difficult to choose the best one out of them which would satisfy their passion, income, increase their credibility and respect in the society. [1] Choosing a Professional career or a 'White collar Job' always kept motivating the students in choosing dental education.

"The Joy of providing beautiful smiles on earth is one of the important accomplishments of a dentist which cannot be measured". [2]

Corresponding Author:
Dr. Divya Lalitha. N
SRM Dental College, Ramapuram, Chennai-600089
Ph no: 8056215655, Email: diyan2409@gmail.com

The Motives for choosing dentistry is multifactorial which includes financial rewards, secured life, social status, credibility, nature of the occupation, interest and passion in research field, familial interest etc. [3]

So what is dentistry?

Dentistry is a rewarding profession where we get to help others and regularly change people's lives for the better. Dentists play an equal role concerning your health alike your family doctor by looking after your general oral health instead of specializing in a specific area.

NEET-UG (Undergraduate) was put into action in order to reduce stress of multiple examinations, to ensure minimum competence and more importantly with the purpose to weed out corruption in medical education across the country. NEET-UG was first proposed in the Vision 2015 by Board of Governors (BOGs) appointed

after by Government of India after dissolution of medical council of India (MCI). This exam was supposed to be a single window for entry into a medical college and dental colleges across India.[4]

NEET-UG replaced the All India Pre Medical Test (AIPMT) and all individual exams conducted by states or colleges themselves for admissions. However, many colleges and institutes took a stay order and conducted their own private examinations for admission to courses. Nevertheless, many other reputed institutes such as the Armed Forces Medical College and Banaras Hindu University have opted to admit students on the basis of the NEET-UG now. [4]

The least that is expected to happen through NEET is to identify the best possible candidates who have the right skills for science and an attitude for hardwork. There is also a need for uniform distribution of the limited seats, which are in such high demand year after year. These could possibly be the fundamental reasons to seek National Eligibility-cum-Entrance Test (NEET) across the country. [5]

Before National eligibility cum Entrance Test (NEET) came into action, the system was lacking transparency in admission procedures. [6] As NEET came into effect, the pathways were opened up to question the validity of other qualifying exams conducted by state governments and private institutions. On the other hand, the conflicts arise due to insufficient syllabus, difficulty in attempting the exam for students, favorable to particular board of education was also seen among the students. There is a mixed reaction toward NEET, whether it is the ideal gateway to get admission in colleges.

In the era of modern education which is mainly knowledge based to lead an economic life, a person has to clearly show the required skills to lead a healthy professional life. [7]

Inspite of various exams and boards of education owing to test the person, the need for a single portal has always been a void in education system of India. Dental schools, on the other hand requires a proper medium to decide, if the student is eligible or has the skill to get admitted in their respective dental schools. So, it is inevitable for the society to depend on Knowledge and skill based qualifying exam.

The aim of this study is to assess the impact of National eligibility cum entrance test (NEET) among the first and second year undergraduate students studying in various dental colleges in Chennai, Tamilnadu, qualified through the NEET examination conducted in the academic year of 2016-2017 and 2017-2018.

Materials and Method

The present cross-sectional questionnaire study was conducted among the NEET qualified candidates who had successfully affiliated themselves to undergraduate (Bachelor of Dental Surgery) degree.

The sample size was conscripted to 110 students based on simple random sampling among the students pursuing the undergraduate dental degree among various dental colleges in Chennai. The samples were recruited within the age interval of 17-21 years. The sample included 55 male and 55 female undergraduate dental students who gave concern to participate in the study. This study was conducted during the period of September to October 2017.

The inclusion criteria included all the candidates who are pursuing BDS after their admission in the academic year of 2016 and 2017 and who gave consent to participate in this study. Candidates who did not give concern to participate in the study, who did not fill the questionnaire were excluded from the study. This study was approved by the Institutional Review Board, Department of Public Health Dentistry, SRM Dental College, Chennai.

A self-administered pre-tested questionnaire containing 14 questions was given to all sample recruited for the study. The first 11 questions were close ended and final 3 questions were open ended. Sociodemographic details of the participants like name, age, gender, address were collected. Close ended questions were about asked about the state, need for NEET in vernacular language, state influence on NEET, Efficiency of the standard twelve syllabus, need for coaching centers, fees structure after NEET etc. Open ended questions were used to know the overall opinion of the student about NEET.

The questionnaire was administered to all the 110 participants in person and the data was collected. The questionnaire consisted of demographic details (Name, age, and gender), their opinion on NEET examination, the influence of syllabus and state which they studied, and their outlook of dentistry.

Descriptive statistics was done and the association was assessed using Pearson's Chi Square test. Statistics was done using SPSS version 23.0 and the p-value was set at 0.05.

Results

The study was done to assess the impact of National eligibility cum entrance test (NEET) among the first and second year students studying in various dental colleges in Chennai, Tamilnadu qualified through the NEET examination conducted in the academic year of 2016-2017 and 2017-2018.

Table 1: Distribution of participants based on choice of dentistry, need for coaching center and productivity of syllabus

		N	**PERCENTAGE (%)**
1. Choice of Dentistry	**Choice** **Chance**	**39** **71**	**35.5** **64.5**
2. Productivity of syllabus	Sufficient Insufficient Indifferent Others	43 49 14 4	39.1 44.5 12.7 3.6
3. Need for coaching centre	Needed Not needed Needed but expensive Expensive not needed	28 19 57 6	25.5 17.3 51.8 5.5

Table 1 shows distribution of participants based on Choice of dentistry, need for coaching center and productivity of syllabus and difficulty of NEET. Totally 55 females and 55 males participated in the study. 71(64.5%) answered that they chose dentistry by chance and 39(35.5%) answered that dentistry was their choice. 75 (68.2%) studied state board syllabus, followed by students who studied CBSE, 29(26.4%) and students who studied in ICSE and other medium of studies were equal in number. 49 (44.5%) of them reported that the syllabus is insufficient to attempt NEET whereas 43(39.1%) of them reported that the syllabus what they studied is sufficient enough to attempt NEET. 57 (51.8%) reported that a coaching center for NEET is needed but it is expensive and only 6(5.5%) participants feel that it is expensive and not needed. 47(42.7%) participants reported that the difficulty of NEET is medium whereas 42(38.2%) feel that it is hard.

TABLE 2: ASSOCIATION BETWEEN PRODUCTIVITY OF SYLLABUS AND NEED FOR COACHING CENTER

Need for coaching centre	Productivity of Syllabus				Total	P value
	Sufficient	Insufficient	Indifferent	Others		
Needed	15	11	1	1	28	0.08
Not needed	9	7	3	0	19	
Needed but expensive	17	30	7	3	57	
Expensive not needed	2	1	3	0	6	
Total	43	49	14	4	110	

Table 2 shows association between productivity of syllabus and need for coaching center. Majority of the participants , 30(27.3%) feel that the efficiency of the syllabus is insufficient to take up NEET and a coaching center is needed but it is expensive. 17 (15.5%) participants feel that the efficiency of the syllabus what they studied is sufficient but still a coaching center is needed but is expensive. On the other hand 15(13.6%) participants said that the efficiency of their syllabus is sufficient but a coaching center is needed for them to attempt NEET.

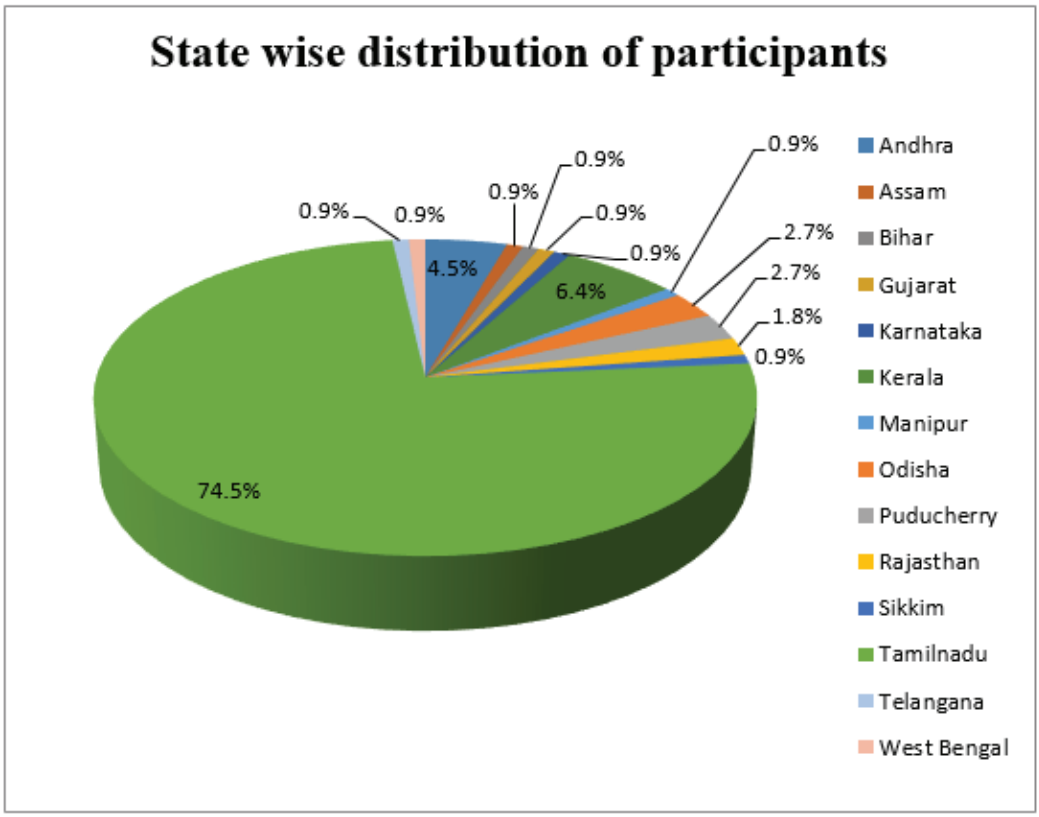


Figure 1: State Wise Distribution of Participants

Figure 1 shows state wise distribution of participants. Majority of them were from Tamil Nadu 82 (42.5%), followed by Kerala 7(6.4%), Andhra 5 (4.5%), Orissa and Pudhucherry 3 (2.7%), Rajasthan 2(1.8%) and then others states 1(0.9%).

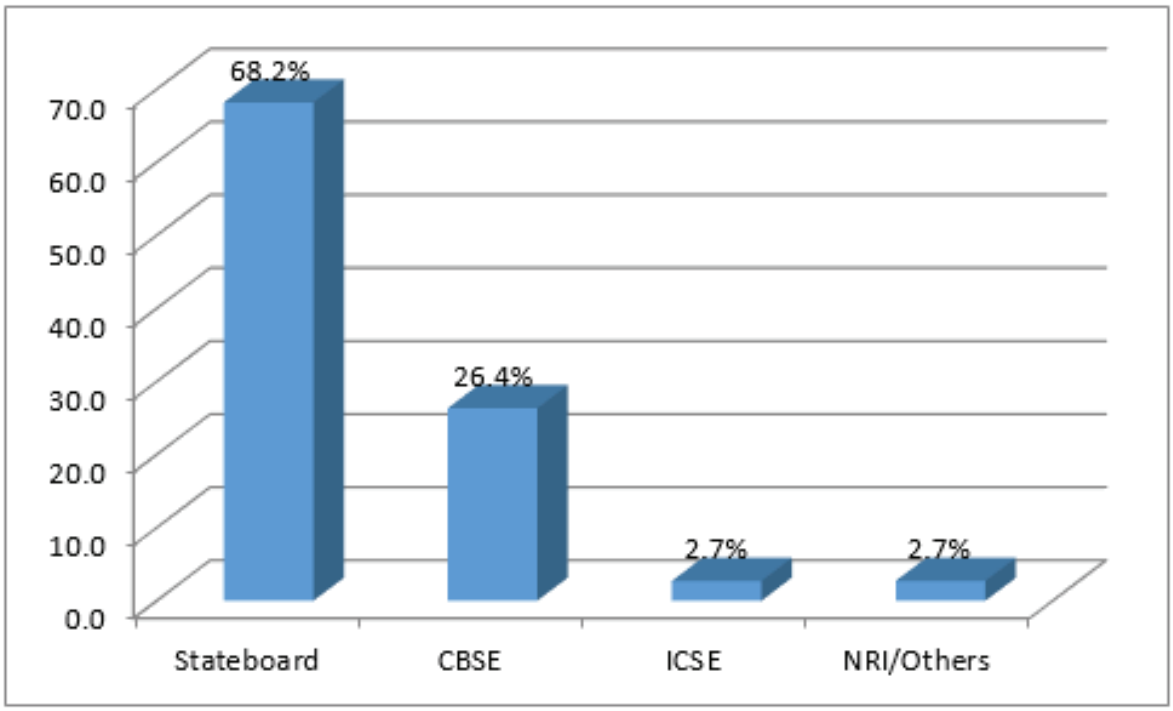


Figure 2: Distribution of Participants According to Syllabus of Study

Figure 2 shows distribution of participants according to their syllabus of study. 75 (68.2%) participants studied stateboard syllabus, 29 (26.4%) studied CBSE, 3 (2.7%) studied ICSE and 3 (2.7%) NRI/others.

Discussion

Although there are many fields in medical sciences, over the past few years, reasons behind students choosing dentistry as a profession have not been well documented by dentists or any others, especially in the developing countries. The motivational factors that influence students in entering dentistry, as well as the selection procedures, vary considerably between countries and even within a single country even between states. These situations pose great responsibility on dental colleges to select the appropriate applicants, both professionally and socially, for the ultimate benefit of the country. [8]

A study done by Kobale et al stated that, majority of students who choose dentistry as their carrier, because of someone encouraging them to do so in their family particularly in India. [9]

Before NEET (National Eligibility Cum Entrance Test) the admission to dental course lacked transparency. But now the system has attained some stability. Students who qualify in the NEET can only be admitted in the dental colleges.

The result of a study done by Rashmi et al found that 38.83% participants first choice was dentistry but in contradiction 64% participants in the present study chose dentistry by chance. [3]

According to a study done by Priya et al, the various reasons for the students dentistry were inability to get medical seat , 224 graduates (47%) followed by choice out of own interest, 175(37%) and family pressure , 76(16%). [1]

A study done among Iranian dental students, revealed that 93.2% students opted dentistry in their initial selection. Among these 82.5% chose it because they feel dentistry is a job which is an insurer of financial independence. [10] In a study done by Anbuselvan et al in Tamilnadu, majority of the students opted dentistry out of self interest. [7]

In one another study which was done among first year dental students, the reason for the students to select dentistry as their career was that it has regular working hours than other health related professions and they can make more money. [11] In a study done by Gallagher et al, 91% of the dental students said that they chose dentistry because of regular working hours. [12]

A significant results (p value=0.0005) was obtained in the present study in correlation of difficulty of NEET and the efficiency of the syllabus which the participant studied. Table 3 shows that, Majority of them (25 participants) feel that efficiency of the syllabus is insufficient so it was hard to attempt NEET. The quality of the syllabus must be improved to help the students. A universal syllabus system can be made so that all the students will get sufficient knowledge out of their own syllabus itself to attempt NEET.

When a question was put forward to the participants on their overall opinion about NEET, we got a mixed response. Few participants answered it is not useful whereas some answered it as it will be useful if all the students in India follow the same syllabus. Other few commented that it's a confusing fact.

Limitations of Study

Since the study was done in private dental colleges, all the participants were from private schools, none were from government schools. The level of difficulty of NEET would be different for a government school student than a private school student, which was not elicited in the study. Perception of postgraduates who came through NEET-PG was not assessed because it was beyond the scope of study. First and second year undergraduate students who took up the NEET exam in the year 2016 and 2017 only were included in the study because they are the students who will know the impact of NEET.

Recommendations

Students in India study different syllabus namely state board, CBSE, ICSE etc. but the syllabus of NEET is different. So there is a difficulty between different syllabus students to attempt NEET. Government school students find it more difficult because of lack of proper coaching. So the syllabus of NEET examination must be standardized to help each and every student be it government or private schools. Separate coaching for NEET can be encouraged in schools to improve the student's performance in NEET.

Conclusion

This was the first study which was conducted to analyze the pre and post NEET changes and opinion of the students among various dental colleges in Chennai. Although there was a mixed response about NEET in the present study, it is slightly evident that the system has attained stability and the admission procedures have become easy and transparent for the students as well as for the institutions. The coaching centers can provide good quality coaching for reasonable fees for the needy students in order to sort this issue. The syllabus can be standardized all over India so that all the students get the equal opportunity to prepare for NEET and to crack it.

Conflict of Interest: Nil

Ethical Clearence: Obtained from Ethical Clearance Board of SRM Dental College

Source of Funding: Self

References

1. Priya B, Shanmugam M, Shivakumar V, Tejasri G, Vidhu S, Anitha V. Career perspective among dental professionals in Tamil Nadu. Journal of Education and Ethics in Dentistry. 2014;4(2):61-4.
2. Glasscoe D. Why would anyone want to become a dentist?. Dental economics-oral hygiene. 1998 Aug;88(8):32-3.
3. Rashmi M, Shoba M, Vijayakumar N, Virjee K, Yadava T. Dentistry as a career: Motives and perception of dental students attending Dental Colleges in Bengaluru city, Karnataka, India. Journal of Indian Association of Public Health Dentistry. 2014;12(3):194-8.
4. National Eligibility cum Entrance Test - NEET (UG), 2018 [Internet]. Cbseneet.nic.in. 2018 [cited 31 August 2018]. Available from: https://cbseneet.nic.in/cbseneet/Welcome.aspx.
5. Ray S. National Eligibility-cum-Entrance Test (NEET). Current Medicine Research and Practice. 2016;6(4):147-8.
6. Solanki A, Kashyap S. Medical education in India: Current challenges and the way forward. Medical Teacher. 2014;36(12):1027-31.
7. AnbuSelvan G, Gokulnathan S, PrabuRajan V, RajaRaman G, Kumar S, Thagavelu A. A study among dental students regarding the factors influenced dental students to choose dentistry as career. Journal of Pharmacy and Bioallied Sciences. 2013;5(5):36-8.
8. Banabilh SM. Career decisions of undergraduate dental students at the University of Science and Technology, Yemen. Journal of dental education.

2013 Mar 1;77(3):331-6.

9. Kobale M, Klaić M, Bavrka G, Vodanović M. Motivation and Career Perceptions of Dental Students at the School of Dental Medicine University of Zagreb, Croatia. Acta stomatologica Croatica. 2016 Sep;50(3):207-14.
10. Hamissi J, Bairami P, Hamissi Z. Assessing the causes for the dentistry selection as a job by Iranian dental students: A Questionnaire Survey. Journal of medicine and life. 2015;8(Spec Iss 3):151-5.
11. Sharma N, Kabasi S, Pati AR. Perception of 1st year dental students studying in Odisha toward career choice: A cross-sectional survey. Journal of Indian Association of Public Health Dentistry. 2015;13(4):449-53.
12. Gallagher JE, Patel R, Donaldson N, Wilson NH. The emerging dental workforce: why dentistry? A quantitative study of final year dental students' views on their professional career. BMC Oral Health. 2007;7(1):7-23.

Minimization of Heart Rate Bias in the Estimation of Heart Rate Variability

Jitendra Kumar Jain[1], Ranjan Maheshwari[2]

[1]Government Engineering College Bikaner, Karni Industrial Area, Pugal Road, Bikaner, Rajasthan, India,
[2]Rajasthan Technical University, Kota, Rawatbhata Road, Kota, Rajasthan, India

Abstract

Background: Heart Rate (HR) is a time varying signal indicating the beating activity of the heart, whereas Heart Rate Variability (HRV) is a noninvasive tool to evaluate the cardiac autonomic regulations. The HRV is widely used to evaluate cardiac/autonomic health in normal healthy as well as chronic diseased population. The HR and HRV are significantly connected with each other. HRV is dependent on the average HR as well on the Autonomic Nervous System (ANS) activity. To make the HRV a potential marker of ANS activity, the influence of HR must be reduced. The present study is designed to minimize the effect of HR on HRV by normalization of the RR interval tachogram.

Method: Forty six young adults participated in the non-invasive and benign study. 10 minutes of Electrocardiogram (ECG) lead II was recorded in each case in supine position. The electrocardiographic records of the subjects were divided into three groups based on their HR viz., slow, moderate and fast HR. The HRV indices were extracted at pre and post HR bias minimization.

Results: The improved HRV was observed with HR bias minimization in all three categories of HR. The reduced HRV was found with increasing heart rate even after HR bias minimization.

Conclusion: Significant impact of normalization was found on moderate and fast HR subjects. This suggests that the HRV studies would yield better results with HR bias reduced, thereby improving health monitoring systems based on HRV.

Keywords: *Heart rate; Heart rate variability; Normalization; HR bias.*

Introduction

Heart rate (HR) is a time varying signal and its variations may contain indications of various cardiac and non cardiac conditions[1]. The instantaneous HR can be calculated from the time between any two QRS complexes of the Electrocardiogram[2]. The Greek physicians were the first to measure the pulse rate and its variation with respiration was first observed by R. Stephen Hales[3]. Dyer et al. reported that high heart rate may be an independent risk factor from sudden death due to both cardiovascular and non-cardiovascular diseases[4]. The excess cardiovascular deaths with more rapid heart rates were also observed in a Framingham study of 5209 men and women for 30 years[5].

The HR is regulated by the natural pacemaker in the heart[6]. The HR is not constant but depends upon sinus node cycle length (CL) which is further under the control of autonomic nervous system (ANS)[7]. The CL variations result into beat to beat fluctuations in the HR which provides a noninvasive measure of cardiovascular control system; the sympathetic and parasympathetic systems[8]. Thus heart rate variability (HRV) is defined as the fluctuations of the RR intervals under the influence of ANS where short term variability mediated by parasympathetic system and long term variability by both sympathetic and parasympathetic pathways[9]. With the application of digital signal processing techniques, the HR and HRV and their relationship with health and diseases was explored[10-12]. The HRV has become a powerful and popular tool for the assessment of cardiovascular autonomic regulation. So far, more than 17000 PubMed listed HRV related articles have been published[13].

The HR and HRV both are strongly correlated. Their inverse correlation was reported by Ungi et al.[14]. The relationship between HR and HRV was further explored in various studies[15-16]. They demonstrated that the association between HR and HRV can be determined both physiologically and mathematically. The physiological association is manifested in ANS activity whereas mathematical association is observed by inverse relationship between HR and RR interval.

Monfredi et al. presented the increased HRV for slow HR (large RR interval) and decreased HRV for fast HR (small RR interval) and therefore concluded that HRV of two different average HR subjects cannot be compared[13]. In support to this, Kazmi et al. investigated the relationship between HR and linear/nonlinear HRV indices and concluded that HRV is dependent on HR and thus, HR should be considered while HRV analysis is performed in evaluation of cardiac ANS activity[17].

To overcome the influence of HR bias in HRV, Sacha et al. investigated the HRV relationship with HR by normalization of the RR interval with respect to the average value[18]. Their study revealed significant differences in the correlation between HR and HRV with normalization of the HR. Thus reducing the HR bias in HRV could metamorphose HRV in a significant manner for ANS activity. However the HR characterization in reducing HR bias is still to be explored. So, the present study was designed to investigate the effect of slow, moderate and fast HR bias minimization in HRV.

Materials and Methods

Study population

A number of college students were invited to take part in the study. Details of the study, procedure and objectives were given to the subjects prior to the data acquisition and written consent was obtained. Volunteers were examined for the following inclusion criteria:

1. Systolic blood pressure <140 mmHg and diastolic blood pressure <90 mmHg.

2. No history/treatment of any cardiovascular disease, diabetes or any other abnormality that would interfere with cardiac autonomic function.

Based on these inclusion criteria, forty six young individuals with age ranging from 18 to 39 years were chosen who met the criteria to participate in this study. The distribution of the population is shown in Table 1.

Table 1 Distribution of population

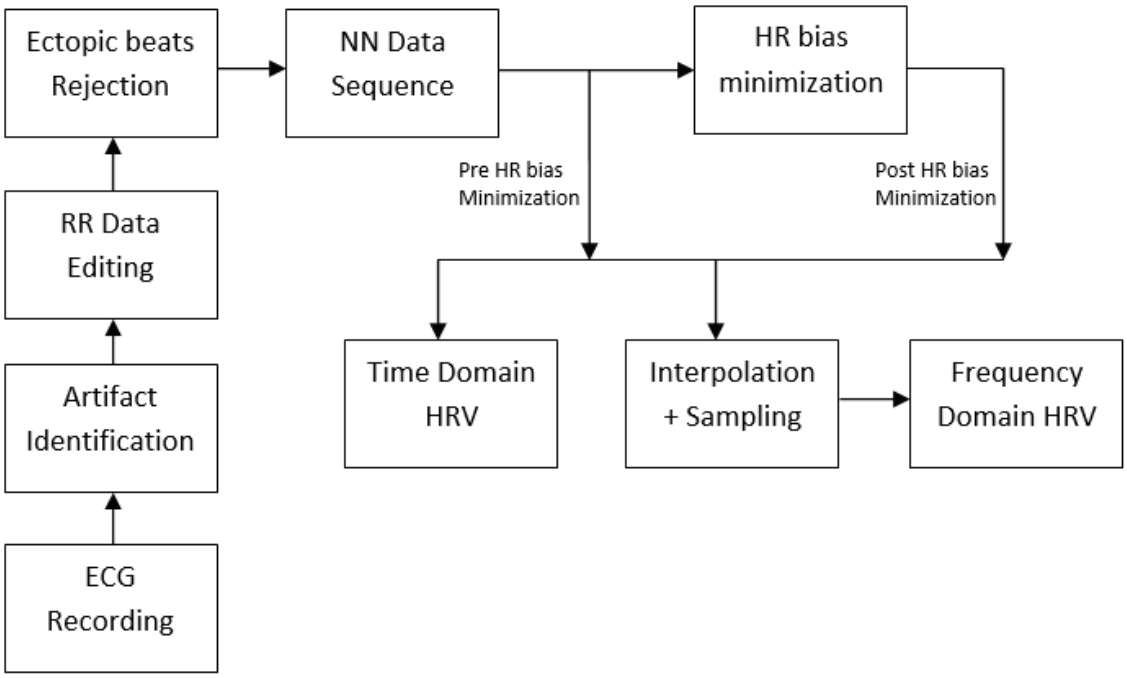
Parameters	HR (BPM)		
	Slow (HR<65)	**Moderate (65≤HR≤85)**	**Fast (HR>85)**
N	16	15	15
Age(years)	23.4±6.09	22.4±5.4	24.5±6.9
HR(BPM)	61.1±3.6	74.9±3.1	88.8±2.6
SBP(mmHg)	119.12 ± 5.75	120.31± 5.92	118.92±9.51
DBP(mmHg)	75 ± 3.18	79.1±4.92	77.1±5.99

Values are shown as mean±SD.
Abbreviations: N, No. of subjects; HR, heart rate; SBP, systolic blood pressure; DBP, diastolic blood pressure

Procedure

The ECG lead II was recorded in supine position for 10 minutes duration with a PowerLab26® and LabChart8.0® software (AD Instruments, Australia). The ECG data acquisition system along with flow chart of the study is shown in Fig. 1.

Fig. 1 Experimental setup and flow chart of the study



Data processing

Out of 10 minutes of ECG recording; smooth, 5 minutes duration of ECG was selected. The HRV module detected beats by detecting R waves in the ECG signal. The beats were classified as normal or ectopic beat based on preset limit. The ectopic beats were identified if the inter beat interval (IBI) differs more than ±30% from mean[19]. The cubic spline interpolation method was used to replace the ectopic beats with interpolated values based on weighted average of nearby accepted values.

The study population was divided into three categories based on the HR viz., slow HR (HR<65 BPM), moderate HR (65 BPM ≤HR≤ 85 BPM) and fast HR (HR>85 BPM). Time domain and frequency domain HRV indices were obtained from HRV module of the LabChart8.0® software[20-21]. For HR bias minimization, the RR interval tachogram was normalized with average RR interval for each subject. The normalization process neutralizes the mathematical inverse relationship between HR and HRV. The HRV parameters were extracted at pre and post HR bias minimization states from recorded Electrocardiographic data.

The data are expressed as mean±SD. Student paired t test was used to compare the difference between HRV parameters of slow, moderate and fast HR cases. Differences were considered significant at the level $p<0.05$.

Results

The time and frequency domain HRV parameters were obtained with LabChart8.0® software. The average values of HRV measures were obtained for slow, moderate and fast HR at pre and post HR bias minimization and presented in Table 2. The improved HRV was observed for all three HR categories with HR bias minimization. However, the impact was more significant in moderate and fast HR cases.

Table 2 HRV measures during pre and post HR bias minimization

HR bias minimization		HRV Parameters					
		SDNN (ms)	**RMSSD (ms)**	**pNN50 (%)**	**LF (ms2)**	**HF (ms2)**	**TP (ms2)**
Slow HR	Pre	63.95±20.63	81.16±28.54	51.68±14.33	1450.13±1308.74	2266.94±2007.02	3808.13±3207.70
	Post	65.65±18.51	83.83±26.33	53.88±13.29	1453.13±1077.92	2405.56±1810.92	3964.25±2693.76
	% Δ	+2.7	+2.8	+4.3	+0.2	+6.1	+4.1
	t stat	1.26	1.49	1.78	-0.02	1.5	-0.65
	p value	0.23	0.16	0.09	0.98	0.16	0.53
Moderate HR	Pre	43.7±13.97	43.25±15.16	19.13±12.04	961.24±622.94	861.8±718.06	1897.2±1181.04
	Post	52.36±16.77	53.08±18.76	27.97±13.68	1627.13±1255.31	994±778.38	2721.13±1964.52
	% Δ	+19.8	+22.7	+46.2	+69.3	+15.3	+43.4
	t stat	8.53	8.36	9.80	3.35	1.81	3.47
	p value	<0.05*	<0.05*	<0.05*	<0.05*	0.09	<0.05*
Fast HR	Pre	35.03±19.53	32.45±22.85	10.45±13.31	566.6±365.07	491.2±610.36	1149.27±982.79
	Post	46.21±26.04	44.78±31.18	19.17±16.96	1067.4±642.06	793.6±885.85	1974.67±1417.06
	% Δ	+31.9	+37.9	+83.4	+88.4	+61.6	+71.8
	t stat	5.51	5.12	5.82	5.55	3.89	5.78
	p value	<0.05*	<0.05*	<0.05*	<0.05*	<0.05*	<0.05*

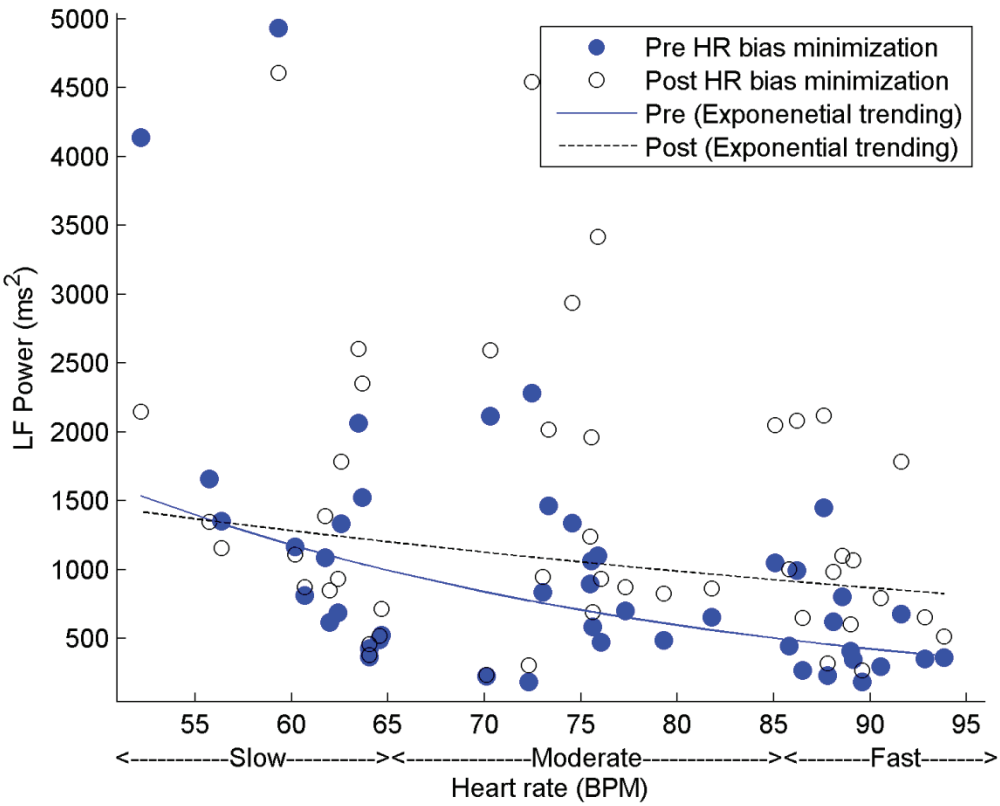
Values are shown as mean±SD. *Statistically significant at $p<0.05$

Abbreviations: t stat, student t test statistics; SDNN, standard deviation of NN intervals; RMSSD, root mean square of differences of successive RR intervals; pNN50, percentage of RR intervals greater than 50 ms; LF (ms2), low frequency power; HF (ms2), high frequency power; TP, total power.

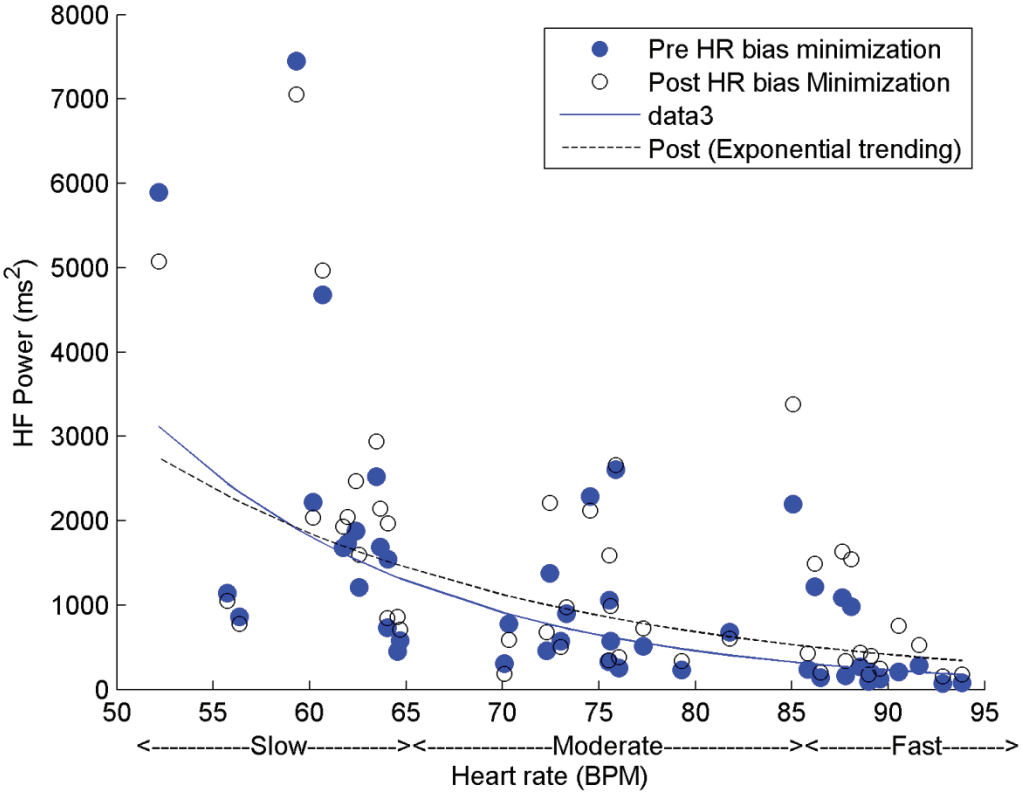
The SDNN was increased at post HR bias minimization. The changes were not statistically significant for slow HR subjects (+2.7%, p=0.23) whereas statistically significant changes were observed for moderate and fast HR subjects (+19.8%, 31.9%, p<0.05) respectively. The RMSSD also increased with HR bias minimization. However the changes were significant only for moderate and fast HR subjects (+22.7 %, 37.9, p<0.05) respectively whereas changes were not significant for slow HR subjects (+2.8%, p=0.16). The pNN50 count also had similar trends. It increased significantly with HR bias minimization in moderate and fast HR subjects (+46.2%, +83.4%, p<0.05) respectively whereas insignificant variation was observed for slow HR subjects (+4.3%, p=0.09).

The HR bias minimization also improved frequency domain HRV measures. The LF power increased with HR bias minimization. The statistically significant changes were observed for moderate and fast HR subjects (+69.3%, 88.4%, p<0.05) respectively. The impact of HR bias minimization on HF power was also significant for fast HR subjects (+61.6%, p<0.05). However the changes were substantial for moderate subjects as compared to slow HR subjects. The TP also increased with HR bias minimization. It increased significantly for moderate and fast HR subjects (+43.4%, +71.8%, p<0.05) respectively.

The scatter plot between HRV indices and HR at pre and post HR bias minimization is presented in Fig. 2. An exponential trending was estimated on the scatter plot. It can be observed a less exponential decay for post HR bias minimization indicating an improved HRV with HR bias minimization. Negative decay of the exponent indicates that HRV decreases with increasing HR, even after HR bias minimization. The similar trends can be observed for all time and frequency domain HRV indices with HR. The two exponent curves are in close proximity at slow HR region depicting less impact of HR bias minimization on slow HR subjects. As HR increases, both the exponent curves moves apart depicting significant impact of HR bias minimization on moderate and fast HR subjects.



(A)



(B)

Fig. 2 HRV measures during pre and post HR bias minimization (A) LF power (B) HF power

Discussion

In this study, the effect of HR bias minimization on HRV measures was presented. The HR bias is present due to inverse mathematical relationship between HR and HRV. To minimize the HR bias, the RR interval was normalized with average RR interval. The normalization procedure do not changes information about signal oscillations. It just changes the oscillations relative to signal average value.

The HR bias has also effect on the QT interval i.e. faster the HR, shorter the QT interval and vice versa. HR dependency on the QT interval has been presented early in 1920 by Bazett and Fridericia and established HR correction formulae[22]. These formulae adjust the QT interval for HR, if it is deviated from 60 beats per minute. The adjustment of the QT to varying HR is a dynamic phenomenon consisting of slow and fast adaptation phases and depends upon nature of HR changes. Repolarization adapts faster to increasing HR than it does to decreasing HR[23]. As the QT prolongation is associated with risk of cardiac arrhythmias and mortality, a correction for HR is warranted for QT interval[24].

Similar to this, correction for HR is also needed in HRV analysis. In this study, the HR bias minimization by RR interval normalization with average RR interval also sets the HRV measures for HR at 60 beats per minute. The HRV measures were improved after HR bias minimization. The HRV measures were found lower at higher HR even after HR bias minimization. This indicates a strong correlation between HR and HRV and the results obtained are in line with numerous studies[13,17,25]. Reduced HRV may be a natural response of ANS in higher HR; however reduced HRV has been also reported in many cardiovascular diseases. Therefore the HRV of two subjects with different average HR cannot be compared. It may lead to draw inappropriate inferences.

In this study, the HR was further characterized as slow, moderate and fast HR. It is proposed that,

(1) The heart rate has significant effect on HRV, particularly in moderate and fast heart rate cases. So, the

effect of heart rate bias minimization is more significant on moderate and fast HR as compared to slow HR.

(2) HRV has inverse relationship with heart rate even after HR bias minimization. It can be attributed to the natural response of ANS at increased heart rate.

Acknowledgement: The authors are indebted to all the volunteers who participated in the study. The institutional ethical committee of Government Engineering College Bikaner is acknowledged for providing guidance and ethical clearance. The authors acknowledge Government Engineering College, Bikaner and Rajasthan Technical University, Kota for their patronage and facilities provided to carry out the work.

Conflict of Interest: The authors declare no conflict of interest.

Funding: The authors received no funding for the current research work.

Ethical Clearance: The study was approved by the institutional ethical committee of Government Engineering College Bikaner, Rajasthan, India (Ref. no. F1B(93)/Estt/ECB/226/2007/207, dated 03-02-2018).

References

[1] R. U. Acharya *et al.*, "Classification of cardiac abnormalities using heart rate signals," *Med. Biol. Eng. Comput.*, 2004.

[2] E. Adetiba, V. C. Iweanya, S. I. Popoola, J. N. Adetiba, and C. Menon, "Automated detection of heart defects in athletes based on electrocardiography and artificial neural network," *Cogent Eng.*, 2017.

[3] G. E. Billman, "Heart rate variability - A historical perspective," *Front. Physiol.*, 2011.

[4] D. AR *et al.*, "Heart Rate as a Prognostic Factor for Coronary Heart Disease and Mortality: Findings in three Chicago epidemiologic studies," *Am. J. Epidemiol.*, 1980.

[5] W. B. Kannel, C. Kannel, R. S. Paffenbarger, and L. A. Cupples, "Heart rate and cardiovascular mortality: The Framingham study," *Am. Heart J.*, 1987.

[6] S. Nimmala, Y. Ramadevi, R. Sahith, and R. Cheruku, "High blood pressure prediction based on AAA++ using machine-learning algorithms," *Cogent Eng.*, 2018.

[7] A. Zaza and F. Lombardi, "Autonomic indexes based on the analysis of heart rate variability: A view from the sinus node," *Cardiovascular Research*. 2001.

[8] S. Akselrod, D. Gordon, F. A. Ubel, D. C. Shannon, A. C. Barger, and R. J. Cohen, "Power spectrum analysis of heart rate fluctuation: A quantitative probe of beat-to-beat cardiovascular control," *Science (80-.).*, 1981.

[9] P. Mansier *et al.*, "Linear and non-linear analyses of heart rate variability: A minireview," *Cardiovascular Research*. 1996.

[10] A. E. Aubert, F. Beckers, and B. Seps, "Non-linear dynamics of heart rate variability in athletes: Effect of training," in *Computers in Cardiology*, 2002.

[11] S. Elsenbruch, M. J. Harnish, and W. C. Orr, "Heart rate variability during waking and sleep in healthy males and females," *Sleep*, 1999.

[12] F. Lombardi, T. H. Mäkikallio, R. J. Myerburg, and H. V. Huikuri, "Sudden cardiac death: Role of heart rate variability to identify patients at risk," *Cardiovascular Research*. 2001.

[13] O. Monfredi *et al.*, "Biophysical characterization of the underappreciated and important relationship between heart rate variability and heart rate," *Hypertension*, 2014.

[14] I. Ungi, A. Thury, and M. Csanady, "Investigation of the correlation between heart rate and heart rate variability," in *Computers in Cardiology*, 1995.

[15] J. Sacha and W. Pluta, "Different methods of heart rate variability analysis reveal different correlations of heart rate variability spectrum with average heart rate," *J. Electrocardiol.*, 2005.

[16] J. Sacha and W. Pluta, "Alterations of an average heart rate change heart rate variability due to mathematical reasons," *Int. J. Cardiol.*, 2008.

[17] S. Z. H. Kazmi *et al.*, "Inverse correlation between heart rate variability and heart rate demonstrated by linear and nonlinear analysis," *PLoS One*, 2016.

[18] J. Sacha *et al.*, "How to strengthen or weaken the HRV dependence on heart rate - Description of the method and its perspectives," *Int. J. Cardiol.*, 2013.

[19] K. J. Kemper, C. Hamilton, and M. Atkinson, "Heart rate variability: Impact of differences

in outlier identification and management strategies on common measures in three clinical populations," *Pediatr. Res.*, 2007.

[20] M. Malik *et al.*, "Heart rate variability. Standards of measurement, physiological interpretation, and clinical use," *European Heart Journal*. 1996.

[21] G. G. G. Berntson *et al.*, "Heart rate variability: origins, methods, and interpretive caveats," *Psychophysiology*, 1997.

[22] h. C. Bazett, "an analysis of the time-relations of electrocardiograms.," *Ann. Noninvasive Electrocardiol.*, 1997.

[23] C. P. Lau, A. R. Freedman, S. Fleming, M. Malik, A. J. Camm, and D. E. Ward, "Hysteresis of the ventricular paced QT interval in response to abrupt changes in pacing rate," *Cardiovascular Research*. 1988.

[24] J. M. Dekker, R. S. Crow, P. J. Hannan, E. G. Schouten, and A. R. Folsom, "Heart rate-corrected QT interval prolongation predicts risk of coronary heart disease in black and white middle-aged men and women: The ARIC study," *J. Am. Coll. Cardiol.*, 2004.

[25] L. Mangin, B. Swynghedauw, A. Benis, N. Thibault, G. Lerebours, and F. Carré, "Relationships between heart rate and heart rate variability: Study in conscious rats," *J. Cardiovasc. Pharmacol.*, 1998.

Is Violin String Players Having Longer Left Fingers?

Joyanta Sarkar[1], Anil Rai[2]

[1]Phd Scholar, [2]Assistant Professor, Birla Institute of Technology and Science, Pilani, India

Abstract

Bones are a form of specialized tissue. They are very strong and durable. Bones in our body will elongate and grow starting from the time we are born until adolescence. The rate of development of our bones will also depend on, amongst other things, the amount of nutrition, exercise and exposure to sunlight. Sunlight helps us produce vitamin D - which is important for absorbing calcium. Our bones provide the frame and structural support required to hold our flesh, organs and muscles together. They also provide protection for our vital organs. For example the ribcage protects the heart and lungs, while the skull protects our brains. Bone marrow found at the core of our bones, is used to produce blood cells and to store fat. Bones also act as a reservoir for calcium storage. In this paper, we propose, whether the experienced violinists have longer fingers on their left hand or not. This paper involved violinists who have been playing the instrument for more than 5 years.

Keywords: *Bone, Tissues, Ribcage, Skull, Osteoblasts, Osteocytes, Osteoid*

Introduction

The violin, sometimes known as a fiddle, is a wooden string instrument in the violin family. Most violins have a hollow wooden body [1]. It is the smallest and highest-pitched instrument in the family in regular use. The violin typically has four strings, usually tuned in perfect fifths with notes G3, D4, A4, E5, and is most commonly played by drawing a bow across its strings, though it can also be played by plucking the strings with the fingers (pizzicato) and by striking the strings with the wooden side of the bow.

Violins are important instruments in a wide variety of musical genres. They are most prominent in the Western classical tradition, both in ensembles (from chamber music to orchestras) and as solo instruments and in many varieties of folk music, including country music, bluegrass music and in jazz. Electric violins with solid bodies and piezoelectric pickups are used in some forms of rock music and jazz fusion, with the pickups plugged into instrument amplifiers and speakers to produce sound. Further, the violin has come to be played in many non-Western music cultures, including Indian music and Iranian music [2]. The name fiddle is often used regardless of the type of music played on it.

The violin was first known in 16th-century Italy, with some further modifications occurring in the 18th and 19th centuries to give the instrument a more powerful sound and projection [3].

Violinists and collectors particularly prize the fine historical instruments made by the Stradivari, Guarneri, Guadagnini and Amati families from the 16th to the 18th century in Brescia and Cremona (Italy) and byJacob Stainer in Austria [4]. According to their reputation, the quality of their sound has defied attempts to explain or equal it, though this belief is disputed. Great numbers of instruments have come from the hands of less famous makers, as well as still greater numbers of mass-produced commercial "trade violins" coming from cottage industries in places such as Saxony, Bohemia, and Mirecourt. Many of these trade instruments were formerly sold by Sears, Roebuck and Co. and other mass merchandisers.

The parts of a violin are usually made from different types of wood. Violins can be strung with gut, Perlon or other synthetic or steel strings. A person who makes or repairs violins is called a luthier or violinmaker. One who makes or repairs bows is called an archetier or bowmaker [5].

Etymology

The word "violin" was first used in English in the 1570s. The word "violin" comes from "Italian violino, [a] diminutive of viola". The term "viola" comes from the expression for "tenor violin" in 1797, from Italian viola, from Old Provençal viola, [which came from] Medieval Latin vitula" as a term which means "stringed instrument," perhaps [coming] from Vitula, Roman goddess of joy..., or from related Latin verb vitulari, "to exult, be joyful." The related term "Viola da gamba" means "bass viol" (1724) is from Italian, literally "a viola for the leg" (i.e. to hold between the legs)." A violin is the "modern form of the smaller, medieval viola da braccio." ("arm viola")

The violin is often called a fiddle, either when used in a folk music context, or even in Classical music scenes, as an informal nickname for the instrument. The word "fiddle" was first used in English in the late 14th century. The word "fiddle" comes from "fedele, fydyll, fidel, earlier fithele, from Old English fiðele «fiddle,» which is related to Old Norse fiðla, Middle Dutch vedele, Dutch vedel, Old High German fidula, German Fiedel, "a fiddle;" all of uncertain origin." As to the origin of the word "fiddle", the "...usual suggestion, based on resemblance in sound and sense, is that it is from Medieval Latin vitula."

Construction and Mechanics

A violin generally consists of a spruce top (the soundboard, also known as the top plate, table, or belly), maple ribs and back, two endblocks, a neck, a bridge, a soundpost, four strings, and various fittings, optionally including a chinrest, which may attach directly over, or to the left of, the tailpiece. A distinctive feature of a violin body is its hourglass-like shape and the arching of its top and back. The hourglass shape comprises two upper bouts, two lower bouts, and two concave C-bouts at the waist, providing clearance for the bow. The "voice" or sound of a violin depends on its shape, the wood it is made from, the graduation (the thickness profile) of both the top and back, the varnish that coats its outside surface and the skill of the luthier in doing all of these steps. The varnish and especially the wood continue to improve with age, making the fixed supply of old well-made violins built by famous luthiers much sought-after.

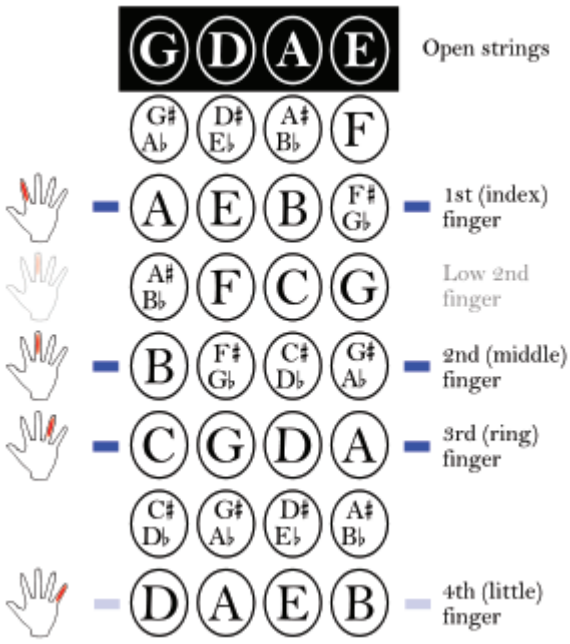
The majority of glued joints in the instrument use animal hide glue rather than common white glue for a number of reasons. Hide glue is capable of making a thinner joint than most other glues, it is reversible (brittle enough to crack with carefully applied force, and removable with very warm water) when disassembly is needed, and since fresh hide glue sticks to old hide glue, more original wood can be preserved when repairing a joint. (More modern glues must be cleaned off entirely for the new joint to be sound, which generally involves scraping off some wood along with the old glue.) Weaker, diluted glue is usually used to fasten the top to the ribs, and the nut to the fingerboard, since common repairs involve removing these parts. The purfling running around the edge of the spruce top provides some protection against cracks originating at the edge [6]. It also allows the top to flex more independently of the rib structure. Painted-on faux purfling on the top is usually a sign of an inferior instrument. The back and ribs are typically made of maple, most often with a matching striped figure, referred to as flame, fiddleback, or tiger stripe.

The neck is usually maple with a flamed figure compatible with that of the ribs and back. It carries the fingerboard, typically made of ebony, but often some other wood stained or painted black on cheaper instruments. Ebony is the preferred material because of its hardness, beauty, and superior resistance to wear. Fingerboards are dressed to a particular transverse curve, and have a small lengthwise "scoop," or concavity, slightly more pronounced on the lower strings, especially when meant for gut or synthetic strings. Some old violins (and some made to appear old) have a grafted scroll, evidenced by a glue joint between the pegbox and neck. Many authentic old instruments have had their necks reset to a slightly increased angle, and lengthened by about a centimeter. The neck graft allows the original scroll to be kept with a Baroque violin when bringing its neck into conformance with modern standards.

The bridge is a precisely cut piece of maple that forms the lower anchor point of the vibrating length of the strings and transmits the vibration of the strings to the body of the instrument. Its top curve holds the strings at the proper height from the fingerboard in an arc, allowing each to be sounded separately by the bow. The sound post, or soul post, fits precisely inside the instrument between the back and top, at a carefully chosen spot near the treble foot of the bridge, which it helps support. It also influences the modes of vibration of the top and the back of the instrument.

The tailpiece anchors the strings to the lower bout of the violin by means of the tailgut, which loops around an ebony button called the tailpin (sometimes confusingly called the endpin, like the cello's spike), which fits into a tapered hole in the bottom block. Very often the E string will have a fine tuning lever worked by a small screw turned by the fingers. Fine tuners may also be applied to the other strings, especially on a student instrument, and are sometimes built into the tailpiece. The fine tuners enable the performer to make small changes in the pitch of a string. At the scroll end, the strings wind around the wooden tuning pegs in the pegbox. The tuning pegs are tapered and fit into holes in the peg box. The tuning pegs are held in place by the friction of wood on wood. Strings may be made of metal or less commonly gut or gut wrapped in metal. Strings usually have a colored silk wrapping at both ends, for identification of the string (e.g., G string, D string, A string or E string) and to provide friction against the pegs. The tapered pegs allow friction to be increased or decreased by the player applying appropriate pressure along the axis of the peg while turning it.

Left hand and pitch production



First position fingerings. Note that this diagram only shows the "first position" notes. There are notes of higher pitch beyond those indicated.

The left hand determines the sounding length of the string, and thus the pitch of the string, by "stopping" it (pressing it) against the fingerboard with the fingertips, producing different pitches. As the violin has no frets to stop the strings, as is usual with the guitar, the player must know exactly where to place the fingers on the strings to play with good intonation (tuning). Beginning violinists play open strings and the lowest position, nearest to the nut. Students often start with relatively easy keys, such as A Major and G major. Students are taught scales and simple melodies. Through practice of scales and arpeggios and ear training, the violinist's left hand eventually "finds" the notes intuitively by muscle memory.

Beginners sometimes rely on tapes placed on the fingerboard for proper left hand finger placement, but usually abandon the tapes quickly as they advance. Another commonly used marking technique uses dots of white-out on the fingerboard, which wears off in a few weeks of regular practice. This practice, unfortunately, is used sometimes in lieu of adequate ear-training, guiding the placement of fingers by eye and not by ear. Especially in the early stages of learning to play, the so-called "ringing tones" are useful. There are nine such notes in first position, where a stopped note sounds a unison or octave with another (open) string, causing it to resonate sympathetically. Students often use these ringing tones to check the intonation of the stopped note by seeing if it is harmonious with the open string. For example, when playing the stopped pitch "A" on the G string, the violinist could play the open D string at the same time, to check the intonation of the stopped "A". If the "A" is in tune, the "A" and the open D string should produce a harmonious perfect fourth.

Violins are tuned in perfect fifths, like all the orchestral strings (violin, viola, cello) except the double bass, which is tuned in perfect fourths. Each subsequent note is stopped at a pitch the player perceives as the most harmonious, "when unaccompanied, [a violinist] does not play consistently in either the tempered or the natural [just] scale, but tends on the whole to conform to the Pythagorean scale." When violinists are playing in a string quartet or a string orchestra, the strings typically "sweeten" their tuning to suit the key they are playing in. When playing with an instrument tuned to equal temperament, such as a piano, skilled violinists adjust their tuning to match the equal temperament of the piano to avoid discordant notes.

The fingers are conventionally numbered 1 (index) through 4 (little finger) in music notation, such as sheet music and etude books. Especially in instructional editions of violin music, numbers over the notes may

indicate which finger to use, with 0 or O indicating an open string. The chart to the right shows the arrangement of notes reachable in first position. Not shown on this chart is the way the spacing between note positions becomes closer as the fingers move up (in pitch) from the nut. The bars at the sides of the chart represent the usual possibilities for beginners' tape placements, at 1st, high 2nd, 3rd, and 4th fingers.

Methodology

The materials required for this experiment: - 10 participants 12 to 20 years old who have played the violin for at least 5 years

- 10 participants 21 to 30 years old who have played the violin for at least 5 years

- 10 participants 31 to 40 years old who have played the violin for at least 5 years

- 10 participants 12 to 20 years old who are non-violinists

- 10 participants 21 to 30 years old who are non-violinists

- 10 participants 31 to 40 years old who are non-violinists

- 1 ruler

- 1 wooden block

Figure 1: Fingering Set-Up-1

Figure 2: Fingering Set-Up-2

Figure 3: Fingering Set-Up-3

Figure 4: Fingering Set-Up-4

1. For this experiment, the independent variable is the age of the participants and whether or not they have played the violin for at least 5 years. The dependent variable is the difference in the length of their left and right fingers. This is determined by measuring the length of their fingers using the ruler and wooden block. The constants (control variables) are the number of years for which they have played the violin and the method used to measure the length of the fingers. 2. Sixty participants are required for this project out of which 30 participants are required to have played the violin for at least 5 years and the remaining 30 participants are non-musicians. Out of the 30 participants, 10 of them will be from each of the age groups 12 to 20 years, 21 to 30 years and 31 to 40 years old. 3. The length of the participant's index, middle, ring and little fingers are measured on the left and right hand. The measurements are taken by placing a wooden block at the tip of the finger and using the ruler to measure the distance from the base of the finger to the edge of the wooded block. 4. The difference in length between the left fingers and right fingers is calculated as follows: Finger length difference = Length of left finger (index) – Length of right finger (index) The measurement is compared between the

same fingers, i.e. left index to right index finger. 5. The differences in finger lengths are recorded. After completing the measurements for all 60 participants, the average difference in finger length for each group is obtained by totaling the differences in finger length, and dividing the total by 10. The finger measurement which shows the most significant difference is used and the calculated results are recorded in the table given below.

Results and Analysis

It was observed that violinists have longer left fingers than their right fingers by about 7mm. Non-musicians have longer right fingers compared to their left fingers by about 8mm. Their age did not make a significant difference in finger length.

Table: Difference in left finger and right finger length for different age groups (mm)

Condition	Difference in left finger and right finger length for different age groups (mm)		
	Age 12-20	Age 21-30	Age 31-40
Violin players	6.7	7.0	7.1
Non-violin players	-8.0	-8.3	-8.4

The graph below represents the results of our experiment:

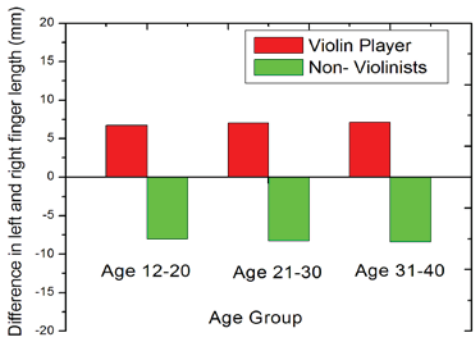


Fig: Finger length of Violinists and non-Violinists Player

Conclusion

Bones are a vital part of our body for many reasons. Involvement in sports and activities that result in stress on our bones, like baseball or playing musical instruments, are believed to increase the length and size of our bones. The hypothesis that violinists have longer fingers on their left hands, while non-violinists have shorter left hand fingers, is proven to be true.

Ethical Clearance- Taken from Birla Institute of Technology and Science, Pilani

Source of Funding- Self

Conflict of Interest – Nil

References

1. Whipple J. Music in intervention for children and adolescents with autism: a meta-analysis. Journal of Music Therapy, 2004 February; 41(2):90-106.
2. Lonsdale J, North C. Why do we listen to music? A uses and gratifications analysis, British journal of psychology London England 1953, 2011 March; 102 (1): 108-134.
3. Picard W, J Klein. Toward computers that recognize and respond to user emotion: Theoretical and practical implications. Interacting with computers. 2002 March; 14(2):141–169.
4. Kim J, Wigram T, Gold C. Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. Autism. 2009 January; 13(4):389-409.
5. See C. M. The Use of Music and Movement Therapy to Modify Behavior of Children with Autism. Pertanika J. Soc. Sci. & Hum. 2012 January; 20 (4): 1103 – 1116.
6. Cicely Saunders. Terminal Care and Music Therapy. Japanese Journal of Psychosomatic Medicine. 1993 March; 33(1): 25-28.

A Study on the Effectiveness of Scapular Retraction Exercises on Forward Head Posture

K. Kirupa[1], S. M. Divya Mary[1], R. Nithyanisha[1], S. Navin Kumar[2]

[1]Assistant Professor, [2]Internee Student, Faculty of Physiotherapy, Dr.M.G.R Educational & Research Institute, Deemed to be University, Velappanchavadi, Chennai, Tamil Nadu, India

Abstract

Objective: The aim of the study is to find out the effectiveness of scapular retraction exercise for forward head posture.

Background of the Study: • Forward head posture is a condition often seen in person who were using computer and laptops for long hours. Forward head posture is the anterior positioning of the cervical spine. This posture is sometime called "text neck".

• It is a posture problem that is caused by several factor including sleeping with head elevated to high. Due to forward head posture the deep flexor muscle gets overstretched and weak thus resulting tightness of pectoralis muscle and over stretched to weak the rhomboid muscle.

• The purpose of this study was to investigate the effect of scapular retraction exercise on neck posture, muscle activity, pain and quality of life in individuals with neck pain and forward head posture.

Methodology: The study is experimental study with study set up at outpatient physiotherapy department of ACS Medical College and Hospital. 30 subjects are randomly selected with inclusion criteria of patient of both male and female, 18 to 30 years of age groups, IT job workers, often indulging in TV, Computer, Texting-neck, Driver's neck and exclusion criteria with Systemic illness, subject undergone surgeries, patient with congenital cervical deformities, Cervical fractures and the material used is adhesive skin marker, Measuring tape and Thera band and the outcome measures is VAS scale, Craniovertebral Angle (tragus right ear &midpoint of the C7) and NDI (neck disability index).

Procedure: 30 subjects with forward head posture were, included in this study. The Craniovertebral angle of all the subjects and were measured by using inch tape. The Craniovertebral angle was measured by angle between midpoint of the adhesive marker at tragus of right ear and midpoint of the reflective marker at C7. All the 30 subjects were received scapular retraction exercises as a common intervention

Result: There is significant effect of Scapular Retraction Exercises in reducing Forward Head Posture.

Keywords: *Forward head posture, Scapular Retraction Exercise, Neck pain, Postural Exercise.*

Introduction

One of the most common postural problems is the forward head posture(FHP) [(1)]. Forward head posture is the anterior positioning of the cervical spine occurring when the lower neck bone is bent and there is an extension of the upper neck bone and the head. This condition has increased and is exacerbated with the advancement in technology and the increasing use of computers and smartphones for extended periods of time. This posture reduces the dispersion of biomechanical loading and therefore causes degeneration of the neck muscles and structural changes in addition, compensatory actions, such as spinal actions, such as spinal curve changes, rounded shoulders and abnormal muscle activity can be observed[(2).]This posture is associated with weakness in the deep cervical short flexor muscles and mid-thoracic scapular retractor (i.e., rhomboids, serratus anterior, middle and lower fibres of the trapezius) and shortening of

the opposing cervical extensor and pectoralis muscles[3]. Forward head posture frequently appear in the patient with neck disorder. Most of the patient with forward head posture spend all day in prolonged sitting such as computer based work, industry related tasks and Bus drivers. Previous studies have shown that forward head posture leads to shortening of posterior neck extensor, tightening of the anterior neck and shoulder muscles and affects scapular position [4]. There is an incidence of 66% for forward head posture among people in age group of 20 to 50 years [5].

Neck pain is one of the most common musculoskeletal disorders, next to back pain. Many people seek medical centres for the treatment at least once in their life time. A review of different observational studies of neck pain around the world showed that is 1-year prevalence range from 16.7 to 75.1 percent for the entire adult population (aged 17 -70 years) with a mean of 37.2 percent [6].

Scapular retraction is an integral component of good trunk posture. Completing simple scapula retraction exercises can strengthen your muscles and improve your posture. These retractors are responsible for squeezing your shoulder blades together and pulling your shoulders back into upright positioning [7]. The two major scapular retractors are the middle trapezius and the rhomboids, but these two muscles vary somewhat in their actions. The middle fibres of the trapezius function as pure scapula and to rotate it to depress the glenoid fossa [8]. If imbalance in cervical muscle resulting from postural misalignment are prolonged an excessive load is imposed on the joint and muscle, thereby making the problem caused forward head posture chronic [9]. There are frequent occurrences of functional movement limitations or non-specific pain in the head and neck region in patient with FHP [10].

The smart phones have small monitors that are typically held downwards near the laps, users must bend their heads to see the screens, increasing activity in the neck extensor muscles overloading the neck and shoulders increases muscle fatigue, decreases work capacity and affects the musculoskeletal system [11]. There have also been concerns raised that the increasing use of computers may put children at higher risk of neck/shoulder problems -such as those commonly seen in adult computer users[12].The craniovertebral angle is identified as the intersection of a horizontal line passing through the C7 spinous process and a line joining the midpoint of the tragus of the ear to the skin overlying the C7 spinous process[13]. There are several exercises to engage the muscles used in retracting your scapula, and many of these exercise are almost strictly scapular retractions [14].

Methodology

The study is experimental study with study set up at outpatient physiotherapy department of ACS Medical College and Hospital. 30 subjects are randomly selected with inclusion criteria of patient of both male and female, 18 to 30 years of age groups, IT job workers, often indulging in TV, Computer, Texting-neck, Driver's neck and exclusion criteria with Systemic illness, subject undergone surgeries, patient with congenital cervical deformities, Cervical fractures and the material used is adhesive skin marker, Measuring tape and Thera band and the outcome measures is VAS scale, Craniovertebral Angle (tragus right ear &midpoint of the C7) and NDI (neck disability index).

Procedure:

Participants who reported to A.C.S medical college and hospital in outpatient physiotherapy department with forward head posture were screened for their eligibility depending on inclusion and exclusion criteria to participate in this study. Then the purpose of the study was explained and an informed consent was obtained. A standardized demographic information including age, gender, height, weight was collected.

All the subjects were asked to sit comfortably on back supported armless chair with both feet flat on floor, hip and knees positioned at 90-degree angle and buttock positioned against the back chair. The subjects were asked to rest their hands on their lap and to keep their shoulder against the back of the chair. Adequate exposure of neck up to shoulder level to clearly define anatomical landmark was done. The most prominent spinous process at the base of cervical spine was palpated. After it was identified, the cervical spine was passively flexed and extended to verify which one moved first, C6 vertebra should be more mobile whereas C7 should demonstrate less motion. Skin over the anatomical landmark was wiped with cotton soaked in spirit to remove skin secretions for proper fixation of adhesive markers. Anatomical landmarks were marked with marker pen; thereafter adhesive marker were fixed over the anatomical landmark. Then taken the measurement of the height between ground and C7 in sitting position of each subject was done with measuring

tape. The craniovertebral angle was measured by angle between mid-point of the adhesive marker at tragus of right ear and midpoint of the reflective marker at C7. After that all subject were asked to sit comfortably on back supported armless chair with feet flat on floor, hips and knees positioned at 90-degree angle hands on their lap.

Measurement of forward head posture: The method for finding the forward head posture, this is done with a tape measure or ruler (scale), ask the patient to lean on the wall in the relaxed position and measures the length between the wall and the head.A total of 30 volunteers meeting the inclusion criteria were selected and performed forward head correction program to 30 min. Forward head posture correction program, the exercises were done 3 weeks per day 2 sessions and 12 repetitions for each session.

Seated row- long sitting position, the patient is asked to take the Thera band to pull the lower sole of feet and grasping the Thera band end with hand, maintaining the shoulder level and head raise and pull the Thera band backward hold it for 2 secs and then relaxed.

Elbow push back- crook lying position, the shoulder kept 90º abduction, external rotation, the elbow push back against the floor and head is raised, both the shoulder retracted and maintain the position for 3 to 5 sec and the relaxed.

Scapular retraction activation- prone lying position, head raised, chintucked, both the arm abducted raising the shoulder from the floor maintain this for few seconds.

Arm slides – crook lying position the shoulder kept 90º abduction and external rotation,the arm slides upward and downward.

Lower trap row exercise - standing position, the Theraband wrapped the window pull the end of Thera bandand then relaxed.

Data Analysis

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups.

Table - 1: Comparison of neck disability index score within group between pre & post test values

#NDI	Pre Test		Post Test		T - Test	Significance
	Mean	S.D	Mean	S.D		
GROUP	20.76	2.22	8.93	1.48	42.27	.000***

(*- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pre-test and post-test values within Group (***- P ≤ 0.001).

Table – 2: Comparison of visual analog scale within group between pre & post test values

#VAS	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	3.76	.430	1.53	.507	28.43	.000***

(*- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pretest and posttest values within Group (***- P ≤ 0.001).

Table – 3 Comparison Of Craniovertebral Angle Within Group Between Pre & Post Test Values

#CVA	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	47.11	.937	52.62	1.47	-25.59	.000***

(*- P ≤ 0.001)**

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group. There is a statistically highly significant difference between the pretest and posttest values within Group (***- P ≤ 0.001).

TABLE - 4: Pearson Correlation of Coefficient between Neck Disability Index and Craniovertebral Angle(CVA)

Parameters	Pearson correlation	
	'r' value	P value
NDI & CVA	-.147	>0.05

The above table reveals the Pearson Correlation of coefficient 'r ' value and p-value between Neck Disability Index and Craniovertebral Angle(CVA)

The value of R is -.147 Although technically a Negative Association and correlation between Neck Disability Index and Craniovertebral Angle(CVA)

Result

On comparing Neck Disability Index Score Pre test **20.76** and Posttest**8.93** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference between Pretest & and Posttest Mean values at **P ≤ 0.001**

On comparing Visual Analog Scale Pre test **3.76** and Posttest**1.53** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference between Pretest & and Posttest Mean values at **P ≤ 0.001**

On comparing Craniovertebral Angle Pre test **47.11** and Posttest**52.62** Mean values within Group (Scapular Retraction Exercises) shows highly significant difference between Pretest & and Posttest Mean values at **P ≤ 0.001**

The value of R is -.147 Although technically a Negative Association and correlation between Neck Disability Index and Craniovertebral Angle(CVA). The decrease in the values of Craniovertebral angle is associated with the greater level of Neck Disability.

Conclusion

In this study on comparing the values of Neck Disability Index Questionnaire, Visual Analogue Scale and Craniovertebral Angle within group, we conclude that Scapular Retraction Exercises are more effective in

reducing Forward Head Posture.

Discussion

The present study was to determine the effectiveness of scapular retraction exercises and forward head posture. This study was conducted on 30 subjects with forward head posture. Patients with forward head posture have rounded shoulders or poor back posture. Therefore, the scapula retraction exercise is applied to patients with forward head posture. Craniovertebral angle of all the subjects were measured using inch tape to assess the forward head posture. The scapular retraction exercises or Seated rows, Elbow push back, Scapular retraction activation, Arm slides and Lower trap row exercise. The outcome parameter is Visual Analogue Scale, Neck Disability Index Questionnaire and craniovertebral angle.

This study supports the findings of MELISSA SABO showed that completing simple scapular retraction exercises can strengthen your muscles and improve your posture. The posture, which is typically caused by weakness in the shoulder blade muscles, can lead to pain in the neck or shoulders if not addressed. Fortunately, shoulder retraction exercises can be helpful for strengthening these weak muscles and improving posture. Forward head posture is the anterior positioning of the cervical spine occurring when the lower neck bone is bent and there is an extension of the upper neck bone and the head. This condition has increased and is exacerbated with the advancement in technology and the increasing use of computers and smart phones for extended periods of time. This posture is associated with weakness in the deep cervical short flexor muscles and mid-thoracic scapular retractor (i.e., rhomboids, serratus anterior, middle and lower fibres of the trapezius) and shortening of the opposing cervical extensor and pectoralis muscles. The purpose of this study was to investigate the effects of scapular retraction exercise on neck posture, muscle activity, neck pain and quality of life in the patients with neck pain and forward head posture in the patient with forward head posture.

On comparing the mean values o of Neck Disability Index Score Pre-test 20.76 and Post-test 8.93 within group (Scapular Retraction Exercises) shows highly significant difference. On comparing the mean values of Visual Analogue Scale Pre-test 3.76 and Post-test 1.53 within group (Scapular Retraction Exercises) shows highly significant difference. On comparing the mean values of Craniovertebral Angle Pre-test 47.11 and Post-test 52.62 within group (Scapular Retraction Exercises) shows highly significant difference.

Therefore, by comparing the statistical values Scapular Retraction Exercises are effective in reducing Craniovertebral Angle and hence also reduces Forward Head Posture. Our data supports alternate hypothesis. Hence, null hypothesis is rejected.

Ethical Clearance - Institutional Review Board (IRB), Dr.M.G.R Educational & Research Institute, Deemed to be University

Source of Funding - Self Funding

Conflict of Interest - Nil

References

1. Won-GyuYoo : Effect of the neck retraction taping(NRT) on forward head posture and the upper trapezius muscle during computer work. Journal of Physical Therapy Science, 2013, 25: 581-582.
2. Jeong-II Kang,PT, PhD, et al : Effect of scapular stabilization exercise on neck alignment and muscle activity in patients with forward head posture. Journal of Physical Therapy Science, 2018, 30(6): 804-808.
3. Katherine Harman, PT, PhD, et al: Effectiveness of an exercise program to improve forward head posture in normal adults: A randomized, controlled 10- week trial. The Journal of Manual and Manipulative Therapy, 2005, vol.13 No.3: 163-176.
4. BoyoungIm, MSc, PT, et al: Effects of scapular stabilization exercise on neck posture and muscle activation in individuals with neck pain and forward. The Journal of Physical Therapy Science, 2016, 28:951-955.
5. Deepmala Thakur, et al: Forward head posture correction versus shoulder stabilization exercises effect on scapular dyskinesia and shoulder proprioception in athletes: An experimental study. International Journal of Physiotherapy, 2016, 3(2), 197-203.
6. Herman Mun Cheung Lau, PgD, MPhil, et al: Measurement of craniovertebral angle with electronic head posture instrument: Criterion validity. Journal of Rehabilitation Research and Development, 2010, 47, 911-918.

7. Melissa Sabo: Scapular Retraction Exercises for Posture, 2009.
8. Jeremy Fennell, MD, PT,et al : Shoulder Retractor strengthening exercise to minimize rhomboid muscle activity and subacromial impingement. University of Toronto Press and the Canadian Physiotherapy Association, 2016, 68(1): 24-28.
9. Kyeong-Jin Lee, et al: The effect of forward head posture on muscle activity during neck protraction and retraction. Journal of Physical Therapy Science, 2015, 27: 977-979.
10. Dae-Hyun Kim, et al: Neck pain in adults with forward head posture: Effects of Craniovertebral Angle and Cervical Range of Motion. Osong Public Health and Research perspectives, 2018,9(6): 309-313.
11. Seong- Yeol Kim, et al: Effect of duration of smartphone use on muscle fatigue and pain caused by forward head posture in adults. The Journal of Physical Therapy Science, 2016, 28:1669-1672.
12. Leon M Straker , et al : IT kids: exposure to computers and adolescents, neck posture and pain, 2014.
13. Wilmart et al, craniovertebral angle, 2002
14. Cole Matthews : Scapular Retraction: Exercise, Benefits, and proper form, 2018.
15. Burt HA-, Effects of faulty posture; President's Address . Proc R Soc Med.1950; 43(3):187-194, 2019.

Association between Stress Scores with Demographic Variables in Mothers of Children Attending Normal School and Special School

K. Maheswari,[1] G.Sasikala[2], P.Panneerselvam[3]

[1]Vice- Principal & Professor, Vinayaka Mission's Annapoorana College of Nursing, Salem, Tamilnadu, [2]Nursing Research Scholar, Vinayaka Mission's Research Foundation- Deemed to be University (VMRFDU), J-1 JMQ Sanatorium quarters, Perundurai, Erode, Tamil Nadu, [3]Assistant Professor, Dept of Physiology, Government IRT Perundurai Medical College, Perundurai, Erode, Tamil Nadu

Abstract

The present study was undertaken to observe the association between stress scores with demographic variables in mothers of children attending normal school and special school. The present study was a cross-sectional (comparative) study. 120 mothers were taken for the study, out of which 60 were mother of intellectually disabled children diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria and 60 was mother of normal children. Stress inventory was used to determine the stress scores. The present study results showed that younger's are having less stress than others. It was confirmed using Chi square test. More income of mother of children attending Special school is having less stress than others. Further multi center studies are recommended in this area for better understanding of the association.

Key words: *Correlation. Stress, depression, mothers*

Introduction

As per Government data, every year new disability children been reported increasing Average -1534 per year in Erode district alone.[1] The aim of this study to compare the level of stress under Physiological, Emotional, Cognitive and Behavioural level between mothers of children attending Normal school Vs special school, considering their demographic background and planning early therapeutic interventions for these mothers to adopt appropriate coping mechanism to overcome their stress. Society plays an important role in the upbringing of their child. Some parents feel ashamed of their child and consider them as burden. Others consider it as their duty to take care of their children. Uplifting the parent's social and psychological well-being would help the parents to deal effectively with their children having problem.[2] Special measures like early diagnosis, prompt treatment and counseling for stress of the mothers of children attending Special school along with provision of need based rehabilitation services for the Intellectual disability children at different levels to reduce the stress of their mother. There is a great need to identify at an early stage which Mothers are at poor mental health and facing psychological problems, so that successfully targeted those mothers to modify their thinking style and living patterns Psycho-social intervention programs for family caregivers of children with Intellectual disability should incorporate building upon specific strategies to enhance their quality of life. The present study was undertaken to observe the association between stress scores with demographic variables in mothers of children attending normal school and special school.

Corresponding author:
G.Sasikala,
Nursing Rearch Scholar in Vinayaka Mission's Research Foundation- Deemed to be University (VMRFDU), J-1 JMQ Sanatorium quarters, Perundurai, Erode, Tamil Nadu- 638053

Materials and Method

Study design: The present study was a cross-sectional (comparative) study

Study setting: The present study was conducted in

and around Erode district, Tamil Nadu.

Study participants: 120 mothers were taken for the study, out of which 60 were mother of intellectually disabled children diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria and 60 was mother of normal children. A total of 60 mothers of intellectually disabled children were selected through convenient sampling method from those who referred to psychiatric clinics for children, specialists' offices, and also advisory centres of department of education and training centers–rehabilitation and organization for exceptional children of Erode district. The following inclusion and exclusion criteria was used in recruiting the participants.

Inclusion and exclusion criteria: Inclusion criteria were having a aged between 6 and 18 years old child, having just one child with intellectually disabled, the presence of both parents in the family, employment of the father and not facing any serious financial crisis, not having any other member in the family suffering from chronic physical-mental problems, not having the child admitted to a boarding school, not having serious marital conflicts during the past month, and no record of the death of a loved one during the past 3 months; also they should have been consent to participate in the study and in the case of mothers' unwillingness to cooperate for completing the questionnaires and giving full answers they would have been excluded from the study.

Outcome measures

Stress inventory: The questionnaire was standardized questionnaire. It consists of 30 items, under 4 parts namely, Physiological, Emotional, Cognitive and Behavioral. There are two possible responses to each item namely, 'Yes' or 'No'. The mothers were asked to tick any one, which applied to them the most. There was no time limit. But the mothers were asked to respond as quickly as possible. Scoring Key and Norms were provided by the authors. The validity of S.I. is 0.80 and the reliability by test retest method is 0.95.[4]

Data analysis: Data were analysed using SPSS software version 11.5 (SPSS Inc). Chi square test was used to detect the association. $P < 0.05$ was considered as statistically significant levels.

Results:

Table 1 shows the association between stress score and mothers of children attending Normal school Demographic variables. Younger's are having less stress than others. It was confirmed using Chi square test. Table 2 shows the association between stress score and mothers of children attending Special school Demographic variables. More income of mother of children attending Special school is having less stress than others. It was confirmed using Chi square test.

Table 1: Association between mothers of children attending normal school stress score and demographic variables

		Level of STRESS						n	Chi square test
	Moderate		High		Very High				
	n	%		%	n	%			
Age	21- 30 years	4	28.6%	10	71.4%	0	0.0%	14	χ2=16.71 P=0.01** DF=6 S
	31 -40 years	5	14.3%	28	80.0%	2	5.7%	35	
	41 -50 years	1	11.1%	4	44.4%	4	44.4%	9	
	51 -60 years	0	0.0%	1	50.0%	1	50.0%	2	
Education status	non formal education	0	0.0%	1	50.0%	1	50.0%	2	χ2=6.96P=0.73 DF=10NS
	Primary school	3	25.0%	8	66.7%	1	8.3%	12	
	Middle school	1	8.3%	9	75.0%	2	16.7%	12	
	High school	3	18.8%	11	68.8%	2	12.5%	16	
	Higher Secondary	3	23.1%	9	69.2%	1	7.7%	13	
	College	0	0.0%	5	100.0%	0	0.0%	5	
Income	Rs.5001 -10000	10	18.9%	36	67.9%	7	13.2%	53	χ2=3.13 P=0.21 DF=2 NS
	>Rs.10000	0	0.0%	7	100.0%	0	0.0%	7	

S – Significant, N.S – Not Significant

Not Significant P> 0.05 AT * significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

Table 2: Association between of children attending special school stress score and demographic variables

		Level of STRESS						n	Chi square test
	Moderate		High		Very High				
	n	%		%	n	%			
Age	21- 30 years	1	4.5%	8	36.4%	13	59.1%	22	$\chi 2$=5.82 P=0.44 DF=6 NS
	31 -40 years	1	3.2%	18	58.1%	12	38.7%	31	
	41 -50 years	1	20.0%	3	60.0%	1	20.0%	5	
	51 -60 years	0	0.0%	1	50.0%	1	50.0%	2	
Education status	non formal education			1	33.3%	2	66.7%	3	$\chi 2$=7.16P=0.71 DF=10NS
	Primary school			5	62.5%	3	37.5%	8	
	Middle school			7	41.2%	10	58.8%	17	
	High school	1	10.0%	6	60.0%	3	30.0%	10	
	Higher Secondary	2	12.5%	7	43.8%	7	43.8%	16	
	College			4	66.7%	2	33.3%	6	
Income	Rs.5001 -10000	0	0.0%	5	29.4%	12	70.6%	17	$\chi 2$=6.64 P=0.03* DF=2 S
	>Rs.10000	3	7.0%	25	58.1%	15	34.9%	43	

S – Significant, N.S – Not Significant

Not Significant P > 0.05 AT * significant at P≤ 0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

Discussion

Stress is most common and prevalent cause for many diseases and clinical conditions.[3] It is well associated with the demographic variables. The stress levels in females are still more when compared with males.[4] Further, the mothers those who have the children with disabilities either the physical or mental undergo enormous amounts of stress levels when compared with mothers of normal children.[5-9] However, it was also reported that the depression scores also higher in the parents of special children.[10] The present study was undertaken to observe the association between stress scores with demographic variables in mothers of children attending normal school and special school. Younger's are having less stress than others. It was confirmed using Chi square test. More income of mother of children attending Special school is having less stress than others. It was confirmed using Chi square test. Stress is found to be an important problem commonly found in parents of children with special needs. Being apprehensive clearly explains stress, anxiety and its repercussions are perceived in no less degree in mothers of children with special needs. A chain reaction to this is seen in their quality of life. It is the need of the hour to make a study on these mothers of children with special needs to manage their stress and anxiety about their children and to enhance their quality of life. Parenting stress can be defined as excess anxiety and tension specifically related to the role of a parent and to parent-child interactions.[3] Parent's psychological

well-being is considered to be very important in parent – child relationship because it is very important key to the success of a meaningful family relationship. Special measures like early diagnosis prompt treatment with rehabilitation to children and counselling to the mothers would help to develop a reasonable attitude rather than an emotional attitude towards the problem and pave way to enhance quality of life. Nurses should plan for various positive behaviour therapeutic interventions to them.

Conclusion

The present study results showed that younger's are having less stress than others. It was confirmed using Chi square test. More income of mother of children attending Special school is having less stress than others. Further multi center studies are recommended in this area for better understanding of the association.

Source of Support: Nil

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval: The study protocol was approved by institutional human ethical committee. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee.

Acknowledgment: We must thank here all the centers for education and rehabilitation of children with special needs, specialized school of the Erode city, and mothers of the disabled children whom their cooperation has made this research an easy job for us.

References

1. Hemalatha, N. & Nandini, M. Stress Inventory (Revised). Unpublished Manuscript, Department of Psychology, Avinashilingam University for Women, Coimbatore, Tamil Nadu, India. 2005.
2. Ravindranadan and Raju. Adjustment and attitude of parents of Children with Mental Retardation. Journal of Indian Academy of Applied Psychology 2007;33(1): 137 - 141.
3. Habibi Asgar Abad M, Rashidi A, Motevalipour A. Comparing the parental stress between the mothers of disabled boys and the mothers of normal boys. J Res Behav Sci. 2009;2:175–81.
4. Davis NO, Carter AS. Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. J Autism Dev Disord. 2008;38:1278–91.
5. Sarafino EP. 4th ed. New York: John wiley&sons Inc; 2002. Health Psychology.
6. Kling KC, Seltzer MM, Ryff CD. Distinctive late-life challenges: Implications for coping and well-being. Psychol Aging. 1997;12:288–95.
7. Habibi Asgar Abad M, Rashidi A, Motevalipour A. Comparing the parental stress between the mothers of disabled boys and the mothers of normal boys. J Res Behav Sci. 2009;2:175–81.
8. Shin JY, Nhan NV. Predictors of parenting stress among Vietnamese mothers of young children with and without cognitive delay. J Intellect Dev Disabil. 2009;34:17–26.
9. ahoney FP. Case Western Reserve University: AAT; 2009. The relationship between parenting stress and maternal responsiveness among mothers of children with developmental problems.
10. Van der Oord S, Prins PJ, Oosterlaan J, Emmelkamp PM. The association between parenting stress, depressed mood and informant agreement in ADHD and ODD. Behav Res Ther. 2006;44:1585–95.

Comparison of Parenting Stress and Quality of Life among Mothers and Fathers of Intellectual Disability Children in Erode, Tamilnadu

K. Maheswari,[1] G.Sasikala[2], P.Panneerselvam[3]

[1]Vice- Principal & Professor, Vinayaka Mission's Annapoorana College of Nursing, Salem, Tamilnadu, [2]Nursing Research Scholar, Vinayaka Missions University, Salem, Tamilnadu, [3]Assistant Professor, Dept of Physiology, Government IRT Perundurai Medical College, Perundurai, Erode, TamilNadu.

Abstract

The present study was undertaken to Compare Parenting stress and Quality of life among mothers and fathers of Intellectual disability children in Erode, Tamil Nadu. The present study was a cross-sectional (comparative) study. 60 couples having children aged between 2 and 18 diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria formed the sample of this study. Case Study Schedule was used to get the needed information about the selected Parents of Mentally Challenged. The questionnaire was standardized questionnaire. It consists of 30 items, under 4 parts namely, Physiological, Emotional, Cognitive and Behavioral. The WHOQOL BREF questionnaire is used to assess the quality of life.[9] Prior permission was obtained to use the Tamil version of the questionnaire. The WHOQOLBREF is an abbreviated version of the original WHOQOL- 100. Very high level of stress was observed in mothers and high levels of stress was observed in fathers. Quality of life was more or less same in both mothers and fathers. There is a moderate negative correlation between fathers stress score and QOL score. It means stress decreases their QOL increases. There is a moderate negative correlation between mothers stress score and QOL score. It means stress decreases their QOL increases. The study recommends further multi center studies for better understanding and to plan adequate interventions.

Key words: *Quality of life, Mothers, Fathers, Stress*

Introduction

Mental retardation (MR) according to the World Health Organization has overall prevalence of 1-3% in the global scenario,[1] In India5.6 % has been reported and decadal change in disabled population in India is 22.4% .[2] This by itself suggests the magnitude of the problem in terms of the economy for a developing country like ours. MR also produces psychological, social and financial distress to the whole family, particularly parents, as they are usually the only constant caretakers.[3] Parents of children with intellectual disabilities frequently report symptoms of depression and anxiety. Studies have shown an association between parental distress and caretaking of children with developmental cognitive delays.[4] A large number of these children have behavioral issues, which can lead to higher levels of parental stress.[5] Parents reported more psychiatric symptomatology when the child showed a high level of dysfunction.[6] Treatment progress may need to address parental stress, which in turn will help optimize treatment outcome for the child and the family.[7] It is important to guide the provision of needed psychosocial, educational, and health services that can strengthen family coping and positive adjustment. Studies had suggest that the reduction of parenting stress is paramount in the enhancement of a child's family life and in the child's ultimate integration within society.There is little data in developing countries, such as India especially Erode district of Tamilnadu, concerning the impact of raising children with ID, upon the quality of life of parent and

Corresponding author:
G.Sasikala,
Nursing Rearch Scholar in Vinayaka Missions University, J-1 JMQ Sanatorium Quarters, Perundurai, Erode, Tamilnadu-638053

their stress. Hence, the present study was undertaken to Compare Parenting stress and Quality of life among mothers and fathers of Intellectual disability children in Erode, Tamil Nadu

Materials and Method

Study design: The present study was a cross-sectional (comparative) study

Study setting: The present study was conducted in and around Erode district, Tamil Nadu.

Study participants: 60 couples having children aged between 2 and 18 diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria formed the sample of this study. The schools meant for children with intellectual disability were chosen. Within a school, parents of children were chosen randomly. These schools are from Erode in Tamil Nadu.

Method:

Case study schedule: Case Study Schedule was used to get the needed information about the selected Parents of Mentally Challenged. Data was collected regarding the age, educational qualification, income, family type of parents, and number of children they have and level of retardation of the mentally challenged. It also assesses the negative emotions and symptoms of the parents of mentally challenged.

Stress inventory: The questionnaire was standardized questionnaire. It consists of 30 items, under 4 parts namely, Physiological, Emotional, Cognitive and Behavioral. There are two possible responses to each item namely, 'Yes' or 'No'. The mothers were asked to tick any one, which applied to them the most. There was no time limit. But the mothers were asked to respond as quickly as possible. Scoring Key and Norms were provided by the authors. The validity of S.I. is 0.80 and the reliability by test retest method is 0.95.[8]

WHOQOL BREF: The WHOQOL BREF questionnaire is used to assess the quality of life.[9] Prior permission was obtained to use the Tamil version of the questionnaire. The WHOQOLBREF is an abbreviated version of the original WHOQOL- 100. The WHOQOL is the only quality of life instrument that has been developed for wide range of cultures in 15 international field centers simultaneously including the Madras center presently Chennai, Tamil Nadu, India.

Data analysis: Data was analyzed using SPSS version 7.5. The results were expressed in terms of percentage, mean and SD. Students T test, Chi square test, were applied to compare the mean scores of different variables under the four domains. Karl Pearson correlation coefficient used to study the correlation between parent stress score and quality of life. A probability value of <0.05 is considered significant.

Results

Study results were presented in table no 1 to 5. There is a moderate negative correlation between fathers stress score and QOL score. It means stress decreases their QOL increases. There is a moderate negative correlation between mothers stress score and QOL score. It means stress decreases their QOL increases. Younger fathers are having less stress and better QOL than others. Mother who generates more income are having less stress better QOL than others. The results of the analysis of these data demonstrate that the families with a member with a disability report significantly greater stress, they also demonstrated that as stress increases the quality of life decreases. Governments need to address this problem if current policies of integrating people with intellectual disabilities into the community are to be successful.

Table 1: Total stress between mother and father of ID children

Level of Stress score	Father		Mother		Chi square test
	n	%	n	%	
Low	0	0.0%	0	0.0%	$\chi 2=17.85$ P=0.001*** DF=2 significant
Moderate	10	16.7%	3	5.0%	
High	43	71.6%	30	50.0%	
Very High	7	11.7%	27	45.0%	
Total	60	100.0%	60	100.0%	

(NS= not significant S=significant DF= Degrees of Freedom**)** (* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001)

Table 2: Mean stress between mother and father of id children

Stress domains	**group**				**Mean difference**	**Student's independent t-test**
	Father		**Mother**			
	Mean	**SD**	**Mean**	**SD**		
PHYSIOLOGICAL	3.45	1.43	3.80	1.46	0.35	t=1.32 P=0.18 not significant
EMOTIONAL	3.52	1.43	5.28	1.66	1.77	t=6.24 P=0.001*** significant
COGNITIVE	3.03	1.06	3.75	1.08	0.72	t=3.67 P=0.001*** significant
BEHAVIORAL	3.47	1.55	5.32	1.65	1.85	t=6.33 P=0.001*** significant
Total	13.47	4.24	18.15	3.65	4.68	t=6.48 P=0.001*** significant

(* significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001

Table 3: Comparing the QOL between mother and father of ID children

Level of QOL score	**Father**		**Mother**		**Chi square test**
	n	**%**	**n**	**%**	
Poor	0	0.0%	0	0.0%	$\chi 2$=6.49 P=0.04* DF=2 significant
Moderate	16	26.7%	22	36.7%	
Good	34	56.7%	36	60.0%	
Very good	10	16.6%	2	3.3%	
Total	60	100.0%	60	100.0%	

*(*NS= not significant S=significant DF= Degrees of Freedom * significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001)

Table 4: Mean QOL between mother and father of ID children

QOL domains	**group**				**Mean difference**	**Student's independent t-test**
	Father		**Mother**			
	Mean	**SD**	**Mean**	**SD**		
PHYSICAL HEALTH	62.48	7.25	62.97	8.29	0.48	t=0.34 P=0.73not significant
PSYCHOLOGICAL	52.58	17.66	49.77	16.67	2.82	t=0.89P=0.37 not significant
SOCIAL	52.90	16.46	47.05	15.85	5.85	t=1.98 P=0.05* significant
ENVIRONMENTAL	54.75	11.03	50.35	9.05	4.40	t=2.38 P=0.02* significant
Overall	55.68	10.03	52.53	7.20	3.15	t=1.97 P=0.05* significant

(NOT SIGIFICANT P> 0.05 AT * significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001)

Table 5: Correlation between parenting stress and QOL of parents of id children

		Mean ± SD	Karl Pearson correlation coefficient
Father	STRESS	13.47±4.24	r=0.49p=0.01** significant
	QOL	55.68±10.03	
Mother	STRESS	18.15±3.65	r=0.42 p=0.01** significant
	QOL	52.53±7.20	

Discussion

The present study was undertaken to Compare Parenting stress and Quality of life among mothers and fathers of Intellectual disability children in Erode, Tamil Nadu. There is a moderate negative correlation between fathers stress score and QOL score. It means stress decreases their QOL increases. There is a moderate negative correlation between mothers stress score and QOL score. It means stress decreases their QOL increases. Younger fathers are having less stress and better QOL than others. Mother who generates more income are having less stress better QOL than others. The results of the analysis of these data demonstrate that the families with a member with a disability report significantly greater stress, they also demonstrated that as stress increases the quality of life decreases.[9] Governments need to address this problem if current policies of integrating people with intellectual disabilities into the community are to be successful. Special measures like early diagnosis, prompt treatment and counseling for stress of the parents along with provision of need based rehabilitation services for the Intellectual disability children at different levels to reduce the stress burden of their parents.[10] There is a great need to identify at an early stage which parents are at poor mental health and facing psychological problems, so that successfully targeted those parents to modify their thinking style and living patterns Psycho-social intervention programmes for family caregivers of children with Intellectual disability should incorporate building upon specific strategies to enhance their quality of life. Parents of children with disability face multiple challenges due to their child's developmental difficulties.[11-12] Parents who adopt positive and problem-focused strategies report less stress and better well-being than those who often use emotion-focused coping strategies, which are ineffective and do not resolve the adverse situation that provokes the stress.

Conclusion

Very high level of stress was observed in mothers and high levels of stress was observed in fathers. Quality of life was more or less same in both mothers and fathers. There is a moderate negative correlation between fathers stress score and QOL score. It means stress decreases their QOL increases. There is a moderate negative correlation between mothers stress score and QOL score. It means stress decreases their QOL increases. The study recommends further multi center studies for better understanding and to plan adequate interventions.

Source of Support: Nil

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval: The study protocol was approved by institutional human ethical committee. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee.

Acknowledgment: We must thank here all the centers for education and rehabilitation of children with special needs, specialized school of the Erode city, and mothers and fathers of the disabled children whom their cooperation has made this research an easy job for us.

References

1. Schwartz C, Tsumi A. Parental involvement in

the residential care of persons with intellectual disability: The impact of parents' and residents' characteristics and the process of relocation. J Appl Intellect Disabil 2003;16:285-93.

2. World Health Organization. Mental Health Around the World, World Health Day 2001. Geneva: WHO; 2001.
3. Cramm, J., & Nieboer, A. Psychological well-being of caregivers of children with intellectual disabilities: Using parental stress as a mediating factor. Journal of Intellectual Disabilities. 2011; 15(2), 101-113.
4. Khamis, V. Psychological distress among parents of children with mental retardation in the United Arab Emirates. Social Science & Medicine. 2007; 64(4), 850-857
5. Saloviita, T., Itaalinna, M., & Leinonen, E. Explaining the parental stress of fathers and mothers caring for a child with intellectual disability: A double ABCX model. Journal of Intellectual Disability Research. 2003; 47(4-5), 300-312.
6. Floyd, F. J., & Gallagher, E. M. Parental stress, care demands, and use of support services for school-age children with disabilities and behavior problems. Family Relations. 1997; 46, 359-371.
7. Rao, P. A., & Beidel, D. C. The impact of children with highfunctioning autism on parental stress, sibling adjustment, and family functioning. Behavior Modification. 2009;33(4), 437-451
8. Davis NO, Carter AS. Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. J Autism Dev Disord. 2008;38:1278–91.
9. Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. Psychol Med. 1998;28:551–8.
10. Hastings RP, Kovshoff H, Ward NJ, Espinosa FD, Brown T, Remington B. Systems analysis of stress and positive perceptions in mothers and fathers of pre-school children with autism. J Autism Dev Disord. 2005;35:635–44.
11. Myers BJ, Mackintosh VH, Goin-Kochel RP. ''My greatest joy and my greatest heart ache": Parents' own words on how having a child in the autism spectrum has affected their lives and their families' lives. Res Autism Spectr Disord. 2009;3:670–84
12. Totsika V, Hastings RP, Emerson E, Lancaster GA, Berridge DM. A population-based investigation of behavioural and emotional problems and maternal mental health: associations with autism spectrum disorder and intellectual disability. J Child Psychol Psychiatry. 2011;52:91–9.

Effectiveness of Mindfulness Life Intervention on Depression among Elderly Persons in a Selected Old Age Home of Pune City

Chhaya Misal[1], Sheela Upendra[2], Sheetal Barde[3]

[1]II year M.Sc (N), Symbiosis College of Nursing, [2]Associate Professor, HoD Mental Health Nursing, [3]Assistant Professor, Symbiosis College of Nursing, Symbiosis International (Deemed University) Pune, Senapati Bapat Road, Pune

Abstract

Background- Sadness, feeling down, having a loss of interest or pleasure in daily activities - these are symptoms familiar to all of us. But, if they persist and affect our life substantially, it may be depression**.** Studies on the elderly population, either in the community, inpatient, outpatient and old age homes have shown that depression is the commonest mental illness in elderly subjects. Prevalence rate of major depression in India amongst the elderly was 31.2 per 1000. **Objectives-** 1) To determine the level of depression among elderly persons at selected old age home in Pune. 2) To determine the level of depression post intervention among elderly persons at selected old age home in Pune city. 3) To evaluate the effectiveness of mindfulness life intervention on the level of depression among elderly persons at selected old age home of Pune city. 4) To find the association between post-test depression level and selected demographic variables. **Methodology-** A descriptive and a pre-experimental one group pre-test and post-test research design was adopted for this study. A non-probability purposive sampling technique was used to fetch a sample of 60. A modified geriatric depression scale (short form) was used to identify the depression in elderly persons of old age home. The reliability of Modified geriatric depression scale was found to be 0.92 by using Pearson's co-relation coefficient test. **Results-** out of 60 subjects, in pre-test, majority of 96.7% of the elderly persons from old age home had depression and 3.3% of them were normal. In post-test majority of 78.3% of the elderly persons from old age home had depression and 21.7% of them were normal. Average depression score in pre-test was 8.7 which reduced to 5.6 in post-test. T-value for this test was 10.6 with 59 degrees of freedom. Corresponding p-value was 0.000 which is small (less than 0.05). This indicates that depression of the elderly persons reduced remarkably after using mindfulness life intervention. **Conclusion-** This study concludes that mindfulness life interventions are effective in reducing depression of the elderly persons.

Keywords: *Effectiveness, mindfulness, depression, elderly person, old age home.*

Introduction or background

Depression (major depressive disorder) is a common and serious medical illness that negatively affects how you feel, the way you think and how you act. Fortunately, it is also treatable. It can lead to a variety of emotional and physical problems and can decrease a person's ability to function at work and at home.[1] Mindfulness is the psychological process of bringing one's attention to experience occurring in the present moment, which can be developed through the practice of meditation and other training. Mindfulness focus on becoming aware of all incoming thoughts and feelings and accepting them, but not attaching or reacting to them. [2] The mindfulness therapy was developed to help individuals who struggle with recurrent episodes of depression. Nandi studied psychiatric morbidity of the elderly population of a rural community in West Bengal. In a sample of 183 subjects (male 85, female 98) they found 60% of the population to be mentally ill with higher morbidity in women compared to men (77.6% and 42.4% respectively).[3]There was significantly more morbidity in population. 2 Studies on the elderly population, either in the community, inpatient, outpatient and old age homes have shown that depression is the commonest mental illness in elderly

subjects. Prevalence rate of major depression in India amongst the elderly was 31.2 per 1000.[4]

Material and Method

A descriptive and Pre-experimental research design was selected for this study. Under the pre-experimental research design one group pre-test and post-test design was adopted. Further, nonprobability purposive sampling technique was used to grab a sample of 60. The participant of this study comprised of elderly persons of Mamata Old Age Home, Pune. On day one of the study, a modified Geriatric Depression Scale was used to assess the depression in the elderly persons. Mindfulness life intervention steps taught and demonstrated to the experimental group. Post-test was conducted four weeks following the intervention using the same modified Geriatric Depression Scale. The collected data were analyzed, organized and presented. **Findings- The** analysis and interpretation of the data collected to determine the Effectiveness of mindfulness life intervention is carried out based on objectives set by the researcher taking the level of significance as 0.05. Researcher applied paired t-test for the effect of mindfulness life intervention on the depression among old age people.

Table 1: Level of depression among elderly persons at selected old age home in Pune

n=60

DEPRESSION	**PRETEST**	
	Frequency	**%**
Normal (Score 0-3)	0	0.0%
Mild (Score 4-7)	44	73.3%
Moderate (Score 8-11)	16	26.7%
Severe (Score 12-15)	0	0.0%

Table 2: Assessment of depression post intervention among elderly persons at selected old age home of Pune.

n=60

DEPRESSION	**POST-TEST**	
	Frequency	**%**
Normal (Score 0-3)	1	1.7%
Mild (Score 4-7)	52	86.7%
Moderate (Score 8-11)	7	11.7%
Severe (Score 12-15)	0	0.0%

Table 3: Effectiveness of mindfulness life intervention on the level of depression among elderly persons at selected old age home of Pune

n=60

Depression	**Pre-Test**		**Post-Test**	
	Freq-uency	**%**	**Freq-uency**	**%**
Normal (score 0-3)	0	0.0%	1	1.7%
Mild (score 4-7)	44	73.3%	52	86.7%
Moderate (score 8-11)	16	26.7%	7	11.7%
Severe (score 12-15)	0	0.0%	0	0.0%

Table 4: Paired t-test for the effectiveness of mindfulness life intervention on the level of depression among elderly persons at selected old age home of Pune

n=60

	MEAN	SD	T	Df	p-value
Pre-Test	6.6	1.464	4.41	59.	0.000
Post-Test	5.6	1.489			

Discussion

Alexander, Langer, Newman, Chandler & Davies compared no treatment to transcendental meditation, mindfulness training and relaxation in terms of their effects on longevity of human life and age related declines amongst 73 residents of nursing home. It was found that transcendental meditation group improved most followed by mindfulness training in contrast to relaxation and no treatment groups on cognitive flexibility, mental health, systolic blood pressure and behavioral flexibility.[5]

In study one group pretest post-test was done. A group of sixty elderly persons of old age home was considered as experimental group. It was found that mindfulness life intervention is effective in decreasing depression level of elderly persons.

Conclusion

This study concludes that mindfulness life interventions are effective in reducing depression of the elderly persons.

Conflict of Interest – Nil

Source of Funding- Self

Ethical Clearance – Obtained from Institute and Hospital

References

1. Kendall-Tackett K. Psychological trauma and physical health: A psychoneuroimmunology approach to etiology of negative health effects and possible interventions. Psychological Trauma: theory, research, practice, and policy. 2009 Mar;1(1):35.
2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub; 2013 May 22.
3. Nandi PS, Banerjee G, Mukherjee SP, Nandi S, Nandi DN. A study of psychiatric morbidity of the elderly population of a rural community in West Bengal. Indian Journal of Psychiatry. 1997 Apr;39(2):122.
4. Kishore J, Gupta A, Jiloha RC, Bantman P. Myths, beliefs and perceptions about mental disorders and health-seeking behavior in Delhi, India. Indian journal of Psychiatry. 2011 Oct;53(4):324.
5. Alexander CN, Langer EJ, Newman RI, Chandler HM, Davies JL. Transcendental meditation, mindfulness, and longevity: an experimental study with the elderly. Journal of personality and social psychology. 1989 Dec;57(6):950.

Interrater and Intra-rater Reliability of the Ball Speed Radar Gun Application to Measure Balling Speed in Cricket Ballers

Chinmoyee Panigrahy[1], Ujwal Yeole[2], Sakina Shaikh[3], Mittal Baish[3]

[1]Assistant Professor, [2]Associate Professor, MPT Dept. of Physiotherapy, [3]Intern, Dept. of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune

Abstract

Background: Balling in cricket is an action of propelling the ball towards the wickets defended by a batter and has always been given a special attention. The tools that measure balling speed are not easily accessible and are expensive and the accessible ones are not reliable. The aim of our study is to establish the Interrater and Intrarater reliability of one such application available on google play, the ball speed Radar gun.

Method: In our study we approached various cricket clubs and cricket set up in and around Pune out of which 30 players were selected based on inclusion and exclusion criteria. The balling speed was recorded by the Ball speed radar gun Application and Data was Collected whose Baseline data values in terms of Age in years (22.66±2.70), BMI in kg/m^2(23.12±2.98), Hours of practice in hours(4.12±1.31) and Years of Experience (2.93±0.91) are comparable at P=0.05 and analysed for Interrater and Intrarater reliability.

Result: In our study we established good Intrarater (k=0.988) and Interrater (k= 0.980) reliability at P=0.05 for the application.

Conculsion: From our study we conclude that Ball speed radar gun application is reliable to measure bowling speed.

Keywords: *Ball Speed Radar Gun, Balling Speed, Cricket.*

Introduction

Cricket is widely played throughout this country, yet there is little research done on the varied aspects of the sport. Cricket as a sport received considerable research attention which seems to have coincided with an increase in the worldwide audience for cricket. It consists of two team of 11 players, played by hitting the ball across the boundary and running between two sets called wicket. (1)

Balling in cricket is an action of propelling the ball towards the wickets defended by a batter and it is distinguished as throwing the ball by an angle in terms of action. Ballers are always given a special attention compare to their peers and according to speed of balling they deliver ballers are classified into Fast Bowlers are described as balling at a speed of 142+ kmph and medium fast bowlers are described as balling at a speed of above 96 kmph. The relationship between speed and techniques has received some attention with studies analysing techniques of balling unit but to evaluate and asses the players on the regular basis balling has to be assessed as an outcome measure. (2) (3)

For regular assessment and evaluation of the athlete's performance the balling speed needs to be assessed. Some of the techniques used includes, **The HAWKEYE** which is considered to be a gold standard in cricket. The basic idea is to monitor the trajectory of the cricket ball during the entire duration of play using 6 cameras to get the speed of the ball, It then calculates the data to track the ball path after the ball leaves the hand of the bowler until the ball stops, but due to its expensive setup and accessibility limited to elite players playing at level of National and International level and also decreased accuracy with factor as Wind, Bright

Corresponding Author:
Chinmoyee Panigrahy
Assistant Professor, MPT, Dept. of Physiotherapy,
Tilak Maharashtra Vidyapeeth, Pune-4110372
Email: lituj5@gmail.com

sunlight, shadow, artificial floodlights, etc. possess a drawback. [4] **Snick-o-meter** consists of a sensitive microphone located in one of the stumps, which can pick up the sound when the ball hits the bat. It was invented by the scientist Allan Plaskett but the drawback is its reduced accuracy as it may record other sounds such as the ball hitting to batsman's pads or the bat hitting the pitch. [5] **Spider cam** is a film camera which move both vertically and horizontally over a pitch. These operates with 4 monitor winches, positioned at each corner at the base of cover area it requires expensive set up to record the balling speed. [6] **Ball spin RPM/ Rev Counter** is able to show a revolution per minutes (RPM) counter, showing how fast the ball is spinning after release. [7] **Speed Gun** is used to measure the speed of the ball from one end of the pitch to other. This technology allows calculating the speed gun gets mounted on a pole positioned next to the sight screen. The device relays a beam from the radar head to detect movement of across the entire length of the pitch, but as suggested most of these methods are expensive and there is always a time to time requirement of assessing the balling speed to evaluate the improvement in a performance of the athlete at a lower level, for the same there should always be a handy tool available which is inexpensive, easily accessible and reliable at the same time and one such tool is Ball speed radar gun application. [8] It is available for free at google play store. Measuring the velocity of the ball through Radar gun technology was developed in 1947 by John Baker, It works on the principle of Doppler Effect. It catches the echo of radio waves as ball travels through the air and uses a principle called doppler shift and classifies the ball between others object on the pitch and displays the speed of the ball. The radar gun reported ball speed to the nearest mph and the error in ball speed arising from misalignment of the radar gun was calculated to be less than 0.1 m/s. [9] [10] [11]But with an easily accessible method its reliability is also equally important leading to the aim of our study which is to establish the interrater and intrarater reliability of ball speed radar gun application.

Method

Study setting was sports clubs in and around Pune. Total number of 30 cricket players were selected between age group 18-30 years of both genders with more than 1 year of experience randomly. Permission was taken from the institutional ethical committee of Tilak Maharashtra Vidyapeeth department of physiotherapy and different centres were approached. Subjects were approached for data collection from cricket sport clubs in & around Pune city, India. The aims and methods of the study were explained and their written consent was taken, out of which 30 participants were selected randomly following the exclusion and inclusion criteria. The therapists used Tripod for stationary video recording of baller balling and distance from the pitch was kept at 50m. For intrarater reliability 30 players were assessed for balling speed on day 1 and were assessed again after a week by the same therapist, for interrarter reliability 15 players were assessed by therapist no.1, and assessed again by therapist no. 2 at a span of 1 week. A pilot study was conducted and errors were resolved.

Data management and Statistical Analysis:

The data was statistically analyzed using Excel sheet and medcalc and Tables and graphs were made using Microsoft word. The central tendencies were calculated for baseline demographic data for of Age (22.66±2.70), BMI (23.12±2.98), Hours of practice (4.12±1.31) and Years of Experience (2.93±0.91) which was found to be comparable at P=0.05.

To establish Interrater and Intrarater Reliability Cohen's kappa index for reliability was used within confidence interval of 95%.

Results

TABLE NO.1 shows the Average value of Age (22.66±2.70), BMI (23.12±2.98), and Hours of practice (4.12±1.31) and Years of Experience (2.93±0.91) comparable at 0. 05.

Table 1. BASELINE DATA OF THE SUBJECTS COMPARABLE AT P=0.05

VARIABLES	MEAN±SD
AGE	22.66±2.70
BMI	23.12±2.98
HOURS OF PRACTICE	4.12±1.31
YEARS OF EXPERIENCE	2.93±0.91

In our study, this application showed good inter-rater reliability (K=0.980) and intra-rater reliability (K=0.988) at P=0.05. (TABLE NO. 2, GRAPH 1 AND 2)

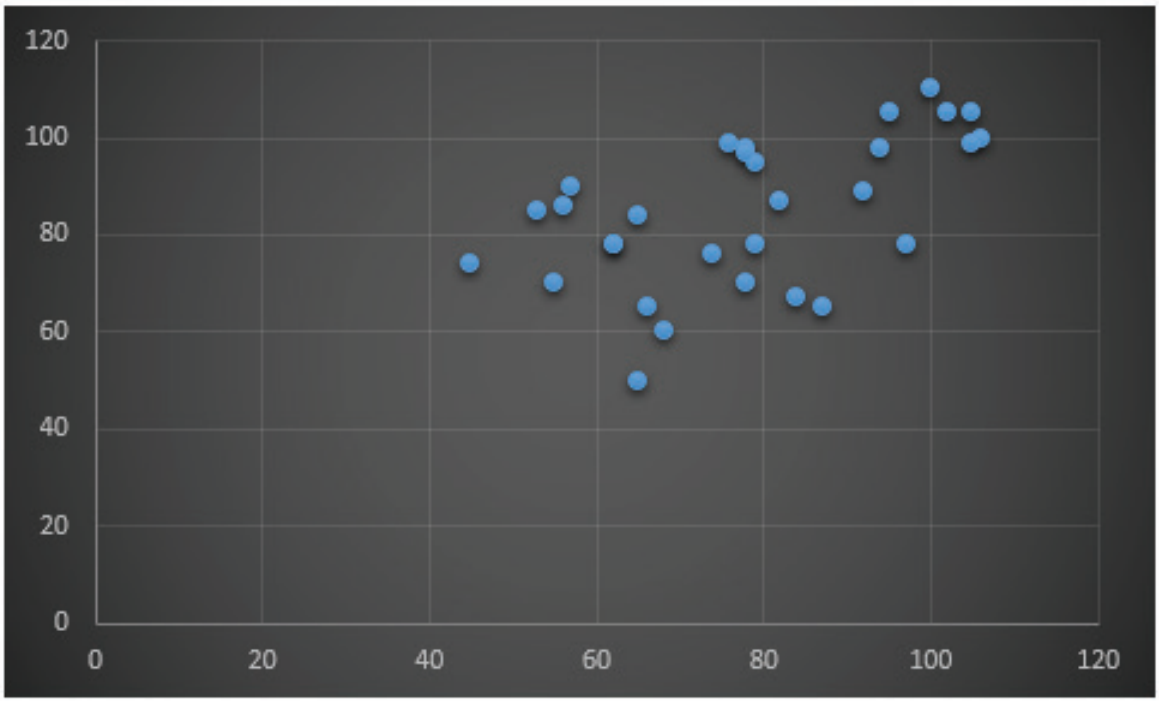


Figure 1: INTRARATER RELIABILITY OF BALL SPEED RADAR GUN AT A SPAN OF 7 DAYS FOR P=0.05, K=0.988

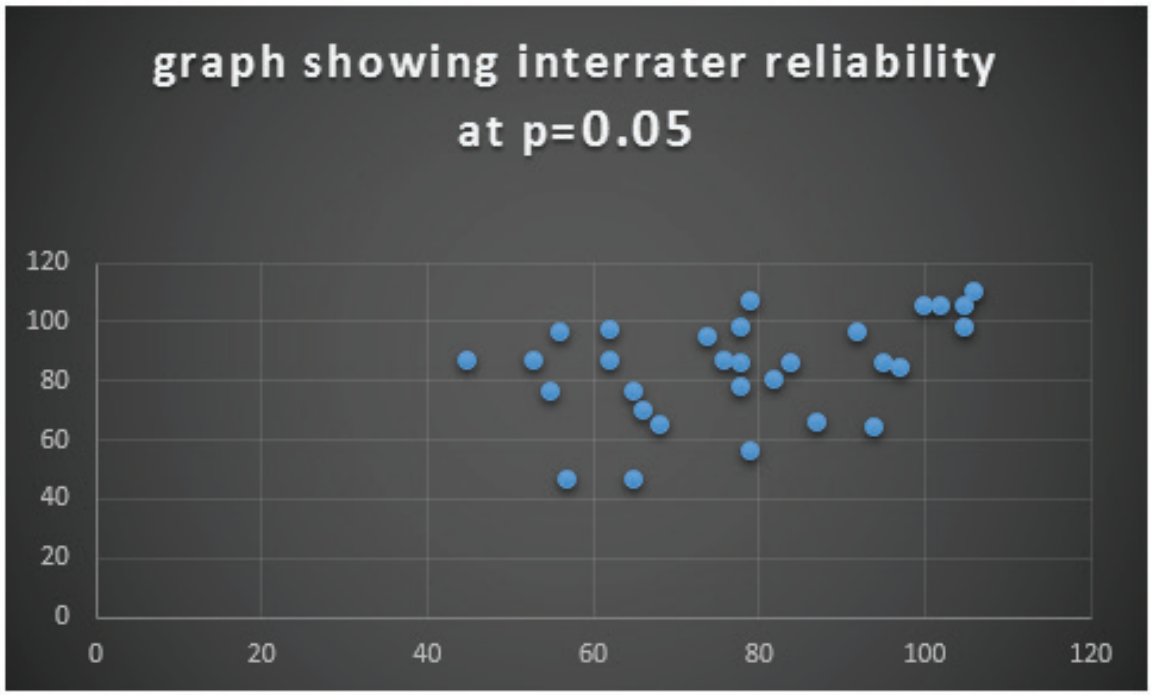


Figure 2 INTERRATER RELIABILITY OF BALL SPEED RADAR GUN AT A SPAN OF 7 DAYS FOR P=0.05, K=0.98

Table 2: TABLE SHOWING INTERATER AND INTRARATER RELIABILITY OF BALL SPEED RADAR GUN AT A SPAN OF 7 DAYS FOR P=0.05

INTERRATER RELIABLITY	K=0.980
INTRARATER RELIABILTY	K=0.988

Discussion

Reliability in psychometrics is the overall consistency of a measurement [12] [13]repeated over span of time. Various kinds of reliability coefficients, with values ranging between 0.00 (much error) and 1.00 (no error), are usually used to indicate the amount of error in the scores. [14] Reliability does not imply validity, that is measure is said to be reliable if it shows consistency used over a period of time. [15] Test-retest reliability is a measure of reliability obtained by administering the same test twice over a period of time to a group of individuals. The scores from time 1 and time 2 can then be correlated in order to evaluate the test for stability over time. [16] The time span in our study was kept at one week as, if the time interval is kept too long the therapist may forget how to perform a test or if the time span is kept too low, a carryover effect may occur, which would lead to a study bias. [17]

The Ball Speed radar gun Application detects the colour of the cricket ball to analyse the ball speed. The working of the APPLICATION is as follows:

Make sure camera is steady and not shaking/ moving while recording:

1. Play the video using open video button

2. Pause when ball is just released out of hand (in the air)

3. Click the "find speed" button and see the values detected

4. The camera is calibrated properly before measuring the speed for every baller.

5. The appropriate ball color is selected, else the app will not be able to track.

To Measure the bowling speed a phone is sufficient with the APP installed unlike the intricate machinery's also it can be assessed at the therapist's own comfort. This APP is can also measure the speed of a moving object and along with speed it also gives a complete analysis of bowling/pitching/serving/smashing action.

Camera calibration method

Point the camera at a player standing at the pitch or base where you want to measure the speed. Freeze the previous frame pause align / drag the two-red line to head and feet of the player standing at the pitch and enter the player's correct height. This way the application understands the pixel distance on phone screen vs the real players height. Then the application calculates you're the instantaneous speed (not average).

As explained earlier this application works on the principle of Doppler Effect that catches the echo. [9]This application can measure the instantaneous speed of a ball object using your phone camera and then the application calculates the instantaneous speed. [4]The possible bias that can be created in our text are the Researcher's lack of knowledge about the application use, Camera not being stationary , poor camera Quality, change in the Distance of the camera from rater to rater, within the rater or amongst the raters. To resolve these sources of error we did a pilot study. We found out that this application shows good inter-rater reliability (K=0.980) and Intra-rater reliability (K=0.988) at P=0.05.

The relationship between speed and techniques have received some attention with studies analysing techniques of balling unit but to evaluate and asses the players on the regular basis balling speed has to be assessed as an outcome measure. [2]There are many factors that affect bowling speed such as aerodynamics and techniques of swing used. [3; 18] [19]For regular assessment and evaluation of the athlete's performance of balling speed needs to be assessed. A timely evaluation of performance is not only helpful in understanding the athlete's game but also keeps the interest of the player in the game, hence this APP can be helpful in the lower levels to provide with a good performance review.

Conclusion

From our study we conclude that the Ball speed radar gun application which is available at the google play app store for free to assess balling speed is a reliable tool.

Acknowledgment: A sincere thanks to all the player and their coaches who participated in the study and to staff members of Department of physiotherapy of Tilak Maharashtra Vidyapeeth, Pune.

Financial support and sponsorship: Non-Funded

Conflicts of Interest: There are no conflicts of interests.

Ethical Clearance: A synopsis was submitted and permission was taken from Institutional Ethical Committee of Tilak Maharashtra Vidyapeeth,

Department of Physiotherapy.

References

1. GANGULI,RANA. MCC offical laws of cricket. 25 july 2019.
2. Rana, Varsha Chorsiya and Ankit. Relationship between Shoulder Strength and Bowling Speed in Cricket Bowlers. s.l. : Journal of excericse science and physiotheraphy, 2017, QE535, Vol. VOL 13 .
3. David B, Pyne I.fast bowler spped in junior and senior cricketer . 2006.
5. Davidshofer, Kevin R. first the sinkometer . culture, media and sports committee. : s.n., 21 may 2000.
6. https://www.gadgetsnow.com/game-changing-technology of cricket world cup. 2005.
7. Murple charles speeders in connective to face real radar test. 1st september 2015.
8. https://en.m.wikipedia.org/wiki/radar speed gun.
9. Evans, Harry collin and robert.Public understanding of technology with special reference to "Hawk-Eye" Public Understand. . 2008.
10. Leathrine Wickinton and Nicholas. Life Sciences University London, Uxbridge, Middlesex UB8 3PH, UK;. Linthome,. University London : s.n., 2017.
11. Trochim, WILLAM M.K, Relability . 2013.
12.. Pardise, Paul S glaziers and Giorgos P.Anthropometric and kinematic influences on release speed in men's fast-medium bowling Journal of Sports Sciences 2000, Vol. vol 18.
13. NationalCouncilonMeasurementinEducation. center,Resources.s.l.http://www.ncme.org/ncme/NCME/Resource_Center/Glossary/NCME/Resource_Center/Glossary1.aspx?hkey=4bb87415-44dc-4088-9ed9-e8515326a061#anchorR.
14. Davidshofer, Kevin R. Murphy, Charles O. s.l Psychological testing : principles and applications. : Upper Saddle River, N.J.: Pearson/Prentice Hall. ISBN 0-13-189172-3., 2005, Vol. 6th edition.
15. http://changingminds.org/explanations/research/design/types_reliability.htm.
16. Murple charles Pshchological testing principles and application. Vol. 6th edition .
17. R.M.Bartlett, N.P..Stockill The biomechanics of fast bowling in men cricket .. s.l. : journal of sport science , 15 may 2017.
18. Kevin M Lorsin, David F stooden. Bowling model indicates the ball release speed should decreases almost linearly with increases ball weight. The players bowling mechanism are also important in fast bowling both for generating ball speed and for reducing the first of injuries. A fast ball. 2013, Vol. VOL 84.
19. Kevin G,Launder.Scapular Dysfunction in Throwers With Pathologic Internal Impingement, PhD, ATC1 Joseph B. Myers, PhD, ATC2. 2018.

Effect of Yogic Practices with Sattvic Diet on Selected Bio Chemical Variable among Yogic Men Competitors

D. Chochalingam[1], P. Kaleeswaran[2]

[1] Research Scholar, [2]Assistant Professor, Alagappa University College of Physical Education,, Alagappa University, Karaikudi, Tamilnadu, India

Abstract

The purpose of the present study was to investigate the effect of yogic practices with sattvic diet on selected bio chemical variable among yogic men competitors. To achieve the purpose of the study thirty yogic men competitors were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 14 to 21 years. The selected subjects were divided into two equal groups consists of 15 men each namely experimental group and control group. The experimental group underwent yogic practices with sattvic diet programme for six weeks. The control group was not taking part in any training during the course of the study. High density lipoprotein was taken as criterion variable in this study. The selected subjects were tested on high density lipoprotein was measured through heparin precipitation method. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique 't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to yogic practices with sattvic diet given to the experimental group on high density lipoprotein when compared to control group.

Keywords: *yogic practices, sattvic diet, high density lipoprotein and't' ratio.*

Introduction

Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations). To practising yoga regularly it can make you into sound body and sound mind. Yoga is the costless permanents treatment for more diseases, alaguraja, k.[1.] It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole, alaguraja, k. et.al., [2] One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures), alaguraja, k. et.al,[3.] The science of Yoga Nidra is based on the receptivity of consciousness.

When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical, yoga, p. et. al[4]. Training is a chain process that can be able to attain certain needs of the person's goal, alaguraja, k[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports, alaguraja, k. et.al.,[6] Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy, alaguraja, k. et.al,[7]. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person, alaguraja, k[8]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual, alaguraja, k. et.al, 2019 [9]. Today's there is an escalating emphasis on appearing smarter, feeling etter and living longer. In order to achieve these ideals as, scientific evidence tells us that one of the keys is high fitness and exercises, alaguraja, k. et.al,[10]. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs

of the person. It's a scientific process the person must be follow the basic principles yogasana practice, alaguraja, k.[11]. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all, selvakumar, k. et.al,[12]. Yogic action, or inner technique, such as breath control, parthasarathy., s. et.al,[13].

Research Methodology

Selection of subjects

The purpose of the study was to find out the effect of yogic practices with sattvic diet on selected bio chemical variable among yogic men competitors. To achieve this purpose of the study, thirty yogic men competitors were selected as subjects at random. The age of the subjects were ranged from 14 to 21 years.

Selection of variable

Independent variable

- Yogic practices with sattvic diet
- Dependent variable
- High Density Lipoprotein (HDL)

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as yogic practices with sattvic diet group (Experimental Group) and control group. The experimental group underwent yogic practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following bio chemical variable namely high density lipoprotein was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable high density lipoprotein was measured through heparin precipitation method at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis of the Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the pre and post tests of experimental and control group on High density lipoprotein (Scores in mg/dl)

Variables	Group	Mean		df	't' ratio
		Pre	Post		
High density lipoprotein	Control Group	46.55	46.54	14	0.45
	Experimental Group	46.58	46.85		17.83*

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on high density lipoprotein were 46.55 and 46.54 respectively. The obtained 't' ratio was 0.45, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on high density lipoprotein were 46.58 and 46.85 respectively. The obtained 't' ratio was 17.83* since the obtained 't' ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in high density lipoprotein. It may be concluded from the result of the study that experimental group improved in high density lipoprotein due to six weeks of yogic practices with sattvic diet.

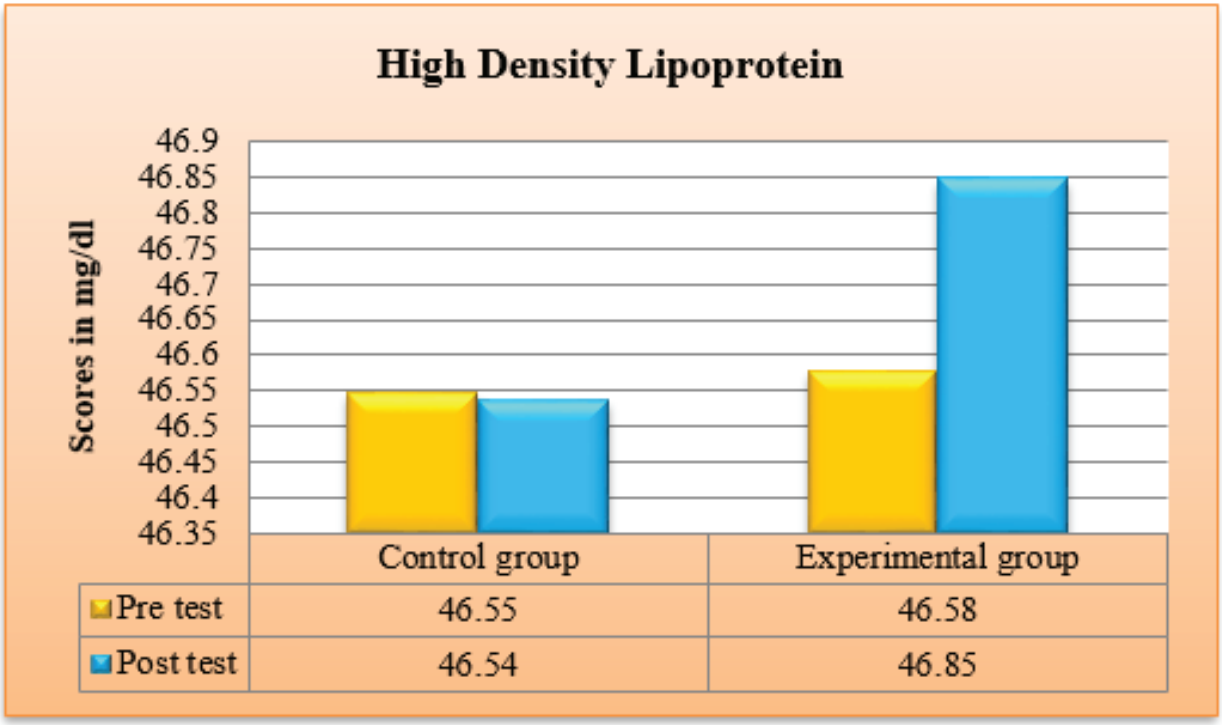


Figure-1: Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on High density lipoprotein

Discussions on Findings

The result of the study indicates that the experimental group, namely yogic practices with sattvic diet group had significantly improved the selected dependent variable, namely high density lipoprotein, when compared to the control group. It is also found that the improvement caused by yogic practices with sattvic diet when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on high density lipoprotein after the training period.

2. There was a significant improvement in high density lipoprotein. However the improvement was in favor of experimental group due to six weeks of yogic practices with sattvic diet.

Source of Funding : Self funding

Conflict of Interest Nil.

Ethical Clearance: With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas

pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research. 2019; 9, (10), pp. 73-74.

2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. International Journal of Yoga, Physiotherapy and Physical Education. 2017; 2(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. Indian Journal of Applied Research, 2019; 9, (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. International Journal of Advanced Education and Research, 2019; 4 (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research,2019; 9, (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3 (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. Journal of Information and Computational Science,2019; 9(8), pp. 483-487.
8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research, 2019; 9 (10), pp. 73-74.
9. Alaguraja, K., & Yoga, P. Analyze of pranayama technique on physiological parameter among rural school students. Journal of Information and Computational Science, 2019; 9(8), pp.545-550.
10. Alaguraja, K., Yoga, P., James Rathinaraj, S., R., & Selvakumar, K. A study on yoga intervention on maximal oxygen uptake among stress patient. Indian Journal of Applied Research,2019; 9 (9), pp. 38-39.
11. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research, 20019; 9(10), pp. 73-74.
12. Selvakumar, K., & Yoga, P. (2019). Influence of yogic practice on flexibility among college students. Indian Journal of Applied Research,2019; 9, (7), pp. 45-46.
13. Parthasarathy., & Dhanaraj. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. Indian Journal of Applied Research,2019; 9(11), pp. 45-46.

A Comparative Study on General Health of Adolescents

E. Manila Arouza Pai[1], R. Neelakandan[2], Ramaa Raju[3], M. Muthuraj[4]

[1]Research Scholar, [2]Assistant Professor, Department of Psychology, Annamalai University, TN, Associate Professor, Department of Psychology, Jyothi Nivas College, Bangalore, [4]Assistant Professor, Department of Physical Education, Annamalai University

Abstract

The purpose of the study was to analyse a comparative study on general health of adolescents. For the purpose of the study one hundred and twenty CBSE school students were selected as subjects (*sixty male and sixty female students*). The subjects' age ranged between eleven to twelve years. The general health selected as variable to compare the students. The collected data were analysed by the comparative T test to find out the difference between the male and female school students on general health. The result showed that there was a significant difference between male and female students on general health.

Key Words: *General Health, male, female and CBSE School Students.*

Introduction

The education which is associated with fitness is also called health training. Health training is a career of educating people about fitness.1 Areas within this profession encompass environmental fitness, physical health, social health, emotional health, highbrow fitness, and non secular fitness, as well as sexual and reproductive fitness schooling.2 Nutrition and exercising can appear enormously unimportant while younger, however building a regimen of wholesome behaviours at some stage in this time can serve us well within the long time. Work to keep away from the following problems many college students face as they stability coursework with other commitments and obligations. When students make time to have a look at and socialize, they lose sleep. Pulling "all-nighters," or staying up too overdue, takes its toll, leaving you with low levels of electricity and motivation.

Corresponding Author:
E. Manila Arouza Pai
Designations: Research Scholar, Department of Psychology, Annamalai University
Address: 148, The White Oak Jayaram layout, Bannerughatta Jigani Main Road,
Bannerughatta, Bengaluru, Karnataka – 560083.
Mobile: 9945338809
Email id: manila.carvalho@gmail.com

Fast meals and comparable eating alternatives seem like time and money savers, adding too lots of those food to our food plan robs us of nutrients important to hold bodily robust and mentally alert. Throughout your academic career, tension will probable get up from assignments, assessments, and other necessities. With the addition of a difficult work schedule and different duties, the strain may additionally reach exceptional heights in scholar's existence.

Mental health additionally represents major situation for college students. Issues ranging from depression and anxiety to eating issues and dependancy can affect college students' lives in large and harmful approaches. Fortunately, colleges and universities provide a bunch of assist and related services; extra resources can be observed via country and neighbourhood places of work and independent corporations in our community. Physical fitness entails taking care of our body and ensuring it really works as intended.

Maintaining bodily health includes primary areas of awareness getting enough workouts and practicing top sleep behaviour. Look beneath to don't forget both the advantages of those sports and the resources available to assist the scholars.

Methodology

The purpose of the study was to analyse a comparative study on general health of adolescents. For

the purpose of the study one hundred and twenty CBSE school students were selected as subjects (*sixty male and sixty female students*). The subjects' age ranged between eleven to twelve years. The general health selected as variable to compare the students. The general health was assessed through the General Health Questionnaire developed by Goldberg (1988), it consist of 12 items, each assess the severity of the mental problem with using 4 point scale, score from 0 to 3, higher score indicate the worse condition of the health. The collected data were analysed by the comparative T test to find out the difference between the male and female school students on general health.

Results

General Health

The data collected from and female school students on general health were statistically analysed by comparative't' test and the results are presented in Table-1.

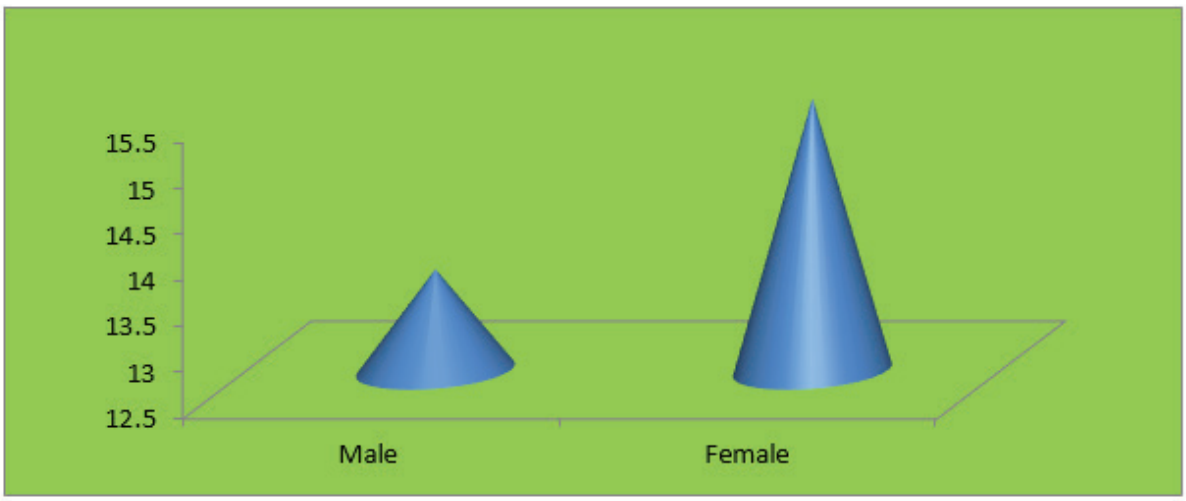
Table – 1 : Analysis of 't' test on general health of male and female school students

Group	N	Mean	SD	DM	't' - ratio
Male	60	13.60	1.23	1.86	7.83*
Female	60	15.46	1.35		

* Required table value for significance at 0.05 level of confidence for df of 59 is 2.00

Table – 1 gives the suggest and widespread deviation values on general health thirteen.60 + 1.23 and 15.forty six + 1.35 for male and woman college students respectively. Since the received 't' fee of 7.eighty three on fashionable health changed into higher than the specified desk cost of 2.00 for great stage zero.05 with 59 stages of freedom. It concluded that, there is sizeable degree of distinction on popular fitness between male and lady college students. Cone diagram for the male and female school students on general health.

Cone diagram for the male and female school students on general health



Discussion

The end result of the have a look at said that the there's giant level of distinction on fashionable fitness among male and female (adolescents) school students. Moreover the male adolescents are having higher trendy health conditions than the girl youngsters on the faculty stage. The following researches are helping this result. 3Astudy mentioned how college nurses promote intellectual fitness and subsequent educational success with the aid of screening and referral for children demonstrating mental fitness issues. They concluded that mental health problems can have an effect on school performance and academic fulfilment. 4A study attempted to difficult the relationship between instructional fulfilment and mental health of kids. Results without a doubt indicated that there's a quite vast relation

among educational fulfilment and positive dimensions of intellectual health namely standard adjustment and intelligence for the pattern as a whole.Conclusion

The conclusion of the study known that the there is significant level of difference on general health between male and female (adolescents) school students. Moreover the male adolescents are having better general health conditions than the female adolescents at the school level.

Ethical Clearance – Not required because, data collected through questionnaire.

Source of Funding - Self

Conflict of Interest - Nil

References

1. McKenzie, J., Neiger, B., Thackeray, R.,. Health education can atlso Boone seen as preventive medicine (marcus 2012). Health Education and Health Promotion. *Planning, Implementing, & Evaluating Health Promotion Programs*. (2009) ; (pp. 3-4). 5th edition. San Francisco, CA: Pearson Education, Inc.
2. Donatelle, R., Promoting Healthy Behaviour Change. *Health: The basics*. (pp. 4). 8th edition. San Francisco, CA: Pearson Education, Inc. (2009).
3. Puskar, K.R., Bernardo, L.M.,. Mental health and academic achievement: role of school nurses. J Spec Pediatr Nurs. (2007);12(4):215-23.
4. Jasbir Kaur and Babita Arora.,. Study of academic achievement in relation to mental health of adolescents. International Journal of Humanities,

An Epidemiological Study of Sputum Positive TB Patients & Burden of Tuberculosis amongst their Contacts in East District of Sikkim

Forhad Akhtar Zaman[1], Vijay Kumar Mehta[2], Shraddha Deokota[3]

[1]Professor, Department of Community Medicine, [2]Dean, [3]Assistant Professor, Sikkim Manipal Institute of Medical Sciences, 5th Mile, Tadong, Gangtok, Sikkim

Abstract

Background- Tuberculosis (TB) is a major public health problem all over the world and more so in India as it reports the highest burden of TB (both Drug sensitive and Drug resistant TB) globally. The magnitude of TB in Sikkim is enormous as is evident by the number of cases being reported (275 per 100,000 population) which is higher than the national average. It is a known fact that one single active case of TB can infect about 10 to 15 persons in a year. Early identification of the contacts ensures a better chance at cure and also helps to reduce the transmission.

Materials and Method - It was a cross sectional study conducted among all the Sputum Positive cases of Tuberculosis and their household contacts in East District of Sikkim that were registered with RNTCP for the first and second quarters of the year 2017.

Results- A total of 55 sputum positive cases of Tuberculosis and 196 household contacts were included in the study. Nearly 60% of the index cases reported having cough for more than two weeks along with fever in the beginning of their illness. On assessment of the past medical history of the contacts, it was observed that 8 (4.08%) had a history of TB in past. Almost a quarter of the contacts spent all their time in the same room as the index cases, another quarter spent only night time in the same room while about 61(30%) spend only daytime in the same room as index cases. Among the contacts, 5 were referred for sputum microscopy out of which 1 was found to be positive and 1 was negative. The remaining 3 didn't get themselves tested.

Conclusions- With the burden of TB being highest in India and having a goal to end TB by 2025, a more active approach to diagnose TB among contacts is the need of the hour which can led to early treatment and cut down transmission among the contacts.

Key words- *sputum positive cases of Tuberculosis, Contacts*

Introduction

Tuberculosis (TB) is a major public health problem all over the world and more so in India as it reports the highest burden of TB (both Drug sensitive and Drug resistant TB) globally. In 2017, the estimated number of cases in India was reported to be 2.74 million accounting for about 27% of cases in the world.[1] While TB is both curable and preventable; it is still among the ten leading cause of death in the world accounting for 1.6 million deaths in 2017.[2]

The magnitude of TB in Sikkim is enormous as is evident by the number of cases being reported (275 per 100,000 population) which is higher than the national average of 247 per 100,000 population. In 2016, total number of cases that were notified from Sikkim was

Corresponding Author
Shraddha Deokota, MD
Assistant Professor, Department of Community Medicine, Sikkim Manipal Institute of Medical Sciences, 5th Mile, Tadong, Gangtok, Sikkim -737 102.
Ph. No. +91- 3592- 270294, 231137, Ext: (Office) 150
Fax No. +91 -3592-231496; Mobile: +91-9821293173
Email: shraddhadeokota@gmail.com

1539. Sikkim also reports a high number of MDR TB cases. [3]

TB is transmitted from person to person via droplet infection. It is a known fact that one single active case of TB can infect about 10 to 15 persons in a year. Therefore, the longer a case goes undetected, the more number of people they may infect.[4] Countries that have a high burden of TB report high prevalence of TB in contacts, particularly household members. Effective investigation and screening of such close contacts of TB cases will lead to early identification of a significant number of cases who can then be put on treatment. Early identification ensures a better chance at cure and also helps to reduce the transmission.[5] Many high income countries already have screening programmes for detection of TB in close contacts, however such a mechanism is often seen missing in the countries with highest TB burden.[5] Given the large burden of disease in the state of Sikkim, it is important to assess the burden of disease in the close contacts of an active TB case.

Aims and Objectives

The objective of this study was to assess the epidemiology of Sputum positive TB patients & the burden of Tuberculosis infection amongst their close contacts in the East district of Sikkim.

Materials and Method

It was a cross sectional study conducted among the Sputum Positive cases of Tuberculosis and their household contacts in East District of Sikkim. The study covered all the Sputum Positive cases of Tuberculosis and their close contacts (those sharing same household) that were registered with RNTCP for the first and second quarters of the year 2017. After obtaining the Institutional Ethics Committee clearance and permission from Govt. of Sikkim, the subjects fulfilling the inclusion criteria were first explained about the study in details and written informed consent of the subjects were taken. The study duration was for one year and a pre-designed questionnaire was used to collect information.

Two questionnaires were used: one for the sputum positive patient and another for the contacts. The questionnaire for the patient included information regarding their socio-demographic characteristics, details of household contacts, environmental sanitation, diagnostic and follow up investigations and treatment history. The second questionnaire for contacts collected information on whether they had experienced any symptoms of TB and their medical history. If the contact was found to have any symptom of TB, they were referred to the nearest designated microscopy centre to get their sputum tested and a chest x-ray was also done. The test results and whether or not treatment was started was also noted in the questionnaire. In case of paediatric contact, a history of Isoniazid prophylaxis was also taken.

In children up to 14 years of age, all eligible individuals were subjected to chest x-ray and the individuals showing signs and symptoms were further subjected to microbiological examination. For microbial confirmation, at least one positive sputum smear out of two was taken as a case. If sputum was not available or sputum microscopy failed to detect Acid Fast Bacilli then alternative specimen (like gastric lavage, induced sputum, broncho-alveolar lavage) was collected depending on feasibility and under the supervision of a paediatrician. Chest X-rays (PA view) were read by at least two experienced, independent and blinded readers. In case of discordant findings, the reading by a third expert reader was used.

All contacts regardless of their symptoms were given information on what to do if they developed any symptom.

After checking the questionnaire for completeness, the data was entered into a Microsoft Excel spread sheet and was analysed using SPSS version 20. Data was categorised and is presented in proportions.

ResultS

A total of 55 sputum positive cases of Tuberculosis and 196 household contacts were included in the study. Among the cases 23 (41.8%) were females while 32 (58.2%) were males, with 45.5% of them in the age group of 15 to 25 years.

Table 1: Socio-demographic characteristics of Index TB cases.

Age	**Male**	**Female**	**No (%)**
10-14	1	2	3 (5.45)
15-25	15	10	25 (45.46)
26-35	6	5	11 (20)
36-45	1	0	1 (1.82)
46-55	4	5	9 (16.36)
56-65	2	1	2 (3.64)
66-75	2	0	2 (3.64)
76-85	1	0	1 (1.82)
Religion			
Hindus	16	13	29 (52.73)
Buddhist	8	7	15 (27.73)
Christians	8	3	11 (20)
Educational status			
Graduate	0	1	1 (1.82)
HS	4	4	8 (14.55)
High School	11	6	17 (30.91)
Middle School	8	7	15 (27.27)
Primary School	6	3	9 (16.36)
Illiterate	3	2	5 (9.09)
Type of family			
Joint	9		9 (16.36)
Nuclear	40		40 (72.73)
Three Generation	6		6 (10.91)
Occupation			
Semi professional	2	2	4 (7.28)
Skilled	5	0	5 (9.09)
Unskilled	6	0	6 (10.91)
Unemployed/housewife	19	21	40 (72.73)

Nearly 60% of the cases reported having cough for more than two weeks along with fever in the beginning of their illness, while about 10% reported having only fever and 30% reported having fever with other symptoms of Tuberculosis. A known history of contact was present in 40% of the cases. Among the cases, 23.6% reported consumption of alcohol and smoking, 12.7% were only smokers and 7.3% used smokeless tobacco while 5.5% took only alcohol. On assessment of housing parameters it was found that nearly 13% of cases lived in a kaccha house while 30% had mixed housing. Majority (81%) had adequate ventilation while more than half (52.7%) had overcrowding in the house. About a quarter of the houses did not have a separate kitchen and indoor air pollution was present in nearly 31% of the houses. The initial approach to diagnosis had been x-ray examination in most of the cases (63.6%) and sputum examination in 36.3%.

Table 2: Distribution of the TB cases as per determinants of the treatment adherence & outcome

Motivation for taking treatment				
Who motivated for taking treatment		Total	%	
Health Worker		6	10.92	
House-hold member		44	80	
Neighbor		2	3.64	
Self		3	5.54	
Sex distribution of the time lag between onset of symptoms and treatment				
Time lag	**Sex**		**Total**	**%**
	Male (%)	**Female (%)**		
Within first 2 weeks	13 (40.63)	14 (60.87)	27	49.09
From 2 weeks to 1 month	9 (28.13)	3 (13.04)	12	21.81
From 1 month to 3 months	8 (25%)	4 (17.39)	12	21.81
More than 3 months	2 (6.25)	2 (8.69)	4	7.27
Sputum result at the end of treatment				
Sputum at the end of treatment		**Total**	**Percentage**	
Positive		0	0	
Negative		12	21.82	
Died		1	1.82	
Not Known		42	76.36	

Out of the total 196 contacts included in the study, 48.5% were male and 51.5% were female. Most (20.9%) of the contacts belonged to the age group of 16 to 25 years followed by 20.4% in the age group 36 to 45 years. Paediatric contacts amounted to 6.1% in 0 to 5 years age, 7.6% between 6 to 10 years and 11.2% in age group 11 to 15 years.

Table 3: TB Symptoms screening among the Household contacts

Symptoms of TB	Number (%)
Cough	3(1.53%)
If Yes, < 2 weeks	1(0.51%)
>2 weeks	2(1.02%)
Blood stained	0
Fever	2 (1.02%)
Noticeable loss of weight (> 3 kg in a month)	0
sweating at night for 3 or more weeks in the last 4 weeks	0
swelling and/or lumps on your neck, arm pits, or groin	0

On assessment of the past medical history of the contacts, it was observed that 8 (4.08%) had a history of TB in past. All of them had been tested for HIV and 1(1.02%) came out positive. Diabetes was reported by 3 (1.53%) contacts and 98 (50%) reported having hypertension. Almost a quarter of the contacts spent all their time in the same room as the index cases, another quarter spent only night time in the same room while about 61(30%) spend only daytime in the same room as index cases. Two contacts shared the bed with the cases and 46(23.5%) slept in the same room but did not share a bed. Most of the contacts 137(69.9%) had been living in the same house as the index cases for more than five years. Among the contacts, 5 qualified for referral after screening and were referred for sputum microscopy out of which 1 was found to be positive and 1 was negative but the remaining 3 didn't get themselves tested. Among the paediatric contacts, none was referred as none was found to be chest symptomatic after screening all of them. Among them, 6 had started Isoniazid preventive therapy (IPT), 4 had completed and 3 were yet to start IPT.

Discussion

The present study identified 55 index cases of Sputum Positive TB & 196 household contacts. Along with sharing the same living space, the burden of care for the sick often falls on the household members. This means prolonged periods of close contact, putting the contacts at potential risk for developing Tuberculosis themselves.

In the present study there more male cases as compared to females with most of them in the age between 15 to 25 years. The findings are similar to studies conducted in other parts of the country except a higher proportion of cases in the age group below 14 years (5.5%). This difference may be due to the higher burden of TB in the state of Sikkim as compared to other parts of the country. [3,6,7] Overcrowding is a known risk factor for spread of respiratory illnesses especially tuberculosis and the present study report that almost half of the cases live in overcrowded houses. [8] Similar findings are reported by Singh et al.[6] Known history of contact with tuberculosis was present in 40% of the cases in the present study meaning that the index cases themselves had been contacts of cases of TB. On screening the contacts for symptoms, the commonest was found to be cough followed by fever, other studies also report similar findings with cough and fever being reported more than other symptoms like night sweats, weight loss or any swelling.[6] Among contacts in this study, 4.1% had TB in the past which is higher than that reported by Singh et al (0.8%), Lee et al (2%) and Nair et al (3.1%), which could be due to the higher burden of TB in the state of Sikkim. [6,7,9] Diabetes was reported in 1.53% of the contacts, similar to Lee et al (1.1%), putting these contacts at a higher risk of developing TB as Diabetes Mellitus triples a person's risk for developing TB.[10]

Sevaraju et al conducted a multi-centric cohort study and identified that contacts with age between 6 to 15 years, who are males and have long exposure to index patient per day had higher risk for TB incidence.[11] Similar report is given by Singh et al that male contacts had higher risk for developing TB.[6] The current study reports that 70% of the contacts have been living in the same house as cases for 5 years, almost half are males and 40% belong to age group 15 to 45 years, putting them at a considerable risk for developing TB.

This study could identify 1(0.5%) contact having sputum smear positive tuberculosis, which is comparable to that reported by Thanh et al (0.4%) and less as compared to other studies like Singh et al (6.8%), Nair et al (4.2%), Gupta et al (1.15%) and Fox et al (3%).[6,7,12,13,14] The difference can be attributed to the difference in the process of identifying and screening the household contacts. Some studies have employed more vigorous methods like offering screening to all contacts (Nair et al), use of a prospective study design was also seen with multiple follow up as in Singh et al and Gupta et al while Thanh et al relied on a self-referral mechanism according to the symptoms of the contacts.

Conclusion

With the burden of TB being high in India and having a goal to end TB by 2025, a more active approach to diagnose TB among contacts is the need of the hour which can led to early diagnosis & treatment and therefore cut down transmission.

Ethical Clearance- Ethical clearance was taken from Institution Ethics Committee (IEC) of Sikkim Manipal Institute of Medical Sciences (SMIMS), Gangtok, Sikkim.

References

1. World Health Organisation. Global Tuberculosis Report. World Health Organisation; 2018, Pg- 8
2. World Health Organisation. Top 10 causes of death factsheet. World Health Organisation; 2018. [Internet] [Accessed on 2 October 2019] Available from : https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
3. https://sikkim.gov.in/DepartmentsMenu/health-family-welfare department/National%20Health%20Mission/state-tb-control-society-rntcp
4. World Health Organisation. Tuberculosis factsheet. World Health Organisation; 2019. [Internet] [Accessed on 2 October 2019] Available from : https://www.who.int/news-room/fact-sheets/detail/tuberculosis
5. World Health Organisation. Tuberculosis: Contact investigation. World Health Organisation;2019[Internet] [Accessed on 5th October 2019] Available from: https://www.who.int/tb/areas-of-work/laboratory/contact-investigation/en/
6. Singh J, Sankar MM, Kumar S, Gopinath K, Singh N, et al. Incidence and Prevalence of Tuberculosis among Household Contacts of Pulmonary Tuberculosis Patients in a Peri-Urban Population of South Delhi, India. PLoS ONE . 2013 Jul 26. 8(7): e69730. doi:10.1371/journal.pone.0069730
7. Nair D, Rajshekhar N, Klinton J S, Watson B, Velayutham B, Tripathy J P et al. Household Contact Screening and Yield of Tuberculosis Cases —A Clinic Based Study in Chennai, South India. PLoS ONE. 2016 Sep 1; 11(9): e0162090. doi:10.1371/journal. pone.0162090
8. Lienhardt C. From Exposure to Disease: The Role of Environmental Factors in Susceptibility to and Development of Tuberculosis. Epidemiol Rev. 2001; 23(2): 288-301
9. Lee MSN, Leung CC, Kam KM, Wong MY, Leung MCM, Tam CM et al. Early and late tuberculosis risks among close contacts in Hong Kong. Int J Tuberc Lung Dis. 2007 Nov 7; 12(3):281–287
10. World Health Organisation. Tuberculosis and Diabetes. 2019; [Internet] [Accessed on 3 October 2019] Available from https://www.who.int/tb/publications/diabetes_tb.pdf?ua=1
11. Sevaraju S, Thiruvenkadam K, Paradkar M, Marinaik S, Bharadwaj R, Rajagopalan S et al. Incidence of Tuberculosis disease among Household Contacts of Adult Pulmonary Tuberculosis Patients in India-CTRIUMPH A Multi Centric Cohort Study.
12. Thanh THT, Ngoc SD, Viet NN, Van HN, Horby P, Cobelens FGJ et al. A household survey on screening practices of household contacts of smear positive tuberculosis patients in Vietnam. BMC Public Health. 2014; 14:713
13. Gupta M, Saibannavar AA, Kumar V. Household symptomatic contact screening of newly diagnosed sputum smears positive tuberculosis patients

- An effective case detection tool. Lung India 2016;33:159-62

14. 1Fox GJ, Barry SE, Britton WJ and Marks GB. Contact investigation for tuberculosis: a systematic review and meta-analysis. Eur Respir J. 2013; 41: 140-56.

Assessment of Cardiovascular Risk and Knowledge on Risk Factors among a Rural Population in Mangalore, Karnataka

G Shiny Chrism Queen Nesan[1], Rashmi Kundapur[2], G Rakesh Maiya[1]

[1]Assistant Professor, [2]Professor, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai, [2]K. S Hegde Medical Academy, Mangalore

Abstract

Introduction: The major causes of CVD in low and middle income countries includes globalization, rapid unplanned urbanization and increasing sedentary lifestyle. Awareness of CVD and the risk factors of the same are significant in preventing and reducing CVD deaths.

Aims & Objectives: To assess the magnitude of association between the knowledge regarding the risk factors for cardiovascular disease and risk of developing CVD in next 10 years. **Methodology:** A cross sectional study conducted in Rural Mangalore among 230 participants, selected based on simple random sampling. A pre – validated, pre – tested and semi structured questionnaire to observe socio demographic characteristics, WHO/ISH Risk prediction algorithm was used to predict risk of CVD and likert scale was used to assess knowledge. Chi Square test was done to test the significance ($p<0.05$). **Results:** 64.8% had < 10% risk of which, 40.4% were males and 24.3% were females. 5.2% had > 40% risk which is the highest risk score of which 3.9% were males and 1.3% were females. Males (53.9%) had better knowledge on CVRF than females (28.3%). As age increases, knowledge decreases. **Conclusion:** Education was directionally proportional to the knowledge whereas age was inversely proportional to the Knowledge.

Key words: *CVD, Risk factors, Knowledge, Education, WHO/ISH chart*

Introduction

The Cardiovascular Disease is one of the major cause of disability and premature death throughout the world which includes coronary heart disease (CHD), stroke, peripheral vascular disease, congenital heart disease, endocarditis and many other conditions and it contributes to the increasing costs of health care, mortality, and morbidity.[1] The major causes of CVD in low and middle income countries includes globalization, rapid unplanned urbanization and increasing sedentary lives and it was noted that the morbidity due to CVD is 8 times higher compared to mortality.[2] Thus, it can be prevented and it is considered as a major public health importance. CVD risk factors tend to cluster in individuals rather than presenting as isolated risk factors.[3] Hence, rather to concentrate on a single risk factor, accounting the total risk a person carries will be more practical for the prevention of CVD. The WHO-ISH risk prediction chart[4] has been put together to assess various risk factors leading to the cardiovascular event and to predict the 10years risk of developing fatal and non-fatal MI or Stroke. Combining risk factors to assess and predict the total risk of CVD is a logical approach towards funneling the target for treatment. Awareness of CVD and the risk factors of the same are significant in preventing and reducing CVD deaths. Knowledge to make liable the risk factors is an important step in modification towards the lifestyle behaviors and conducive to optimal cardiovascular health in developing countries.[5] Thus, this study overall is done to predict the risk of developing CVD in the next 10 years among a selected population in a rural community and to assess their knowledge regarding the CVD risk factors as the knowledge of the patient's individual risk factors can play a useful role in clinical decision making regarding

Corresponding Author:
Dr G Rakesh Maiya
Assistant Professor, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India
Mail ID: rakeshmaiyag@gmail.com

the intensity of preventable interventions and in guiding individualized management and control of the factors.[6]

Aims and Objectives

To determine the risk of developing cardiovascular events (fatal and non-fatal MI or Stroke) among the individuals above 40 years of age in next 10 years by using WHO/ISH risk prediction algorithm and to assess the magnitude of association between the knowledge regarding the risk factors for cardiovascular disease and risk of developing CVD among the study population

Methodology

A cross sectional community health survey was conducted in a rural field practice area of Mangalore, Karnataka for 4 months among the individuals above the age of 40 years residing in that village. A previous study conducted in Puducherry, reported that 17% of subjects had moderate to high risk of developing CVD in next 10yrs.[7] With 5% allowable error and using formula $4pq/d^2$ the sample size derived as 225. Totally, 230 study participants were involved in the study using simple random sampling method to select the households for the study. A pre – validated, pre – tested and semi structured questionnaire was prepared to observe socio demographic characteristics and knowledge assessment was done using three points likert scale with options ranging between 'agree', 'disagree' and 'undecided'. WHO/ISH cardiovascular risk prediction algorithm for South East Asian region – Annexure 4[4] was used to predict 10 years' risk of developing MI or stroke. All people above 40 years and permanent residents of Bengre who were willing to participate in the study were included and those who are diagnosed with MI or stroke, mentally unstable and moribund subjects were excluded from the study. This study had obtained the ethical clearance approval from the institutional ethical committee. Written informed consent was obtained from all study participants. The collected information was summarized by using descriptive statistics such as frequencies and percentage. Chi square test was used for association between WHO Risk prediction scores and knowledge of CVD risk factors. P value < 0.05 was considered significant. Data management and analysis was done by using Microsoft excel and SPSS version 22.

Results

Among 230 participants, 64% were males and 36% were females. Majority of the males were in the age group of 40 – 50 years (26.1%) and majority of females were in the age group of 51 – 60 years (15.7%). Most of the study participants belonged to the socio-economic status of Lower middle class (43%), as per Modified B G Prasad socio economic classification scale, proposed in 2018. Among females 5.7% were unskilled workers which mainly involved bidi rolling in their homes itself. 33.5% of the study participants were Hypertensives, 30.4% of them had both Diabetes Mellitus and Hypertension and only 1.7% had Diabetes Mellitus. 27.4% of study participants had a strong family history of Hypertension and 24.8% of both Diabetes Mellitus and Hypertension.

Table 1 shows the listing of individual CVD risk assessment in next 10 years. It was observed that 64.8% had < 10% risk and 5.2% had ≥ 40% risk which is the highest risk score of which 3.9% were males and 1.3% were females. It was noted that the males had more risk of cardiovascular disease in future than females. Considering knowledge on risk factors for CVD among study participants, it was seen that majority of 82.2% of them considered stress as a major risk factor for CVD, followed by high lipid level (66.1%), hereditary (61.3%), smoking (60.9%), high blood pressure (60.4%), physical inactivity (42.6%), high sugar level (40.9%), obesity (38.7%), alcohol consumption (24.3%) and unhealthy diet (17.8%). The assessment was done over top five correct responses only.

On observing the knowledge on cardiovascular risk factors and gender distribution in **Table 2** it was noted that the males had better knowledge on the risk factors than females and these findings were statistically significant as observed in the table. The distribution of age and knowledge on risk factors of CVD in **Table 3**, it was noted that as the age increases the knowledge on risk factors decreased. These findings were significant for the knowledge on Stress, high lipid level, hereditary and smoking. In **Table 4** the socio-economic status and knowledge were compared, it was observed that most the participants from lower middle class families have correctly responded compared to upper middle class families for all risk factors mentioned in above table except Hereditary where upper middle class participants (26.5%) had responded correctly than lower middle class participants (19.6%) and this finding was statistically significant.

Table 5 shows the association between the knowledge on cardiovascular risk factors among the study subjects and the WHO/ISH risk prediction score

for next 10 years. It was observed that when the knowledge on cardiovascular risk factors was poor, the risk level of getting CVD was more. The table shows the significant associations for the knowledge on certain cardiovascular risk factors such as high lipid level, hereditary and high blood pressure. It was seen that 33.3% of participants who disagreed high lipid level was a potential risk factor was causing CVD had > 40% risk level of getting CVD than 4.6% of subjects who agreed to it.

Table 1: Distribution of WHO Risk prediction score in next 10 years (N = 230)

WHO SCORE**	MALES N = 147 N (%)	FEMALES N = 83 N (%)	TOTAL N = 230 N (%)
< 10%	93 (40.4%)	56 (24.3%)	149 (64.8%)
10 – 19.9%	25 (10.9%)	15 (6.5%)	40 (17.4%)
20 – 29.9%	13 (5.7%)	6 (2.6%)	19 (8.3%)
30 – 39.9%	7 (3.0%)	3 (1.3%)	10 (4.3%)
≥40%	9 (3.9%)	3 (1.3%)	12 (5.2%)

** WHO/ISH Risk prediction algorithm

Table 2: Knowledge of cardiovascular risk factors Vs Gender distribution (N = 230)

Risk factors	Knowledge on risk factors						P value#
	Agree N (%)		Undecided N (%)		Disagree N (%)		
	Males	Females	Males	Females	Males	Females	
Stress	124 (53.9%)	65 (28.3%)	14 (6.1%)	16 (7.0%)	9 (3.9%)	2 (0.9%)	0.060
High lipid level	109 (47.4%)	43 (18.7%)	32 (13.9%)	40 (17.4%)	6 (2.6%)	0	<0.001
Hereditary	87 (37.8%)	54 (23.5%)	20 (8.7%)	27 (11.7%)	35 (15.2%)	7 (3%)	<0.001
Smoking	105 (45.7%)	35 (15.2%)	34 (14.8%)	46 (20%)	8 (3.5%)	2 (0.9%)	<0.001
High blood pressure	97 (42.2%)	42 (18.3%)	42 (18.3%)	39 (17%)	8 (3.5%)	2 (0.9%)	0.016

chi square test was used, $p < 0.05$ is significant

Table 3: Knowledge on cardiovascular risk factors Vs Age distribution (N = 230)

Risk factors	Age (Years)	Knowledge on Risk factors			p Value#
		Agree N (%)	Undecided N (%)	Disagree N (%)	
Stress	40 - 50	75 (32.6%)	6 (2.6%)	8 (3.5%)	0.039
	51 – 60	79 (34.3%)	1 (0.4%)	14 (6.1%)	
	61 – 70	30 (13.0%)	2 (0.9%)	5 (2.2%)	
	>70	5 (2.2%)	2 (0.9%)	3 (1.3%)	
High lipid level	40 - 50	69 (30.0%)	2 (0.9%)	18 (7.8%)	<0.001
	51 – 60	58 (25.2%)	0	36 (15.7%)	
	61 – 70	22 (9.6%)	2 (0.9%)	13 (5.7%)	
	>70	3 (1.3%)	2 (0.9%)	5 (2.2%)	
Hereditary	40 - 50	64 (27.8%)	17 (7.4%)	8 (3.5%)	0.002
	51 – 60	56 (24.3%)	14 (6.1%)	24 (10.4%)	
	61 – 70	20 (8.7%)	7 (3.0%)	10 (4.3%)	
	>70	1 (0.4%)	4 (1.7%)	5 (2.2%)	
Smoking	40 - 50	61 (26.5%)	4 (1.7%)	24 (10.4%)	0.022
	51 – 60	56 (24.3%)	1 (0.4%)	37 (16.1%)	
	61 – 70	20 (8.7%)	3 (1.3%)	14 (6.1%)	
	>70	3 (1.3%)	2 (0.9%)	5 (2.2%)	
High Blood Pressure	40 - 50	51 (22.2%)	4 (1.7%)	34 (14.8%)	0.074
	51 – 60	58 (25.2%)	1 (0.4%)	35 (15.2%)	
	61 – 70	25 (10.9%)	3 (1.3%)	9 (3.9%)	
	>70	5 (2.2%)	2 (0.9%)	3 (1.3%)	

chi square test was used, $p < 0.05$ is significant

Table 4: Knowledge on cardiovascular risk factors Vs Socio economic status distribution (N = 230)

Risk factors	Socio-economic status	Knowledge on Risk factors			p Value#
		Agree N (%)	Undecided N (%)	Disagree N (%)	
Stress	Lower middle class	79 (34.3%)	6 (2.6%)	14 (6.1%)	0.008
	Middle class	43 (18.7%)	3 (1.3%)	14 (6.1%)	
	Upper middle class	67 (29.1%)	2 (0.9%)	2 (0.9%)	
High lipid level	Lower middle class	62 (27.0%)	4 (1.7%)	33 (14.3%)	0.050
	Middle class	34 (14.8%)	2 (0.9%)	24 (10.4%)	
	Upper middle class	56 (24.3%)	0	15 (6.5%)	

Cont... **Table 4: Knowledge on cardiovascular risk factors Vs Socio economic status distribution (N = 230)**

Hereditary	Lower middle class Middle class Upper middle class	45 (19.6%) 35 (15.2%) 61 (26.5%)	26 (11.3%) 10 (4.3%) 6 (2.6%)	28 (12.2%) 15 (6.5%) 4 (1.7%)	<0.001
Smoking	Lower middle class Middle class Upper middle class	59 (25.7%) 31 (13.5%) 50 (21.7%)	7 (3.0%) 3 (1.3%) 0	33 (14.3%) 26 (11.3%) 21 (9.1%)	0.071
High Blood Pressure	Lower middle class Middle class Upper middle class	65 (28.3%) 34 (14.8%) 40 (17.4%)	7 (3.0%) 3 (1.3%) 0	27 (11.7%) 23 (10.0%) 31 (13.5%)	0.061

chi square test was used, $p < 0.05$ is significant

Table 5: Knowledge on cardiovascular risk factors Vs WHO Risk prediction score (N = 230)

Risk factors	**Knowledge on cardiovascular risk factors**	**WHO Risk Scores** N (%)**					**p Value$**
		< 10%	**10 - 19.9%**	**20 – 29.9%**	**30 – 39.9%**	**>40%**	
Stress	Agree Undecided Disagree	125 (66.1%) 19 (63.3%) 5 (45.5%)	32 (16.9%) 4 (13.3%) 4 (36.4%)	13 (6.9%) 6 (20.0%) 0	10 (5.3%) 0 0	9 (4.8%) 1 (3.3%) 2 (18.2%)	0.058
High lipid level	Agree Undecided Disagree	108 (71.1%) 40 (55.6%) 1 (16.7%)	22 (14.5%) 16 (22.2%) 2 (33.3%)	8 (5.3%) 10 (13.9%) 1 (16.7%)	7 (4.6%) 3 (4.2%) 0	7 (4.6%) 3 (4.2%) 2 (33.3%)	0.033
Hereditary	Agree Undecided Disagree	104 (73.8%) 23 (48.9%) 22 (52.4%)	20 (14.2%) 13 (27.7%) 7 (16.7%)	7 (5.0%) 7 (14.9%) 5 (11.9%)	6 (4.3%) 1 (2.1%) 3 (7.1%)	4 (2.8%) 3 (6.4%) 5 (11.9%)	0.017
Smoking	Agree Undecided Disagree	95 (67.9%) 51 (63.7%) 3 (30.0%)	22 (15.7%) 14 (17.5%) 4 (40.0%)	9 (6.4%) 9 (11.3%) 1 (10.0%)	6 (4.3%) 4 (5.0%) 0	8 (5.7%) 2 (2.5%) 2 (20.0%)	0.191
High Blood Pressure	Agree Undecided Disagree	90 (64.7%) 56 (69.1%) 3 (30.0%)	26 (18.7%) 10 (12.3%) 4 (40.0%)	7 (5.0%) 11 (13.6%) 1 (10.0%)	8 (5.8%) 2 (2.5%) 0	8 (5.8%) 2 (2.5%) 2 (20.0%)	0.033

$ Likelihood ratio ** WHO/ISH Risk prediction algorithm

Discussion

Our study showed that 9.50% had high risk (> 30%) of getting fatal or non-fatal MI or stroke in 10 years. This finding was less when compared to a similar study done by Gift Normal et.al[8] which showed an alarming 15.2% of high risk. Though both the studies have been conducted in Karnataka there is a difference in intensity of high risk, which may be due to the heterogenicity between two study settings based on dietary and working pattern.

In our study, it was observed that an average of 49.52% of participants only have responded correctly for the assessment of knowledge on risk factors asked to them. A similar study conducted by Omar et.al[9] revealed that only 41% of the participants surveyed had good knowledge on the risk factors which was slightly lesser than our finding. This shows that a significant amount of nearly half of our study subjects had poor or inadequate knowledge. A study conducted over American Indians in Arizona, Oklahoma, and South/ North Dakota[10] showed that 70% - 90% of their participants responded correctly for the risk factors analyzed.

In our study, only 40.9% were having knowledge that high sugar level may lead to CVD in future. Our results are consistent with previous study[11] conducted among Indians showed a low level of knowledge on DM. It was observed in our study that as the age increases the knowledge on the risk factors decreases, but it was observed in a study done by Potvin[12] among the Canadian population it was noted that mean knowledge scores progressively increased from the ≤ 30-year age group to >60-year group. This difference the level of knowledge was evident to show that the South Asian countries have a large knowledge gap when compared to the European countries

Conclusion

This study showed majority of the study subjects had <10% chance of getting CVD in next 10 years. The males had better knowledge on the CVD risk factors than the females. Education was directionally proportional to the knowledge whereas age was inversely proportional to the Knowledge.

Acknowlwdgement: We thank all the study subjects for their cooperation in this study.

Source of Funding: Nil

Conflict of interest: None declared

References

1. Mary Ellen, Joel. White Paper on Cardiovascular Disease in New Jersey... [Internet]. Rutgers Center for State Health Policy; 2006 [cited 2019 Oct 27]. Available from: http://www.cshp.rutgers.edu/Downloads/6760.pdf.
2. Cardiovascular diseases (CVDs) [Internet]. World Health Organization. World Health Organization; [cited 2019 Oct 27]. Available from: http://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds).
3. Mumford SL, Schisterman EF, Siega-Riz AM, Gaskins AJ, Wactawski-Wende J, Vanderweele TJ. Effect of Dietary Fiber Intake on Lipoprotein Cholesterol Levels Independent of Estradiol in Healthy Premenopausal Women. American Journal of Epidemiology. 2010Sep;173(2):145–56.
4. World Health Organization: Prevention of cardiovascular disease: Guidelines for assessment and management of cardiovascular risk. Geneva [Internet]. Who.int. 2007 [cited 2019 Oct 27]. Available from: http://www.who.int/cardiovascular_diseases/guidelines/PocketGL.ENGLISH.AFR-D-E.rev1.pdf.
5. Kumar R, H. S. A comparative study on awareness of cardiovascular risk determinants among rural and urban women population of Davangere district, Karnataka, India. International Journal of Community Medicine and Public Health. 2016;3336-3339.
6. Saffi M, Macedo Junior L, Trojahn M, Polanczyk C, Rabelo-Silva E. Validity and reliability of a questionnaire on knowledge of cardiovascular risk factors for use in Brazil. Revista da Escola de Enfermagem da USP. 2013;47(5):1083-1089.
7. Shrivastava S, Ghorpade A, Shrivastava P. A community-based cross-sectional study of cardiovascular risk in a rural community of Puducherry. Heart Views. 2015;16(4):131.
8. Norman G, George C, Krishnamurthy A, Mukherjee D. Burden of cardiovascular risk factors of a rural population in South India using the WHO multivariable risk prediction algorithm. International Journal of Medical Science and Public Health. 2014;3(6):764.
9. Saeed O, Gupta V, Dhawan N, Streja L, Shin J, Ku

M et al. Knowledge of modifiable risk factors of Coronary Atherosclerotic Heart Disease (CASHD) among a sample in India. BMC International Health and Human Rights. 2009;9(1).

10. Kurt S, June E, Thomas W, Ying Z. Cardiovascular Disease Risk Factor Awareness in American Indian Communities: The Strong Heart Study. Ethn Dis. 2006;16(3):647-52.
11. Murugesan N, Snehalatha C, Shobhana R, Roglic G, Ramachandran A. Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. Diabetes Research and Clinical Practice. 2007;77(3):433-437.
12. Potvin L, Richard L, Edwards A. Knowledge of cardiovascular disease risk factors among the Canadian population: relationships with indicators of socioeconomic status. CMAJ. 2000;162(9 Suppl): S5-11.

A Study on Suicide Ideation among Medical Students in Mangalore

G Shiny Chrism Queen Nesan[1], Rashmi Kundapur[2], G Rakesh Maiya[1]

[1]Assistant Professor, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai,
[2]Professor, K. S Hegde Medical Academy, Mangalore

Abstract

Introduction: Suicide is the second most common cause of death among adolescents in industrialized countries and high rates are being reported from India recently. **Objectives:** To determine the prevalence of suicidal ideation among students in a medical college in Mangalore and to associate the same with various socio demographic characteristics. **Materials & Methods:** A cross sectional (health survey) study done using pre-validated, structured and self-administered questionnaire based on Beck's scale of suicidal ideation, elicits questions on demography, life events and suicide ideation. Universal sampling method was followed and Chi Square test was done to test the significance ($p<0.05$). **Results:** Among 415 students, 179(43.1%) were males and 236(56.9%) were females. 3.6% and 8.9% had high and moderate risk of committing suicide respectively. 3.3% felt to attempt suicide at least once in last 12months and 27.9% did not care if they live or die. Suicidal Ideations were more significant among individuals with habits such as smoking and alcohol ($p=0.036$) and other addictions ($p=0.006$). Characteristics such as being neglected by parents, being physically assaulted by seniors, having psychiatric illnesses were more statistically significant to have suicidal ideas than other characteristics. **Conclusion:** Social factors have major impact on suicidal ideation among students. Identification of high risk adolescents is important to prevent suicides**.**

Key Words: *Suicide, Stress, Isolation, Medical students, Beck's scale, suicidal ideations*

Introduction

According to the WHO Suicide Prevention (SUPRE) Program, around one million people die due to suicide every year and this shows a worldwide mortality rate of 16 people per 100,000 or roughly one death every 40 seconds[1]. Suicidal ideation is defined as thoughts of harming or killing oneself[2] and it is an important factor of predicting suicide attempts and is considered as an index of the other mental health problems[3,4]. Suicide is the second most common cause of death among adolescents in industrialized countries and high rates are being reported from India recently[5]. Thus, Suicide is a major public health concern in India but there is only limited information available regarding suicide and suicidality in our community.

Some studies have shown that the level of suicidal thoughts among medical students and young physicians is very high.[6] Moreover, other overviews indicate an increased suicide rate in physicians and medical students. The estimated relative risk varied from 1.1 to 3.4 in male, and from 2.5 to 5.7 in female doctors, as compared to the general population[7]. Depressive disorders are often accompanied by suicidal thoughts, which are recognized as a risk factor for attempted suicide[8]. There are only few studies undertaken among the medical students and professionals to analyze this threatful situation and hence this study was conducted to have more clear view regarding the suicidal prevalence and thoughts among the medical students.

Aims and Objectives

To determine the prevalence of suicidal ideations among the under graduate students and to evaluate the association between suicidal ideations with various

Corresponding Author
Dr G Rakesh Maiya
Assistant Professor, Saveetha Medical College and Hospital, Chennai, Tamil Nadu, India
Mail ID: rakeshmaiyag@gmail.com

socio demographic and influencing factors of suicides among study subjects.

Material and Method

A cross sectional health survey study was conducted among the undergraduate students in a medical college in Mangalore. The study was conducted from June to August 2017, among 3 batches of M.B.B.S students between 17 to 20 years. Considering a prevalence of life time suicidal cognition of, life not worth living was reported as 44.2%[9] With 5% allowable error and using formula $4pq/d^2$ the sample size derived as 395. Totally, 415 study participants were involved in the study using universal sampling method. A pre-validated, structured and self-administered questionnaire based on Beck's scale of suicidal ideation consisting 19 items, were given to each student. Each item in the questionnaire was scored based on an ordinal scale from 0 to 2 and the total score was considered as 0 to 38. The categorical score classifies individuals into three categories with suicidal ideations such as Mild: 0 – 8, Moderate: 9 – 19 and Severe: 20 – 38. The questionnaire also contains sections on socio demographic and other influencing factors for suicide. All students who were willing to participate in the study were included. This study had obtained the ethical clearance approval from the institutional ethical committee of K.S Hegde Medical Academy, Mangalore, Karnataka. Written informed consent was obtained from all study participants before eliciting the desired information. The collected information was summarized by using descriptive statistics such as frequencies and percentage. Chi square test (Inferential Statistics) was used for univariate analysis such as association between suicidal ideation scorings, sociodemographic and influencing factors for suicide. P value < 0.05 was considered significant. Data management and analysis was done by using Microsoft excel and SPSS version 16.

Results

Out of 415 participants, 179 (43.1%) were males and 236 (56.9%) were females. By nationality, 84.1% were Indians, 10.4% were NRIs and 5.1% were Foreigners. 85.5% were residing in hostel and 13% were coming from home. By religion, 60.2% were Hindus, 25.5% were Muslims and 11.8% were Christians. Among the participants, 33(8%) consumed alcohol 7(1.7%) were also smokers and 28(6.8%) mentioned to have addictions like substance abuse and pornography. Gender based suicidal scoring was done and it was observed that 87.5% of individuals had 'Mild' suicidal ideations of which 49.6% were females and 37.8% were males. Similarly, 8.9% (3.9% males & 5.1% females) of individuals had 'Moderate' and 3.6% (1.4% males & 2.2% females) had 'Severe' suicidal ideations.

Based on the general satisfaction in life, 24.1% of females were academically satisfied compared to 13.3% of males. 29.2% of females were satisfied with their extracurricular activities than 22.2% of males.40% of females had social life satisfaction than 30.6% of males and only 12.3% of males were satisfied with the pocket money they get from home than 20.7% of females. It is observed that 4.1% of females had suicidal thoughts often compared to 2.4% of males. 3.6% of males responded that they had courage to commit suicide compared to 2.2% of females.17.1% of females did not care to live compared to 11.3% of males. 8.4% of females were wishing they were dead compared to 4.3% of males. It was seen that 13 of them had strong intensity suicidal thoughts in past 12 months, 3 were ready to commit suicide if means available, 3 of them have completed preparation for suicide, 10 have completed suicide note and 7 of them have already attempted suicide.

The association between the suicidal ideation scoring and sociodemographic factors such as nationality, gender, religion, habits, addictions, residence and whom they stay with was observed. It showed that there was a significant association between suicidal ideations and individuals with habits such as alcohol and smoking (p=0.036) and addictions such as substance abuse and pornography (p=0.006). **Table 1** illustrates association between suicidal ideation scoring and factors which influences suicidal ideations showed that being physically assaulted by seniors, individuals who stay isolated, those who have low self-esteem on themselves, those who are having psychiatric conditions, being neglected by their parents and those whose parents who very demanding on academics were more significantly associated with suicidal thoughts and ideations compared to others.

Table 1: Association between suicidal ideations with influencing factors of suicide

CATEGORIES	SUICIDAL SCORING N % (N=415)						*P value (<0.05)
	0		1		2		
	N	%	N	%	N	%	
Physically assaulted							
Yes	19	4.6	3	0.7	4	1.0	**0.003**
No	344	82.9	34	8.2	11	2.7	
Neglected by parents							
Yes	7	1.7	2	0.5	2	0.5	**0.015**
No	356	85.8	35	8.4	13	3.1	
Fear of exams							
Yes	192	46.3	20	4.8	9	2.2	0.860
No	171	41.2	17	4.1	6	1.4	
Treated badly by seniors							
Yes	58	14.0	8	1.9	3	0.7	0.638
No	305	73.5	29	7.0	12	2.9	
Having low self esteem							
Yes	103	24.8	18	4.3	7	1.7	**0.016**
No	206	62.7	19	4.6	8	1.9	
Having psychiatric illness							
Yes	8	1.9	2	0.5	2	0.5	**0.015**
No	355	85.5	35	8.4	13	3.1	
Sexually assaulted							
Yes	13	3.13	0	0	2	0.5	0.199
No	350	84.3	37	8.9	13	3.1	
Parents' academic demands							
No	113	27.2	11	2.7	7	1.7	
Not much	121	4.8	20	4.8	3	0.7	**0.017**
Yes, very much	38	9.2	6	1.4	5	1.2	
Staying isolated							
Yes	103	24.8	18	4.3	7	1.6	**0.016**
No	260	62.6	19	4.5	8	1.9	
Broken with close friend							
Yes	152	36.6	19	4.6	8	1.9	0.389
No	211	50.8	18	4.3	7	1.7	

*chi square test was used to find p value

Discussion

Suicidal ideations among young adults is an increasingly burdensome issue worldwide. Further, various studies have shown a very high prevalence of suicidal ideation in medical students, ranging from 9.1% to 48.2%[10,11]. Many factors contribute to the development of suicidal tendencies in this specific population including certain behavioral and personality traits, coexisting mental health problems, and stressful personal or academic events[6,12,13] Our study has briefly investigated over these factors and has found significant association over many.

Research done by Pickard M Bates et.al[14], Stockman J[15] and Arria et.al[16] had shown that the suicidal thoughts or wishes among females are more when compared to males which is similar to our study. In our study 5.1% of females had moderate suicidal ideations over 3.9% males and 2.2% of females had severe suicidal ideations over 1.4% of males. Few studies quoted that students with psychiatric stressors and therefore having anxiety and depression were susceptible for suicidal ideations[17,18]. A Study conducted by M.Esfahani[19] in 2015 showed a significant relationship between mental illness and suicidal ideation which was also significant in our study.

Other common traits that may contribute to suicidal thoughts in medical students include substance abuse, heavy curricular burdens, decreased life satisfaction, and certain personality traits including maladaptive behavior[6,20]. In our study addictions, such as substance abuse and pornography were significant to have suicidal thoughts and males had decreased life satisfaction when compared to females. A study conducted in 2014 showed that medical students do not look after their personal concerns and seek mental health treatment due to fears about stigmatization, confidentiality, and any impact such treatment may have on their future careers[12,21,22]. Additionally, certain personality traits make medical students more vulnerable to mental health stressors and suicidal ideation. These include neuroticism, introversion, and low self-esteem[23,24]. Several previous studies have shown that low self-esteem, which implies self-rejection, self-dissatisfaction, and self-contempt, is associated with suicidal ideation[25]. Like these studies our study has also shown that individuals with low self-esteem and those who always stayed isolated were significantly associated with having suicidal thoughts.

In our study, academic pressure was found to be a significant source of academic stress for many students along with parents' demands on academic excellence which was like the study done by Toero et.al in 2001[26]. According to our study, 1.7% of participants reported to have attempted suicide at least once in their life. Whereas a study done in 2015 reported 7% of individuals already have attempted suicide[19].

Conclusion

Our study shows that sociological and unsupportive environment at home play a major role in implication of the suicidal ideations among the students as these are an important source of comfort during stressful periods. It also revealed that students who stay depressed or isolated and those who are under psychiatric treatment had more suicidal tendencies than other students. Students who requested for support were taken care with utmost confidentiality.

Recommendations

This study calls for strategies to identify and refer high risk adolescents and young adults for mental health care and advices that it must be strongly implemented. Multi-faceted approach including mental health care services, academic support systems and counseling centers are necessary to prevent suicidal thoughts among the students.

Limitations:

The sample is not representative of the general population of Mangalore, and so the generalizability of the findings is rather limited. However, it can reflect the status in the population in a medical college in Mangalore. The clinical history of having psychiatric conditions and undergoing treatment for the same was based on the self-report of the participants only without any scope of verification. It is highly possible that people do not report their suicidal ideas or attempts.

Ethical Clearance: Obtained from Institutional Ethical committee of K.S Hegde Medical Academy, Mangalore, Karnataka

Source of Funding: Nil

Conflict of interest: None declared

References

1. Suicide across the world (2016) [Internet]. World Health Organization. 2019 [cited 13 December 2019]. Available from: https://www.who.int/

mental_health/prevention/suicide/suicideprevent/en/

2. Reducing Suicide: A National Imperative - PubMed - NCBI [Internet]. Ncbi.nlm.nih.gov. 2019 [cited 13 December 2019]. Available from: https://www.ncbi.nlm.nih.gov/pubmed/25057611
3. Joiner T, Walker R, Rudd M, Jobes D. Scientizing and routinizing the assessment of suicidality in outpatient practice. Professional Psychology: Research and Practice. 1999;30(5):447-453.
4. Vilhjalmsson R, Sveinbjarnardottir E, Kristjansdottir G. Factors associated with suicide ideation in adults. Social Psychiatry and Psychiatric Epidemiology. 1998;33(3):97-103.
5. Aaron R, Joseph A, Abraham S, Muliyil J, George K, Prasad J et al. Suicides in young people in rural southern India. The Lancet. 2004;363(9415):1117-1118.
6. Tyssen R, Vaglum P, Grønvold N, Ekeberg Ø. Suicidal ideation among medical students and young physicians: a nationwide and prospective study of prevalence and predictors. Journal of Affective Disorders. 2001;64(1):69-79.
7. Lindeman S, Laara E, Hakko H, Lönnqvist J. A Systematic Review on Gender-Specific Suicide Mortality in Medical Doctors. British Journal of Psychiatry. 1996;168(3):274-279.
8. Kessler R, Borges G, Walters E. Prevalence of and Risk Factors for Lifetime Suicide Attempts in the National Comorbidity Survey. Archives of General Psychiatry. 1999;56(7):617.
9. Kar N, Thirthalli J. A survey of suicidality and views on suicide in an Indian sample of adults. Indian Journal of Social Psychiatry. 2015;31(2):100.
10. Dyrbye L, Harper W, Moutier C, Durning S, Power D, Massie F et al. A Multi-institutional Study Exploring the Impact of Positive Mental Health on Medical Students' Professionalism in an Era of High Burnout. Academic Medicine. 2012;87(8):1024-1031.
11. Thompson D, Goebert D, Takeshita J. A Program for Reducing Depressive Symptoms and Suicidal Ideation in Medical Students. Academic Medicine. 2010;85(10):1635-1639.
12. Heiman N, Davis R, Rothberg B. A deeper understanding of depression and suicidality among medical students. Medical Teacher. 2018;41(6):711-713.
13. Rosiek A, Rosiek-Kryszewska A, Leksowski Ł, Leksowski K. Chronic Stress and Suicidal Thinking Among Medical Students. International Journal of Environmental Research and Public Health. 2016;13(2):212.
14. Pickard M, Bates L, Dorian M, Greig H, Saint D. Alcohol and drug use in second-year medical students at the University of Leeds. Medical Education. 2000;34(2):148-150.
15. Stockman J. Burnout and Suicidal Ideation among U.S. Medical Students. Yearbook of Pediatrics. 2010;2010:392-394.
16. Arria A, O'Grady K, Caldeira K, Vincent K, Wilcox H, Wish E. Suicide Ideation Among College Students: A Multivariate Analysis. Archives of Suicide Research. 2009;13(3):230-246.
17. Center C, Davis M, Detre T, Ford D, Hansbrough W, Hendin H et al. Confronting Depression and Suicide in Physicians. JAMA. 2003;289(23):3161.
18. Slavin S, Schindler D, Chibnall J. Medical Student Mental Health 3.0. Academic Medicine. 2014;89(4):573-577.
19. *Maryam E. Psychometric assessment of becks scale for suicidal ideation in general population in Tehran. Medical journal of islamic republic of Iran. 2015;29(3):268.*
20. Mojs E, Warchoł-Biedermann K, Głowacka M, Strzelecki W, Ziemska B, Samborski W. Are students prone to depression and suicidal thoughts?. Archives of Medical Science. 2015;3:605-611.
21. Downs N, Feng W, Kirby B, McGuire T, Moutier C, Norcross W et al. Listening to Depression and Suicide Risk in Medical Students: the Healer Education Assessment and Referral (HEAR) Program. Academic Psychiatry. 2014;38(5):547-553.
22. Chew-Graham C, Rogers A, Yassin N. 'I wouldn't want it on my CV or their records': medical students' experiences of help-seeking for mental health problems. Medical Education. 2003;37(10):873-880.
23. Brezo J, Paris J, Turecki G. Personality traits as correlates of suicidal ideation, suicide attempts, and suicide completions: a systematic review. Acta Psychiatrica Scandinavica. 2006;113(3):180-206.
24. Berlim M, Mattevi B, Pavanello D, Caldieraro M, Fleck M. Suicidal Ideation and Quality of Life Among Adult Brazilian Outpatients with

Depressive Disorders. The Journal of Nervous and Mental Disease. 2003;191(3):193-197.

25. Mitsui N, Asakura S, Shimizu Y, Fujii Y, Toyomaki A, Kako Y et al. The association between suicide risk and self-esteem in Japanese university students with major depressive episodes of major depressive disorder. Neuropsychiatric Disease and Treatment. 2014;:811.

26. Toero K, Nagy A, Sawaguchi T, Sawaguchi A, Sotonyi P. Characteristics of suicide among children and adolescents in Budapest. Pediatrics International. 2001;43(4):368-371.

Stress Levels between Mothers of Children Attending Normal School and Special School in Erode, Tamilnadu

G.Sasikala[1], K. Maheswari[2], P.Panneerselvam[3]

[1]Nursing Research Scholar, Vinayaka Missions University, Salem, Tamilnadu, [2]Vice- Principal & Professor, Vinayaka Mission's Annapoorana College of Nursing, Salem, Tamilnadu, [3]Assistant Professor, Dept of Physiology, Government IRT Perundurai Medical College, Perundurai, Erode, TamilNadu.

Abstract

The present study was undertaken to observe the stress levels between mothers of children attending Normal school and Special school in Erode, Tamilnadu. The present study was a cross-sectional (comparative) study. The present study was conducted in and around Erode district, TamilNadu. 120 mothers were taken for the study, out of which 60 were mother of intellectually disabled children diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria and 60 was mother of normal children. A total of 60 mothers of intellectually disabled children were selected through convenient sampling method. Stress inventory questionnaire was used to assess the stress levels. The major findings of this study are that mothers of children with intellectual disability experience stress. However, all the subjects experience higher level of Emotional, Cognitive, Behavioral stress than Physiological stress. Generalizations from this study are cautioned, due to the small volume of data and convenient selections of schools. Considering all that has mentioned above it has been shown that mothers of children with intellectual disability experience different levels of stress. Some relevant therapeutic interventions for these mothers and through methods of stress management interventions could be adapted to prevent many of these mothers' problems with their children. Special educations and early interventional measures should be more extensive in India and it should be available to educate and support mothers of intellectual disability children. The results of this study show that most of the mothers in our sample population must be referred to specialists for professional consultation on stress management.

Key words: *Stress, Mothers, special schools*

Introduction

Every child is special gift and blessing to their parents. But some children have special needs that challenge parents especially the mother to find ways to best prepare these children for their future and to handle any problem that may arise. The parents of children with special needs definitely face more difficulties than parents of normal children, which in turn affect their emotional well-being. Families of intellectually disabled children probably vary in their behaviour, social attitude and family relationships as compared to families who do not have disabled children. Understanding the emotional reaction and attitude of the parents as well as family members of intellectually disabled children are of great importance in the management. Children with intellectually disabled generally require more care, attention and direct supervision than children without disabilities.

Research demonstrates that these higher care giving demands are associated with poor psychological and physical health states for parents and other family members.[1] It is worrying fact that children of special needs are not given the attention they deserve. Despite modern human right attitudes, the idea that a disabled child is the result of the anger of God, or ancestors, the embodiment of sin in the family or the sin in itself, is widely prevalent. Endless research shows that parents

Corresponding author:
G.Sasikala, Nursing Rearch Scholar in Vinayaka Missions University, J-1 JMQ Sanatorium Quarters, Perundurai,Erode, Tamilnadu-638053.
saipannsai@gmail.com

of disabled children feel guilty and sometimes take the blame for the impairment on themselves. Inevitably, the stigma and guilt result in isolation or segregation of the disabled child. In developing countries; the mother of the disabled child is abandoned by the husband forces the mother into either abandoning the child herself or becoming a beggar.[2] Society plays an important role in the upbringing of their child. Some parents feel ashamed of their child and consider them as burden. Others consider it as their duty to take care of their children. Uplifting the parent's social and psychological well-being would help the parents to deal effectively with their children having problem.[3] The present study was undertaken to observe the stress levels between mothers of children attending Normal school and Special school in Erode, Tamilnadu.

Materials and Method

Study design: The present study was a cross-sectional (comparative) study

Study setting: The present study was conducted in and around Erode district, Tamil Nadu.

Study participants: 120 mothers were taken for the study, out of which 60 were mother of intellectually disabled children diagnosed with ID based on Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM5) criteria and 60 was mother of normal children. A total of 60 mothers of intellectually disabled children were selected through convenient sampling method from those who referred to psychiatric clinics for children, specialists' offices, and also advisory centres of department of education and training centers–rehabilitation and organization for exceptional children of Erode district. The following inclusion and exclusion criteria was used in recruiting the participants.

Inclusion and exclusion criteria: Inclusion criteria were having a aged between 6 and 18 years old child, having just one child with intellectually disabled, the presence of both parents in the family, employment of the father and not facing any serious financial crisis, not having any other member in the family suffering from chronic physical-mental problems, not having the child admitted to a boarding school, not having serious marital conflicts during the past month, and no record of the death of a loved one during the past 3 months; also they should have been consent to participate in the study and in the case of mothers' unwillingness to cooperate for completing the questionnaires and giving full answers they would have been excluded from the study.

Outcome measures

Stress inventory: The questionnaire was standardized questionnaire. It consists of 30 items, under 4 parts namely, Physiological, Emotional, Cognitive and Behavioral. There are two possible responses to each item namely, 'Yes' or 'No'. The mothers were asked to tick any one, which applied to them the most. There was no time limit. But the mothers were asked to respond as quickly as possible. Scoring Key and Norms were provided by the authors. The validity of S.I. is 0.80 and the reliability by test retest method is 0.95.[4]

Data analysis: Data were analysed using SPSS software version 11.5 (SPSS Inc). Quantitative data were expressed as mean (standard deviation) and qualitative as number (percent). Analysis of variance (ANOVA) was used for comparing the stress score among between mothers of children attending Normal school and Special School in Erode with respect to each of the dependent variables. $P < 0.05$ was considered as statistically significant level.

Results

Table 1 compares the level of stress between mothers of children attending Normal school and Special school. Most of the mothers of children attending Normal school are 71.6% having low level of stress score , 16.7% of them are having moderate level of stress score, 11.7% of them are having moderate level of score and none of them are having very high level of stress score. Whereas mothers of children attending special school are none of them having low level of stress score, 16.7% of them are having moderate level of stress score, 71.6% of them are having higher level of score and 11.7% are having very high level of stress score. Table 2 shows the comparison of Mothers of children attending Normal school and Mothers of children attending Special school stress score.

Table 1: Comparison of level of stress score

Level of Stress score	MOTHER'S of children attending Special school		MOTHER'S of children attending Normal school		Chi square test
	n	%	n	%	
Low	0	0.0%	43	71.6%	$\chi 2$=17.85 P=0.001*** DF=2 not significant
Moderate	10	16.7%	10	16.7%	
High	43	71.6%	7	11.7%	
Very High	7	11.7%	0	0.0%	
Total	60	100.0%	60	100.0%	

(NS= not significant S=significant DF= Degrees of Freedom) **(**NOT SIGIFICANT P> 0.05 * significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001)

Table 2: Comparison of mean stress score

Stress domains	group				Mean difference	Student's independent t-test
	Mothers of children attending Normal school		Mothers of children attending Special school			
	Mean	SD	Mean	SD		
PHYSIOLOGICAL	3.45	1.43	3.80	1.46	0.35	t=1.32 P=0.18 not significant
EMOTIONAL	3.52	1.43	5.28	1.66	1.77	t=6.24 P=0.001*** significant
COGNITIVE	3.03	1.06	3.75	1.08	0.72	t=3.67 P=0.001*** significant
BEHAVIORAL	3.47	1.55	5.32	1.65	1.85	t=6.33 P=0.001*** significant
Total	13.47	4.24	18.15	3.65	4.68	t=6.48 P=0.001*** significant

(NOT SIGIFICANT P> 0.05 AT * significant at P≤0.05 ** highly significant at P≤0.01 *** very high significant at P≤0.001)

Discussion

The present study compared the level of stress among mother of children attending Normal school and Special school stress and also to investigate the potential effects of variables such as age, mother's education and income in the Erode society on these differences, our research data results revealed that None of the mothers of children attending Special school are having low level of stress score , 16.7% of them are having moderate level of stress score, 71.6 % of them are having high level of score and 11.7 % of them are having very high level of stress score. Statistically there is a significant difference between mothers of children attending Normal school Vs Special school, it was confirmed using chi square test very high significant (P=0.001). This confirms hypothesis I. This finding is in consonance with the findings of Rangaswamy and Bhavani [5] Parents with disabled child may have higher levels of stress and lower levels of wellbeing than with the normal children. Similar studies have also revealed that Lopez et al [6] also reported that parents of children with developmental delays experienced greater stress than children without delay. Floyd and Galladjhar [7] also observed that parents of children with intellectual disability often experienced considerable stress resulting from worries and demand related to their children. Similarly, Baker et al [8] found that parenting stress was higher for parents of pre-schoolers with delays than for parents of pre-schoolers without delays.

Stress is found to be an important problem commonly found in parents of children with special needs. Being apprehensive clearly explains stress, anxiety and its repercussions are perceived in no less degree in mothers of children with special needs. A chain reaction to this is seen in their quality of life. It is the need of the hour to make a study on these mothers of children with special needs to manage their stress and anxiety about their children and to enhance their quality of life. Parenting stress can be defined as excess anxiety and tension specifically related to the role of a parent and to parent-child interactions.[9] Parent's psychological well-being is considered to be very important in parent – child relationship because it is very important key to the success of a meaningful family relationship. The major findings of this study are that mothers of children with intellectual disability experience stress. However, all the subjects experience higher level of Emotional, Cognitive, Behavioral stress than Physiological stress. Generalizations from this study are cautioned, due to the small volume of data and convenient selections of schools.

Conclusion

Considering all that has mentioned above it has been shown that mothers of children with intellectual disability experience different levels of stress. Some relevant therapeutic interventions for these mothers and through methods of stress management interventions could be adapted to prevent many of these mothers' problems with their children. Special educations and early interventional measures should be more extensive in India and it should be available to educate and support mothers of intellectual disability children. The results of this study show that most of the mothers in our sample population must be referred to specialists for professional consultation on stress management

Source of Support: Nil

Conflict of Interest: The authors declare that they have no conflict of interest.

Ethical Approval: The study protocol was approved by institutional human ethical committee. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee.

Acknowledgment: We must thank here all the centers for education and rehabilitation of children with special needs, specialized school of the Erode city, and mothers of the disabled children whom their cooperation has made this research an easy job for us.

References

1. Hickman, L. (2000), "Living in my skin: The insiders" view of life with a special needs child", San Antonio, TX: Communication Skill Builders. 2000; 239.
2. Ravindranadan and Raju. Adjustment and attitude of parents of Children with Mental Retardation. Journal of Indian Academy of Applied Psychology 2007; 33(1): 137 - 141.
3. David E. Gray. Perceptions of stigma: the parents of autistic children. Sociology of Health & Illness.1993;15(1):102-120.
4. Hemalatha, N. & Nandini, M. Stress Inventory (Revised). Unpublished Manuscript, Department of Psychology, Avinashilingam University for

Women, Coimbatore, Tamil Nadu, India. 2005.

5. Rangaswamy, K. and Bhavani, K. (2008). Impact of disability on the family and needs of families of disabled children. J. Commu. Guid. Res., 25(1): 121- 130
6. Vicki Lopes, Tessen Clifford, Patricia Minnes, and Helene Ouellette-Kuntz . Parental Stress and Coping in Families of Children With and Without Developmental Delays. J. on Developmental Disabilities.2008; 14(2): 99- 104.
7. Floyd, F. J. and Gallagher, E. M. Parental stress, care demands and use of support services for school age children with disabilities and behavior problems. Family Relations. 1997;46:359- 371.
8. Baker, B. L., Mclntyre, L. L., Balchur, J., Crnic, K., Edelbrock, C. and Low, C. Pre-School children with and without developmental delay: behavior problems and parenting stress over time. J. Intellectual Disability Res.2003; 47 (415): 217-230.
9. Abidin, R. R. Parenting stress index: Manual (3rd ed.). Odessa, FL: Psychological Assessment Resources. 1995.

Targeted Local Drug Delivery – A Possible Approach in Dentistry

Gummuluri Sriram[1], Kavalipurapu Venkata Teja[2]

[1]Undergraduate Student, Bachelor of Pharmacy, SVS Group of Institutions, SVS School of Pharmacy, Bheemaram, Hanumakonda, Warangal, Telangana, India, [2]Private consultant, Hyderabad, [3]Postgraduate, Sibar Institute of Dental Sciences, Guntur

Abstract

Drug delivery is a method of administering a pharmaceutical compound to achieve a therapeutic effect in humans and animals. Conventional therapy is a classical method of achieving drug delivery. Where, it provides drug release immediately and causes fluctuation of drug level in in blood depending on the dosage forms compared to conventional, which improves the drug potency, controlled drug release to give a sustained therapeutic effect, provide greater safety and target a drug specifically to a desired tissue. It mainly includes targeted, controlled and modulated drug delivery systems. Hence, there is an increased interest towards the application of targeted therapies in medicine and dentistry and has proven to be successful in prevention and treatment of various oro-dental disorders.

Keywords: *Biodegradable; Carrier System; Nanoparticle; Target Drug*

Introduction

Targeted drug delivery is a special form of system, where the medicament is selectively targeted or delivered only to its site of action or absorption and not to the non-target organs or tissues or cells. It improves the efficacy and reduces the side effects [1]. The drug may be delivered, to the capillary bed of the active sites, to the specific type of cell or even an intracellular region, to a specific organ or tissue by complexion with the carrier that recognises the target. The main objective of a targeted therapy, is to mainly achieve a desired pharmacological response at a selected site, thereby the drug has a specific action with minimum side effects and better therapeutic index [1]. The main reason behind the targeting of the drug is in intervention, prevention or treating a disease. Conventional dosage forms have few drawbacks like, pharmaceutical drug instability, low absorption and high membrane bounding, biological instability. The drug delivered through conventional system, has a very low specificity, shorter half life, large volume of distribution and low therapeutic index. These challenges lead to increased interest towards a targeted therapy [2]

Corresponding Author:
Gummuluri Sriram
Undergraduate Student, Bachelor of Pharmacy, SVS Group of Institutions, SVS School of Pharmacy, Bheemaram, Hanumakonda, Warangal, Telangana, India,

Requirements of drug targeting

For a drug to be targeted, it should have certain characteristics or requirements to be satisfied. Mainly it should be nontoxic, biocompatible, biodegradable and physico-chemically stable both invitro and invivo. The drug that has been delivered should be restricted to the targeted area and should have a uniform capillary distribution. It should be controllable and with predictable drug release. Amount of release is therapeutic, with minimal leakage during transit [3]. Carriers used must be bio-degradable or readily eliminated from the body without any problem. Although targeted therapy has several advantages, but still it has many limitations that hinder its application. The main disadvantage of this therapy is difficulty in predicting the exact action of drug at the specified site. Rapid clearance of targeted systems, immune reactions, insufficient localisation of targeted systems, possible toxic reactions in therapeutic dosages and tedious preparation procedures lead to decreased usage for day to day basis [4].

Carriers in targeted drug delivery:

Targeted drug delivery, can be achieved by using carrier system. Carrier is a special molecule or system essentially required for effective transportation of loaded drug to the selected site. Various pharmaceutical carriers used are polymers, microcapsules, microparticles, lipoproteins, liposomes, micelles. The important componential properties that influence drug targeting are mainly the drug delivered its concentration, particulate location and distribution, molecular weight, physicochemical properties and drug carrier interaction. In case of carrier molecule, its type, number of excipients, surface characteristics, size and density. In vivo electric field [5,6].

Various strategies in drug targeting [5] are, passive, active, ligand mediated, physical, dual, double inverse and combination targeting. Passive targeting utilises, the natural course of bio-distribution of the carrier. The colloids which are taken up by the reticulo-endothelial system can be ideal vectors for passive targeting. Active targeting involves the modification or functionalization of the drug carriers so that the contents are delivered exclusively to the site corresponding to which carrier is architectured. It can be affected at different levels like first order or organ compartmentalization, second order or cellular targeting, third order or intercellular organelles targeting. In first order targeting, there is a restricted distribution of drug carrier system to the capillary bed of a pre-determined target site, organ or tissue. In second order targeting, the drug is selectively delivered to a specific cell type such as tumor cells and to the normal cells. In third order targeting, drug is delivered to the intracellular organelles of the target cells. Inverse targeting is a reverse of passive system which avoids the passive uptake of colloidal carriers by the reticuloendothelial system. It can be achieved, by suppressing the function of reticulo-endothelial system by pre-junction of a large amount of blank colloidal carriers or macromolecules [5]. Ligands are carrier surface groups, which can be selectively direct the carrier to the pre-specified site, housing the appropriate receptor units to serve as homing device to the carrier or drug. The ligands confer recognition and specificity upon drug carrier and endow them with an ability to approach the respective target selectivity and deliver the drug. Physical targeting involves environmental changes like pH, temperature, light intensity, electric field and ionic strength. Dual targeting is an approach where, the carrier molecule itself, have their own therapeutic activity and thus increase the therapeutic effect of the drug. Double targeting is of two types, it can be achieved by spatial and temporal control. In spatial control, drugs are targeted to specific organs, tissues, cells or even subcellular component. In temporal control, the rate of the drug delivery is controlled to the target site. Combination targeting systems are equipped with carriers, polymers and homing devices of molecular specificity that could provide a direct approach to the target site [5,6, 7].

Delivery systems

Drug delivery, is a method or process of administrating a pharmaceutical compound to achieve a therapeutic effect. It is achieved through delivery systems, which help in delivering or carrying the drug to the specified site. The various delivery systems used are nanotubes, nanowires, nano shells, quantum dots, gold nano, dendrimers niosomes virosomes, liposomes, nanocrystals, magnetic nanoparticles, nanorobots [8]. Nano tubes are the hollow cylinder tubes made of carbon atoms, which can be filled and sealed for potential drug delivery they measure about 10 to 100 micrometers [9,10]. Nanowires are the thin wires which are usually microns in size, they localize the pinpoint damaged site. It has its wide applicating in patients with neurological disorders [8]. Nanoshells are the hollow silica spheres, covered with gold. Antibodies can be attached to their surfaces, enabling shells to target a particular cell in the body [8]. Quantum dots are miniscule silica particles, which are mainly the semiconductor particles, which are useful in various diagnostic and therapeutic purposes. Gold nano can be nanoparticles that are coated or made of gold particles. They are helpful in detection of DNA and protein markers. It has its wide applications in cancer treatment and genetic engineering [11]. Dendrimers are precisely defined [10,12]. Synthetic nanoparticles that are approximately 510nm in diameter. They are made up of layers of polymer surrounding a central core. They contain different sites to which the drugs are attaches and delivered. They have wide applications in gene transfection and medical imaging [8,9]. Liposomes are small microscopic vesicles in which an aqueous volume is entirely composed by membrane of lipid molecule. The drug molecules can either be encapsulated in aqueous space or intercalated into the bilayers [13,14,15]. Niosomes are non- ionic surfactant vesicles which can entrap both hydrophilic or lipophilic drugs either in aqueous phase or vesicular membrane made of lipid materials. It seems to have better stability than liposomes. Virosomes are immuno-modulating liposomes consist of glycoprotein

of viruses. They helpful in genome grafting and cellular microinjection [16,17,18,19]. Nanocrystals are nanoparticles with lesser than 100nm in diameter. Nanorobots include the technology of creating robots at nanoscale diameters, it is a hypothetical designing principle, which is still in research. It is claimed that they specifically delivered to certain areas and get targeted [8,9].

Applications of targeted drug delivery:

The applications of targeted drug delivery mainly include in treating oral mucosal lesions, in treating endodontic infections, cancer therapy and treating patients with periodontitis [20]. In treating oral mucosal lesions, various drugs are targeted using different strategies like usage of quantum dots, liposomes [13,14,15] which are bio-compatible, biodegradable and nonimmunogenic. Which ultimately reduce the toxicity and side effects of drugs. They have a wider role, with increased therapeutic effect as an antimicrobial, antiviral, antitumoral and also used in gene therapeutics. Folate targeting and sono poration have proven to be useful in treating patients with oral cancer. The major importance of nano particles, compared to the other conventional medicinal drugs is that the targeting of the nanoparticles to the specific tumor tissue. Compared to the microparticulate systems, nanoparticles can easily traverse in the blood vessels and the tumor tissue. In targeting the cancer tissue mainly by active and passive targeting modalities. In passive targeting, the injectable drug carriers have been surface modified to evade the reticule endothelial system. They are lived for longer time they have a greater advantage of reaching the blood vessels surrounding the solid tumors. The nanoparticulate molecules have enhanced permeability and retention. Active targeting is by conjugating a ligand to the surface of the particle, such ligand only target the specific cancerous tissue. Most of the studies till date, have focused on the tissue specific antigen mainly the tissue specific antigen. Liposomal carriers and the polymeric nanoparticles are the major important pathways of the targeted drug delivery [13]. Although other nanomicelle systems and studies are still being undertaken.

Periodontic and endodontic diseases are the conditions which mainly occur due to the inflammatory responses from the teeth and the supporting tissues. Endodontic and periodontal pathologies are both biofilm mediated diseases. Thus suppression of the microorganisms and the bio films is challenging. The recurrence of the infection is more common due to the adaptive nature of the microorganisms, protective extracellular polysaccharide matrix formation and development of resistance to microbial agents. To circumvent these challenges, nanomaterials in the form of nanofibers and nanoparticles have been considered in dental therapies. The micro and nano particles are used for localised delivery of the anti-infective agents for the periodontal and endodontic diseases. The micro particles seem to have a greater potential in improving the strategies in management of the endodontic and periodontal diseases. They are very effective when directed against the periodontal pockets and root canals as they have prolonged antibacterial effect and extremely effective. Among all the natural and synthetic polymers available, copolymers of lactic and glycolide family are the most studied and versatile with reference to its availability, release profile, biodegradation time and biocompatibility [21,22,23,24].

In controlling periodontal pathogens, various antibiotics such as doxycycline, tetracycline and minocycline are used. When these antibiotics, encapsulated with the polylactic glycolic acid blend spheres, it is observed the minimal inhibitory concentration was more than required in the gingival crevicular fluid, with continuous drug release up to a week. There was significant improvement in the plaque and gingival index scorings with relative attachment levels. Calcium hydroxide nanospheres are seen to be more effective in endodontic therapy compared to the conventional calcium hydroxide. The nanoparticles can also be used in dental materials, as nanoparticles, for improving the physicomechanical properties of the dental materials. Polymeric nanoparticles such as chitosan nanoparticles, serve as a prophylactic approaches for prevention of bacterial biofilm formation and possibility of penetration into the already formed biofilms. In addition to chitosan, polylactic glycolic acid and cellulose acetate phthalate nanoparticles have been used optimally as antibacterial agents for endodontic and periodontal disease management [25]. Charged and surface charged nanoparticles have direct interaction with the microorganisms and they are helpful in the selective eradication. It is a process where selectively the bacteria are eradicated by binding to the opposite charged bacteria or pathogens. The concept utilised in both endodontics and periodontics is by usage of the photosensitisers encapsulate with the nanoparticles, in the active photodynamic therapy to eradicate the microorganisms [25]. The principle is that

the photosensitiser is preferentially taken by the bacteria and the activation of the light generates free radicals and singlet oxygen which kills the microorganisms. Specific targeting nanoparticles is a strategy where a particular and specific pathogen can be identified and targeted. It is possible via conjugation of the antibodies with the respective nanoparticles. Immunoliposomes have been used to for the precise delivery of these Antimicrobial agents for specific plaque control. Although there are currently only a limited number of endodontic and periodontal nanodrug delivery systems, there is a future hope of developing and applying these nanoparticles in the endodontic and periodontal perspective [25,26].

Conclusion

Targeted drug delivery is an effective and alternative pathway for the modern dentistry. Although it is beneficial in several ways, the delivery systems still have to be I proved for they effective delivery into the targeted tissues. And there is a hope in near future that nano targeted dentistry will improve the treatment outcomes.

Ethical Clearance- Not applicable

Source of Funding- Nil

Conflict of Interest - Nil

References

1. Hillery AM. Supramolecular lipidic drug delivery systems: From laboratory to clinic A review of the recently introduced commercial liposomal and lipid-based formulations of amphotericin B. Advanced Drug Delivery Reviews. 1997;24(2-3):345-63.
2. Rani K, Paliwal S. A review on targeted drug delivery: Its entire focus on advanced therapeutics and diagnostics. Sch. J. App. Med. Sci. 2014:328-31.
3. Mody N, Tekade RK, Mehra NK, Chopdey P, Jain NK. Dendrimer, liposomes, carbon nanotubes and PLGA nanoparticles: one platform assessment of drug delivery potential. Aaps Pharmscitech. 2014;15(2):388-99.
4. Bae YH, Park K. Targeted drug delivery to tumors: myths, reality and possibility. Journal of controlled release. 2011;153(3):198.
5. Gupta M. and Sharma V. Targeted drug delivery system: A Review. Res. J. Chem. Sci 2011; 1(2): 135-138.
6. Agnihotri J, Saraf S, Khale A. Targeting: new potential carriers for targeted drug delivery system. International Journal of pharmaceutical sciences Review and Research. 2011;8(2):117-23.
7. Martinho N, Damgé C, Reis CP. Recent advances in drug delivery systems. Journal of biomaterials and nanobiotechnology. 2011;2(05):510.
8. Reddy RS, Dathar S. Nano drug delivery in oral cancer therapy: An emerging avenue to unveil. Journal of Medicine, Radiology, Pathology and Surgery. 2015 ;1(5):17-22.
9. Hu CM, Aryal S, Zhang L. Nanoparticle-assisted combination therapies for effective cancer treatment. Therapeutic delivery. 2010;1(2):323-34.
10. Tang M, Lei L, Guo S, Huang W. Recent progress in nanotechnology for cancer therapy. Chin J Cancer. 2010;29(9):775-80.
11. Khan AK, Rashid R, Murtaza G, Zahra A. Gold nanoparticles: synthesis and applications in drug delivery. Tropical journal of pharmaceutical research. 2014;13(7):1169-77.
12. Patra JK, Baek KH. Green nanobiotechnology: factors affecting synthesis and characterization techniques. Journal of Nanomaterials. 2014; 2014:219.
13. Jones MN, Kaszuba M. Polyhydroxy-mediated interactions between liposomes and bacterial biofilms. Biochimica et Biophysica Acta (BBA)-Biomembranes. 1994 ;1193(1):48-54.
14. Sanderson N, Jones M. Encapsulation of vancomycin and gentamicin within cationic liposomes for inhibition of growth of Staphylococcus epidermidis. Journal of drug targeting. 1996;4(3):181-9.
15. Jones MN, Kaszuba M, Reboiras MD, Lyle IG, Hill KJ, Song YH, Wilmot SW, Creeth JE. The targeting of phospholipid liposomes to bacteria. Biochimica et Biophysica Acta (BBA)-Biomembranes. 1994;1196(1):57-64.
16. Manchester M, Singh P. Virus-based nanoparticles (VNPs): platform technologies for diagnostic imaging. Advanced drug delivery reviews. 2006;58(14):1505-22.
17. Singh P, Destito G, Schneemann A, Manchester M. Canine parvovirus-like particles, a novel nanomaterial for tumor targeting. Journal of nanobiotechnology. 2006;4(1):2.

18. Flenniken ML, Willits DA, Harmsen AL, Liepold LO, Harmsen AG, Young MJ, Douglas T. Melanoma and lymphocyte cell-specific targeting incorporated into a heat shock protein cage architecture. Chemistry & biology. 2006;13(2):161-70.
19. Flenniken ML, Liepold LO, Crowley BE, Willits DA, Young MJ, Douglas T. Selective attachment and release of a chemotherapeutic agent from the interior of a protein cage architecture. Chemical Communications. 2005(4):447-9.
20. Munot NM, Gujar KN. Orodental delivery systems: an overview. Int J Pharm Pharm Sci. 2013;5(3):74-83.
21. Ghali RF. The potential link between periodontitis and systemic diseases–an overview. J Advanc Med Res. 2011; 1:24-35.
22. Greenstein G, Polson A. The role of local drug delivery in the management of periodontal diseases: a comprehensive review. Journal of periodontology. 1998 ;69(5):507-20.
23. Robinson AM, Bannister M, Creeth JE, Jones MN. The interaction of phospholipid liposomes with mixed bacterial biofilms and their use in the delivery of bactericide. Colloids and Surfaces A: Physicochemical and Engineering Aspects. 2001;186(1-2):43-53.
24. Venkatesh A, Ramamurthy J. Local drug delivery systems in the treatment of periodontitis–An Overview. Int J Pharm Pharm Sci. 2012;4(1):30-7.
25. Shrestha A, Kishen A. Antibacterial nanoparticles in endodontics: a review. Journal of endodontics. 2016;42(10):1417-26.
26. Kishen A. Nanotechnology in endodontics. Springer International Pu; 2016.

The Under 5 Age Children in Urban Area of Sangareddy, Telangana

Humera Abida[1], Batchu NagaGayathri[2]

[1]Assistant Professor, [2] Assistant Professor, Department of Community Medicine,, Mahavir Institute Of Medical Sciences, Vikarabad, Telangana, India

Abstract

Background: Diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual) [1]. Diarrhoea can last several days, and can leave the body without water and salts that are necessary for survival. In urban setting, diarrhoea is more common in the slum dwelling children who live in an environment with poor sanitary facilities and polluted water [2]

Aim and Objective: To estimate the prevalence of acute diarrhoeal diseases among the children below 5 years of age.

Material and Methodology: Cross sectional type of study conducted in children of 0-5 years of age using pre designed, pretested structured questionnaire. 402 children were selected for the study using convenient sampling technique. Study area was 5 Urban slum pockets in Urban Health and Training Centre(UHTC), Sangareddy, Department of Community Medicine, MNR Medical College, Telangana.

Results: Prevalence of acute diarrhoeal diseases was 15.7% among 402 under-fives children from the urban slum, over a recall period of 2 weeks. Among them 207 children were males and 195 were females, of which prevalence of diarrhea was observed more in females 33 (16.9%) when compared to males 30 (14.5%). About 90% of study participants belonged to nuclear family of which most of them belonged to class IV (upper lower) according to Modified Kuppuswamy scale[3]. Socio environmental conditions of these families were poor.

Conclusions: The study brought light on the unmet needs regarding poverty, sanitation, proper disposal of waste water and daily supply of safe potable drinking water and health care delivery.

Keywords: *Prevalence, diarrhoea, under 5 age children, environment.*

Introduction

Globally, four billion episodes of diarrhea were estimated to occur each year, with > 90% occurring in developing countries. Diarrhoeal disease is an important public health problem among children in developing countries.

According to WHO[4], 'Human faeces remains one of the most dangerous pollutant, spreading microbes causing various diseases like enteric fevers, diarrhoea etc. Rotavirus and Escherichia coli, are the two most common etiological agents of moderate-to-severe diarrhoea in low-income countries. Infection is more common when there is a shortage of adequate sanitation and hygiene and safe water for drinking, cooking and cleaning.

Diarrheoea can also spread from person-to-person, aggravated by poor personal hygiene. Food is another major cause of diarrhoea when it is prepared or stored in unhygienic conditions .Unsafe domestic water storage and handling is also an important risk factor.

In India especially poor sanitary conditions was the most important cause for most of ADD episodes. Health education on the etiology, prevention and management of the diarrhoea has the potential to establish productive contact between the health services and the community, to increase the capability of the families to recognize the

danger signs of diarrhoea in children and to encourage appropriate and early care seeking.

There is an imperative need to know about prevalence of diarrhoea and to assess the existing gap between knowledge and practice such as hand washing and use of sanitary toilet. There is also a need for supply of safe drinking water and maintenance of clean environment through provision of sanitary latrine and proper disposal of refuse. This is more important in case of mothers with under five children, in whom the morbidity and mortality to diarrhoea is very high.

Method

A community based cross sectional type of study conducted for a period of 12 months(January 2016-December 2016) . Study area is Urban slum area by name Marxnagar selected randomly from urban field practice area of Sangareddy. Out of 5245 population in urban slum, 681 under 5 age children are expected to be available to draw the adequate number of study population.

Out of 681 children only 402 children were taken for the study as per the calculations by using the formula for fixing the sample size as mentioned below n = (Z)2pq/ d2.

Where **Z**= percentage point corresponding to significance level. For significance level 5%, Z is1.96. **p** prevalence of diarrhea among under 5 children is 30%[5] q=100-p=70%

d is corresponding maximum error and is 15%. Hence n=1.96x1.96x30x70/4.5x4.5=398 i.e. rounded to 402 children < 5 yrs.

Data Collection:

Informed written consent was taken from the study participants prior to the start of the study. A pre designed, pre tested questionnaire was made as per guidelines given in basic biostatistics by A. Indrayen and L. Sathyanarayana . Pretesting of questionnaire was done in 40 samples selected randomly in 4 streets in the respective area of Sangareddy.

Data Analysis:

Statistical analysis was done using SPSS version 17.0 and the details regarding mother's knowledge and attitude regarding diarrhoea prevention was obtained. Data was summarized in percentages and proportions. Statistical associations was done using Chi square test wherever necessary with $p<0.05$ and considered statistically significant.

Results

Table 1: Distribution according to age & sex of under 5 age children

Demographic Characteristics		**No. of children**	**Percentage (%)**
Age Group	0-12 months	75	18.66
	13-24 months	108	26.86
	25-36 months	90	22.39
	37-48 months	71	17.66
	49-60 months	58	14.43
Sex	Males	207	51
	Females	195	49
Prevalence of Diarrhoea	Males	30	14.5
	Females	33	16.9

From the table 1, it was observed that, out of 402 under 5 aged children 108 (26.86%) children were from the age group of 13-24 months followed by 90 (22.39%). In the above table, majority of children were males 207 (51%)while females were 195 (49%).It was observed that prevalence of acute diarrhoeal diseases was more in females 33 (16.9%) when compared to males 30 (14.5%).

Table 2: Distribution according to Socio Environmental conditions of the families (n=255) of under 5 age children

Socio Environmental Characteristics		**No. of families(n=255)**	**Percentage (%)**
Type of family	Nuclear	235	92.3
	Joint	14	5.7
	Three generation	6	2
Socio Economic status	Class I (Upper)	5	1.96
	Class II (Upper middle)	31	12.15
	Class III (Lower middle)	56	21.96
	Class IV (Upper lower)	136	53.33
	Class V (Lower)	27	10.58
Source of drinking water	Municipal tap water	178	70
	Borewell water	77	30
Type of house	Kutcha	145	57
	Semi pucca	76	30
	Pucca	34	13
Sanitary facility	Present	41	16
	Absent	214	84
Garbage Disposal	Garbage pit	158	62
	House to house collection	18	7
	No facilities	79	31
Fly breeding	Yes	226	89
	No	29	11

From the table 2, it was observed that, majority of the families belonged to nuclear family 235(92.3%) and then followed by joint families (14%). Modified Kuppuswamy scale[6] was used to determine the socio economic status of the study population .Based on that majority of the families belonged to class IV (53.33%) followed by class III (21.96%).

Out of 255 families surveyed 178(70%) houses were receiving municipal tap water whereas 77(30%) houses were still receiving borewell water. Majority of the houses were kutcha type145(57%) followed by semipucca houses76(30%). Only a handful of houses 41(16%) had the sanitary facilities available.

Garbage pit was the major source of Garbage Disposal(62%) in the present study. Fly breeding was seen in approximately 90% of the houses.

Discussion

The present study was conducted in the urban field practice area of department of community medicine of MNR Medical College, Sangareddy, Telangana. For the purpose of study total 255 families were taken which had 402 under five age group children, who were enrolled in the study. The findings in this study document the prevalence of Diarrhoea among the under-five population of urban slum of Sangareddy.

Prevalence of diarrhoea in under five children in this study was found to be 15.7% .Similar findings were seen in studies conducted by Mishra CP[6] and Sudipta Basa[7].The study done in Aligarh of Uttar Pradesh by Ansari et al[8] has reported a prevalence of 16% which is comparable to our study.

In the present study it was observed that, males belonging to 13-24months age group was higher(30.9%) in number. Females belonging to 37-48months age group were higher (25.6%) in proportion than other age groups A cross-sectional study conducted to assess the prevalence of under-five diarrhea and socioeconomic factors by A.M. Elizabeth and Sherin Raj[9], the percentage of children suffering from diarrhea was highest among children aged 6-23 months (20.2%-20.6%) and lowest in the age group of 48-59 months (3.6%).

It was observed that sex ratio of the under five children in this study was 955 females /1000 males and it is slightly higher than the national average of 940/1000(NHFS-4).Prevalence of diarrhoea among under-five females was higher i.e. 33(15.9%) when compared to under-five males 30(14.5%) which is similar to study done by Sudipta Basa[10]

Majority of the under five children were from nuclear family 235(92.3%) and from joint family 14(5.7%). The majority of population was from urban areas and nuclear family culture was mainly followed in such part of country. It may be due to higher number of nuclear families in our study. A similar study done in Rural Community in the Jordan Valley by Abdelhakeem Okour, Ziad Al-Ghazawi, Muntaha Gharaibeh[11] showed no differences in diarrhoea due to type of family.

Source of drinking water in majority of houses 178(70%) was by municipal tap water followed by bore water i.e 77(30%). Among the 70% of water supplied by Corporation 75% were through corporation Lorries to the respective slums in the corporation council wards. Only 25% of the houses were supplied with regular water supply through taps. In a study done by Katharina Diouf[12], public taps were the most common source of drinking water (29.4%; n=162), which is similar to our study.

Out of 255 study families,136 (53.3%)families were belonging to class IV of Modified Kuppuswamy socioeconomic classification followed by 27(10.5%)%) families were of class V. Majority of children with diarrhea were from lower socioeconomic class with 35 children being affected from diarrhoea from class IV . Diarrhoea was higher in lower socio economic groups. It was found that there is a significant relation between socio economic status and prevalence of diarrhoea. ($p<0.05$) Similar findings were also reported by Sudipta Basa[10] in their study, with maximum number of study subjects 312 (44.8%) belongs to socio-economic class IV followed by class V 203(29.2%) which is statistically significant.

From Table no.2 which shows the environment of study area, the types of houses are mostly Kutcha houses(57%) and about 30% were Semi pucca. Only 13% were pucca houses . The environment around the Kutcha houses was poor with inadequate drainage facilities and the housing floor was in surface with street. About 84% of houses have no sanitary latrines and they are using either sulabh public toilet complexes or open air defecation. 40% of mothers said their family members use the near by play ground for open air defecation. Among 16% of houses having sanitary toilets, only 6% has latrine

with adequate water supply. Refuse disposal by most of households 62% were into garbage pits or cabin .About 88.81% of mothers complained about fly nuisance in their houses and they accepted it was due to improper refuse disposal. In a study done in Turkey[13] it was found that the association between family environment and diarrhoea is statistically significant (median 1.48+-0.12). The association between key health care practices and family environment in prevention of diarrhea .Village-level and township-level care were sought for childhood diarrhea by 67.02% of the caretakers[14].

Conclusion

Diarrhea is still the major killer of children under 5 years of age group, although its toll has dropped by a third over the past decade. It killed more than 1600 children under 5 years of age every day in 2012[15]. Hence, along with creating awareness regarding prevention and control of diarrhoeal episodes there is also a need for supply of safe drinking water and maintenance of clean environment through provision of sanitary latrine and proper disposal of refuse.

Ethical Clearance- Taken from MNR Medical college, Ethical committee

Source of Funding- Self

Conflict of Interest –Nil

(Note to Editor: This study is a part of a larger study of which a part has been published in IJCMPH Volume 6, Issue 7, 2019)

References

1. K.Park. Park's textbook of preventive and social medicine. 21st edition; Bhanot publishers; 2015;pg 236-242
2. KB .Banerjee – National program for control of diarrhoel diseases; Indian J Pediatrics.1985 Sep-Oct ,PMID:4077194
3. Tulika singh; Socio economic status scales updated for 2017; IJRMS 2017 jul;5(7):3264-3267
4. WHO Rajagopan S, Shifmann MA: Guide to simple sanitary measures for control of enteric diseases; WHO 1974 Pg:47-51
5. S.C. Tivari, Y. Saraf, G. Nambiar. Study of diarrhoeal diseases in 0-5 years old children and practices of oral rehydration solution, Bhopal, Madhya Pradesh in Conference Proceedings of the 9 th Asian conference on diarrhoeal diseases and nutrition. Sep 28-30, 2001, New Delhi
6. Mishra CP, Kumar S, Tiwari IC, and Prasad DN: A study on diarrhoea related practices in urban Mirzapur. Indian J Public Health 1990 jan-mar; 34(1):6-10
7. Ahmad Komarulzaman ; Clean Water, Sanitation and Diarrhoea in Indonesia: Effects of household and community factors; NiCE Working Paper; 14-105
8. Ansari MA, Khan Z (2012) An Evaluation of Health Education Intervention on Hygienic Status of Food Handlers in Aligarh; 2:142. doi:10.4172/jcmhe.1000142
9. A.M. Elizabeth and Sherin Raj;impact of bio-social determinants on under 5 morbidity; Health and Population - Perspectives and Issues 35(4), 2012, 176-192
10. Sudipta Basa; Prevalence of Diarrhoea among Under-Five children and Health Seeking Behavior of their Mothers in an Urban Slum of Delhi; Asian Journal of Biomedical and Pharmacutical Sciences, 5(45), 2015, 08-11
11. Abdelhakeem Okour, Ziad Al-Ghazawi, Muntaha Gharaibeh; Diarrhea Among Children and the Household Conditions in a Low-Income Rural Community in the Jordan Valley ;J Med J 2012; Vol. 46 (2):108- 117
12. Katharina Diouf; Diarrhoea prevalence in children under five years of age in rural Burundi: an assessment of social and behavioural factors at the household level; Glob Health Action. 2014; 7: 10.3402
13. Aimee L. Webb,Usha Ramakrishnan,Aryeh D. Stein, Daniel W. Sellen,Moeza Merchant, and Reynaldo Martorell ;Greater years of maternal schooling and higher scores on academic achievement tests are independently associated with improved management of child diarrhoea by rural Guatemalan; Matern Child Health J. 2010 Sep; 14(5): 799–806
14. Turkey: Health ministry – state of mothers and children in turkey
15. WHO (2005), The treatment of Diarrhea, A manual for physicians and other senior health workers , Department of child and adolescent health and development, WHO.pg 9-14

Type of manuscript: Original Research

Comparison of Antibacterial Efficacy of Different Herbal Mouthwashes – An in Vitro Study

Ilakkiya Ezhil[1], Sri Sakthi[2]

[1]Undergraduate Student, Seethe Dental College, Saveetha University, Chennai, [2]Reader, Department of Public Health Dentistry, Saveetha Dental College, Saveetha University, Chennai

Abstract

Aim: To compare of antibacterial efficacy of different herbal mouthwashes

Background: Next to dentifrices, mouthwashes are one of the widely used modality to maintain oral hygiene. Chlorhexidine and Listerine are some of the commonly prescribed mouth rinses, but they come along with many disadvantages. To overcome this, in recent decade, the medical field has turned its attention towards indigenous techniques and medicines. Yet the efficacy needs to match the conventional products. Hence this trial was done to assess the anti bacterial efficacy of different commercially available mouth rinses.

Materials and Method: Three different herbal mouthwashes were taken. Saline was taken as control. 1000 µL of Himalaya herbal mouthwash, K.P Namboodiri herbal mouthwash, Orafrsh mourthwash and saline was pipetted into three cuvettes each . Cuvette was then incubated for 1hour at 37 degree Celsius at microbiology department, saveetha dental college, Nutrient agar was prepared. 10µL of sample was pipetted out from one cuvette and poured into one nutrient agar plate. Metal loop was heated to red hot and sample was streaked using metal loop. Nutrient agar plates was then incubated at 37 degrees Celsius for 24 hours. Agar plates were taken out of the incubator and bacterial colony count was done.

Results: The mean CFU/10 µL of streptococcus mutans in Himalaya herbals complete care mouthwash was 8 CFU/10µL. The mean CFU/10µL of streptococcus mutans in namboodiri's herbal mouthwash was 14.33 CFU/10µL. The mean CFU/10µL of streptococcus mutans in orafresh herbal mouthwash was 17.33CFU/10µL. Saline was compared as a control . The CFU/µL of streptococcus mutans in saline was 58.

Conclusion :The Antibacterial efficacy of different herbal mouthwash shows that Himalaya and namboodiri's herbal mouthwash has significantly antibacterial efficacy against S.mutans. Further research should be made against different organism and different herbal mouthwash.

Keywords*: Herbal, Mouthwash, Micro Organisms, Oral Health, S.mutans*

Introduction

Oral health can directly affect systemic health so prevention and maintenance of oral is very important. Products which are safe, effective and economical are necessary for improving oral health. Microorganisms are the main cause for disease of oral cavity. Use of dentifrice and mouthwash prevent the accumulation of plaque and calculus. Main method for prevention the progression of periodontal diseases is by use of mechanical methods like brushing and flossing. After brushing and flossing, use of mouthwash also help in prevention. Mouthwash can be used in mentally and physically challenged patients but it should be used along with brushing and flossing [1]. Mouthwash is an aqueous solution which is most often used for its deodorant, refreshing and antiseptic property or for control of plaque. Mouthwash contains alcohol, synthetic sweeteners, surface acting agents, coloring agent. Mouthwash contains anti microbial substances and hence proven to be effective in eliminating the microorganisms like streptococcus mutans (S. mutans), Lactobacillus, Enterococcus faecalis (E. faecalis) , Staphylococcus aureus (S. aureus) [2,3,4,].

Most of the commercially available mouthwash like chlorhexidine , Listerine contain alcohol leading

to side effects like brown staining of the teeth, changes in taste sensation, alter the oral mucosa leading to mucosal erosion, parotid swelling in rare cases and sometimes can also causes supra gingival calculus and burning sensation of mouth .The staining property of chlorhexidine can be due to degradation of chlorhexidine and release of parachloraniline, Maillard reaction ,metal sulphide formation with protein denaturation ,precipitation of dietary chormogens . Ethanol present in mouthwash can causes oral and pharyngeal cancer. Toxic metabolites of ethanol are formed from alcohol containing mouth and the concentration was similar to those after alcohol consumption. Mouthwashes which contain alcohol have also decreased the hardness of composite and resin restoration and also have altered the color of the composite restoration when it is used for a long time. Xerostomia can also be causes by alcohol present in mouthwash. Alcohol containing mouthwash is contraindicated in children as they can be toxic and even lethal if swallowed in large amounts. Sodium lauryl sulfate (SLS) is a chemical compound present in certain mouthwashes that has been proved to cause many health problem such as menopausal syndrome, premenstrual syndrome (PMS), decreased male fertility and also breast cancer .Benefit of alcohol in mouthwash is not yet scientifically proven.[5,6] Fluoride containing mouthwash is not recommended for children below 6 years because of the risk of fluoride ingestion .

New age medicine is most popular nowadays; new age medicine includes uses of herbal products. Herbal products have lesser side effects than others. Current research indicate that the polyphones, being secondary metabolites, are present in rich amount in various plants . Many of them possess antioxidant, anti-inflammatory, low antibacterial resistance and several others therapeutic properties than chlorhexidine mouthwash [4].

Mouthwash has been used for centuries for both medical and cosmetics purpose. Mouth rinsing was first described in Indian (Ayurveda) and Chinese medicine around 2700 BC. Ancient Indians and Chinese thought decay of the teeth was caused by worms and treatment included powder, tablet or ointments of various mixtures that contain different herbs, minerals, and esoteric agents like mouse bones. The Egyptians used honey, goose fat, cumin, and ochre for rinsing the mouth. Greeks recommended the uses of salt, alum, vinegar, leaves of olive tree, milk, pomegranate seed, and wine for rinsing the mouth. Tooth paste and mouth wash was first invented by Romans they used human urine in mouthwash and paste. Till 18 century urine was added in paste and mouthwash due to its high ammonia content [6 7]. At present there are several herbal mouthwash made out of neem, miswak, pomegranates extracts, papaya extract, clove, basil, lemon grass oil, peppermint , turmeric [4,8].

Use of herbal mouthwash is both promotive and preventive when used. In this method various plant and there extract are used to treat disease and to maintain good hygiene. Natural plants like neem ,clove, tulsi , jyestiamadh, pudina, triphala, ajwain and more plants can be used either as whole single herb or in combination . Herbal products have been scientifically proven to be safe and effective medicine against various oral health problems like gingivitis, periodontitis , halitosis, mouth ulcers and preventing tooth decay. The major strength of these natural herbs is that their use has not been reported with any side affects till date and by use of a herbal mouth rinse, ingredients which causes halitosis are avoided which itself is one step forward towards better oral hygiene and better health [7].

Streptococcus mutans is a, gram-positive coccus, facultative anaerobic. Main stains of S.mutans were isolated from the oral cavity .This microorganism was first described by J Kilian Clarke in 1924. S. mutans is stongly associated with dental caries and the primary causative agent [8].

Hence the aim of the study is to compare the antibacterial efficiency of different commercially available herbal mouthwash - An in vitro study.

Material and Method

Study design: In vitro, microbiological analysis

Inclusion criteria: Herbal formulations available in the market under mouth rinse category were to be included in the study.

(An online search was conducted to find out the commercially available herbal mouth rinse preparations, a total of 10 products were identified, of which 3 were selected for this study)

Exclusion criteria:

Any mouthwash containing alcohol, Chemical constituents as in conventional mouth rinses and fluoride containing mouthwashes were excluded from the study.

Products tested and composition

1) Namboodiri herbal mouthwash

K.P.Namboodiri'S herbal fresh mouthwash ingredients are as follows:

- Sorbitol,
- Licorice extract,
- polysorbate 20,
- Thymol,
- Tea,
- tree oil,
- extracts of clove,
- ginger,
- nutmeg,
- Cardamom.

2) Himalayan herbal complete care miswak and pomegranate mouthwash(Manufactured by the Himalaya Drug Company Makali, Bangalore 562123 (India)

Himalaya herbal complete care ingredients are as follows:

- Salvadora Persica extract ,
- punica granataum fruit extract ,
- Melisa Azadirachta leaf extract ,
- Sorbitol, citric acid.

3) Orafresh mouthwash - manufactured by charak

Orafresh Mouthwash Ingredients are as follows:

- Camellia sinensis 100mg,
- Triphala 100mg,
- Piper cubeba 70 mg,
- Melisa azadirachta 60 mg,
- Acacia catechu 40 mg,
- Mentha spicata 75 mg,
- Purified alum 50 mg,
- Eucalyptus globulus 5mg.

4) saline

Fig1: different herbal mouthwash

Armamentarium:

- Cuvette
- Cuvette stand
- Micropipette
- Petri dish
- Nutrient agar
- Spirit lamp
- Metal loop
- incubator
- saline
- Gloves

Method:

Three herbal mouthwashes were taken. 1000 µL of each herbal mouthwash was pipetted into three cuvettes saline was taken as control .1000 µL of saline was pipettes and poured into a cuvette. S. Mutants bacterial suspension was prepared. 10 µL of the prepared bacteria suspension was pipetted out and add to each cuvette. Cuvette was then incubated for 1hour at 37 degree Celsius at microbiology department, Saveetha dental college, poonamalle. Nutrient agar was prepared. 10µLof sample was pipetted out from one cuvette sand poured into one nutrient agar plate. Metal loop was heated to red hot and sample was streaked using metal loop. Nutrient agar plates were then incubated at 37 degrees Celsius for 24 hours. Agar plates were taken out of the incubator and bacterial colony count was done.

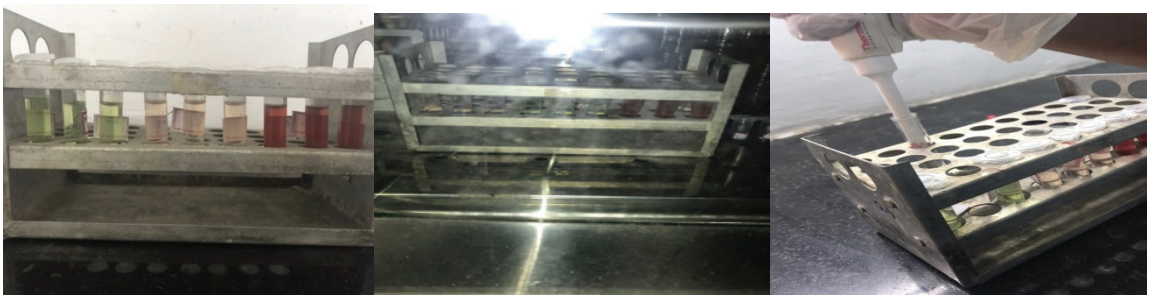


Fig2: depicts methods for identification of antibacterial effect of different herbal mouthwash

Flow chart 1: Method for indentifying antibacterial efficacy of different herbal mouthwash

Statistical Analysis

1) Data was entered in Microsoft excel spread sheet and analysed
2) Numerical data were presented as mean and standard deviation

Result

The CFU/µL of streptococcus mutans in different commercially available herbal mouthwash was given in table 1.

Himalaya herbal mouthwash had less number of bacterial colonies and oral fresh had high number of bacterial colonies, but all the herbal mouthwash has better Antibacterial effect Thant saline.

Table 1: S.mutans colony forming unit per µl of different herbal mouthwashes

Herbal mouthwash	Colony forming units per µL			Mean
	Sample 1	Sample2	Sample3	
Saline	58			
Himalaya	13	7	4	8
Namboodiri's	13	12	23	14.33
Orafresh	21	13	18	17.33

Discussion

In current study Streptococcus mutans showed 8 CFU/10µL in Himalaya herbals complete care mouthwash (miswak and pomegranate) and this result was similar to the results obtained from the study made by Charuta Sadanand Dabholkar, Mona Shah which also showed Himalayan herbal mouthwash exhibited anti bacterial efficacy against S.mutans. Study made by Jonathan E Sam also suggested that Himalaya herbal mouthwash significantly reduced the S.mutans count. Rupali Mahajan.et.al also suggested that Himalaya herbal mouthwash had the same effect of chlorhexidine [9, 10, 11].

Study done by Sanjukta also mentioned the anti bacterial effect of Himalayan herbal mouthwash HiOra R (manufactured by The Himalaya Drug Company, Bangalore, Karnataka, India). It is a herbal preparation, made from a combination of natural herbs with beneficial properties of antiacarcinogenic and anti-plaque due to the presence of Pilu (Salvadora persica) 5 mg, antibacterial, anti-inflammatory, and immunity booster due to Bibhitaka (Terminaliabellerica) 10 mg, antioxidant, antimicrobial, and plaque inhibiting properties due to Nagavalli (Piper betle) 10 mg. Essential oils of Gandhapurataila (Gaultheriafragrantissima) 1.2 mg possess antimicrobial, anti-inflammatory, and analgesic properties. Oil extracted from Ela (Elettariacardamomum) 0.2 mg is a potent antiseptic that is known to kill bacteriaaproducing bad breath. Peppermint satva (Menthaspp.) 1.6 mg acts as a natural mouth freshener. Yavanisatva (Trachyspermumammi) 0.4 mg also has antimicrobial properties. S. persica is one among the most commonly used antibacterial agent in traditional Ayurveda medicine. Its role as an anti-plaque agent has been reported extensively [12]

In the current study Streptococcus mutans showed 14.33CFU/10µL in namboodiri's herbal mouthwash and this result was similar to the result obtained from the study by sham .s butt results suggest that against Streptococcus mutans, K. P. Namboodiri's toothpaste was found to be the most effective followed by Colgate herbal toothpaste. K [6]

In current study orafresh herbal mouthwash showed 17.33 CFU/10µL this herbal mouthwash contain acacia catechu leaf extract which has high levels of Rutin and Epicatechin and the results was similar to the results obtained by Ezhil.I et.al. The results showed that epicatechin has no growth at 25 mg/ml tested against S. mutans and E. faecalis, chlorhexidine as positive control showed no growth in 10 mg/ml. Rutin showed no growth at 50 mg/ml against S. Mutans and at 25 mg/ml against E. faecalis. When compared to chlorhexidine the efficacy was less, but epicatechin and Rutin showed antibacterial activity against S. mutans and E. faecalis with a moderate action. Current research indicates that the polyphenols, being secondary metabolites, are present in rich amount in various plants. [13] .

The results obtained by Rakshana et.al showed that the herbal mouthwash made up of Ocimum sanctum tested showed significant antibacterial efficacy represented in. It showed no growth at 25 mg/ml tested against S. Mutans and 25 mg/ml against S. sanguis, and at 100 mg/ml against L. acidophilus. 10 mg/ml against S. salivations. Agar well diffusion method showed a maximum zone of inhibition against S. Mutans and S. Salivarius (19 mm and 22 mm), respectively [14]

In the current study use of herbal mouthwash was recommended but this was contradictory to the result obtained by Amir Moeintaghavi. This review showed that, when compared to herbal mouthwash , chlorhexidine mouthwashes provided better results in its antimicrobial efficacy against Streptococcus mutans. Further research could study the antimicrobial efficacy of herbal mouth rinse in greater depth and in vivo clinical testing is essential to confirm the in vitro results.[15,16]

There were few limitations associated with this study, colony forming units was only test in this study further study has to be made to identify the zone of inhibition of S.mutans against several herbal mouthwash.

There have been numerous in vitro studies that have investigated the activity of natural plant substances against oral bacteria. These studies have focused on bacteria known to be involved in the aetiology of oral and dental diseases. Early studies have clearly established that a number of herbal substances had potential to be utilized as mouthwash, given their activity against carcinogenic bacteria and those bacteria associated with periodontal diseases. certain plants and herb extracts like clove bud oil, cinnamon bark oil, and papuaamace extracts constituents of these extracts, such as cinnamic aldehyde and eugenol[17,18,19]

Use of different commercial brands of mouthwash, use of different ingredients may differ from study to study hence they affect the results. Presiding the ingredients, concentration, commercial brands can

help the researchers to identifying the main causes of differences in the results. [20]

Conclusion

The Antibacterial efficacy of different herbal mouthwash shows that Himalaya and namboodiri's herbal mouthwash has significantly antibacterial efficacy against S.mutans. Further research should be made against different organism and different herbal mouthwashes.

Ethical Clearance :Nil

Source of Funding : Self

Conflict of Interest : Nil

References

1) EnzoA.Palombo, Traditional Medicinal Plant Extracts and Natural Products with Activity against Oral Bacteria:Potential Application in the Prevention and Treatment of Oral Diseases, Hindawi Publishing Corporation Evidence Based Complementary and Alternative Medicine Volume 2011, Article ID 680354, 15 pages doi:10.1093/ ecam/ nep067.

2 Janan Ghapanchi, The antibacterial efficacy of four mouthwash against S. Mutans and E.fecalis,J pak med assoc ,volume 65, issue number 4 (2015), pages 350 -353.

3 Amit Parashar ,Mouthwashes and Their Use in Different Oral Conditions ,Scholars Journal of Dental Sciences (SJDS) , 2015; 2(2B):186-191

4. Sandhya R ,Herbal Products as Mouthwash – A Review, International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 ,Volume 6 Issue 7, July 2017

5. Dr. N. Nagappan ,Antimicrobial Efficacy of Herbal and Chlorhexidine Mouth rinse - A systematic review ,IOSR Journal of Dental and Medical Sciences (JDMS) ISSN: 2279-0853, ISBN: 2279a0861. Volume 2, Issue 4 (Nov.- Dec. 2012), PP 05-10

6. Bhat SS, Hegde SK, Ratheesh MS. Comparison of Antimicrobial Potential of Various Herbal Dentifrices. Int J Dent Med Res 2014;1(3):41

7. L.G.Vijayaalakshmi et al , Comparison of Herbal Mouth Wash with Conventional Mouth Wash in Use in Reducing Streptococcus Mutans aAn Invitro Study ,J. Pharm. Sci. & Res. Vol. 7(7), 2015, 485-486

8. Salehi P.Comparison of the antibacterial effects of persica mouthwash with chlorhexidine on streptococcus mutans in orthodontic patients ,DARU 2006 14(4) 178-182

9. Dabholkar CS, Shah M, Kathariya R, Bajaj M, Doshi Y. Comparative Evaluation of Antimicrobial Activity of PomegranateaContaining Mouthwash Against OralaBiofilm Forming Organisms: An Invitro Microbial Study. Journ&l of Clinic&l &nd Di&gnostic Rese&rch *: JCDR*. 2016;10(3):ZC65-ZC69. doi:10.7860/JCDR/2016/16478.7475.

10. JonathanE sam ,Comparative Evaluation of antibacterial efficacy of four toothpaste and mouthwashes against streptococcus mutans and lactobacillus :An invitro study.journal of operative dentistry and Endodontics, Julya December 2016;1(2):60-65

11. Rupali Mahajan, Comparison of Efficacy of 0.2% Chlorhexidine Gluconate and Herbal Mouthrinses on Dental Plaque:An in vitro Comparative Study,European Journal of Medicinal Plants 13(2): 1-11, 2016,

12. Bagchi S, Saha S, Jagannath G V, Reddy VK, Sinha P. Evaluation of efficacy of a commercially available herbal mouthwash on dental plaque and gingivitis: A doubleablinded parallel randomized controlled trial. J Indian Assoc Public Health Dent 2015;13p222-227

13. EZHIL I, Lakshmi T. Antibacterial efficacy of Epicatechin and Rutin from Acacia catechu leaf extract against Enterococcus faecalis and Streptococcus mutans a An in vitro study. J Adv Pharm Edu Res 2017;7(1):22-24

14. Rakshanaa TVR, Lakshmi T. Antibacterial efficacy of herbal mouthwash against oral microbes a in vitro assay. JAdv Pharm Edu Res 2017;7(1):31-33.

15. Amir Moeintaghavi, in vitro antibacterial comparison of Chlorhexidine, Persica mouthwash and Miswak extract, the journal of contemporary dental practice 2012;13(2):147-152.

16. Aayush Malhotra,Evaluation of the Antibacterial and Antifungal Properties of Herbal Mouthwash a A Prospective Study International Journal of Enhanced Research in Medicines & Dental Care ISSN: 2349a1590, Vol. 2 Issue 12, Decembera2015.

17. Megalaa, role of herbal leaf extracts in caries

prevention , Int.j count Med Res.2014,1(2):71-78

18. Renuka .s , comparison in benefits of herbal mouthwash with Chlorhexidine mouthwash: a review, Asian journal of pharmaceutical and clinical research,vol10, issue 2, page number 3-7
19. Sowndarya Bet al.2017, Knowledge Attitude and Practice among the Dental PractitionersRegarding the Prescription of HerbalMouthwashes.Int J Recent Sci Res.8(4), pp.16604a16606.DOI: http://dx.doi.org/10.24327/ijrsr.2017.0804.0181
20. A M Khalessi, An in vivo study of the plaque controlefficacy of PersicaTM: a commerciallyavailable herbal mouthwash containingextracts of Salvadora persica International Dental Journal (2004) 54, 279–2814.

Post an Unforeseen Outcome of Serial Volunteering in Clinical Trials, What Does the Affected Community Want?

Irene Sambath[1], Thilagavathi R[2]

[1]MSc Biostatistics & Epidemiology, [2]Faculty of Biostatistics, School of Public Health, SRM Institute of Science & Technology, Kancheepuram, India

Abstract

Background and Aims: A disturbing trend is largely seen in clinical trials that recruit healthy volunteers, where vulnerable low-income groups are over-volunteering, leading to adverse health outcomes. There is a need for an awareness study of the affected rural community that has witnessed an unforeseen outcome of clinical trial participation.

Method: Data on knowledge, attitude, practice and educational materials about clinical trial participation using a semi-structured interview schedule was collected from 192 heads of households from Nagampet Village in Telengana state, South India, that had been making headlines in the news because of the death of one of its residents due to adverse effects of repeated participation in clinical trials. Descriptive and Multivariate analysis of variance was used.

Results: 99% of heads of household were married men with 69.8% belonging to Lower Middle Class and 34.9% less than a primary education. Majority (86.5%) were not aware about clinical trial process. 68.8% opined that family members should reject the individual's voluntary decision about taking part in clinical trials because they fear the death of the only earning member of the family due to any ill-effects from clinical trial participation.

Conclusion: This study brings out what the people want in order to avert another death or another unforeseen event in their village due to clinical trial participation. They want a professional such as teacher, doctor or nurse to explain to them the crucial steps in clinical trial participation during gram sabha and special village gatherings. Well-informed decision-making in clinical trial participation through reliable sources would encourage them to take medical help when in need and not to be lured by middle-men or agents.

Keywords**:** *Serial volunteering; Clinical Trial Participation; Awareness of Clinical Trial, KAP, Knowledge, Attitude, Awareness, MANOVA*

Introduction

Of recently, India's leading newspapers[1], local news channels and review journals[2] have brought to limelight that a growing number of low-income groups are over-volunteering for clinical trials to supplement for their income. Such serial volunteers are an especially vulnerable class of people because of their low levels of education, poverty and rural category[3,4].

Numerous studies, both quantitative[3,5,-10,] and qualitative [4,11,12], have explored the awareness, attitude and perception of general public and trial participants towards clinical research and the circumstances coercing the volunteers to partake in more than one clinical trial. Past studies conducted in North India were from urban and semi urban population and had contrasting results. Two studies[11,13] found majority knew nothing about clinical research while one KAP study[10] found that participants were aware of essential elements of clinical

Correspondence Author:
Irene Sambath,
School of Public Health, SRM Institute of Science & Technology, Kancheepuram 603203, India
e-mail: irene.sambath@gmail.com

trials. Results of all these studies show that healthy volunteers with minimal primary school education, who had taken part in clinical trials atleast once in their lifetime, did not know which trial they had taken part and did not fully participate in informed consent process.

A Korean study[14] replicated the PARTAKE Survey[13] and found a higher percentage of responders from Korea have heard of clinical research compared to India, attributing to high use of internet, media and smart phone in Korea.

The meta-analysis of qualitative studies of Indian clinical trials[9], systematic review of all phase I studies[15], case study of a CRO in Hyderabad[2] and review article of trial compensation in Telengana state[16] reveal that poverty compels many from the marginalised sector to over-volunteer in clinical trials. Similar finding is observed from the qualitative accounts of individuals of a longitudinal study in US[12,15].

What is missing from the past studies is an awareness study of the affected rural community that has witnessed an unforeseen outcome of clinical trial participation. This study aims (1) to explore the knowledge, attitude and practices about participating in clinical trials from this rural community who might be at risk of being lured into clinical trials (2) to find out directly from the people the information/educational materials they would like to have to increase their awareness about clinical trial participation and (3) to find the association between knowledge and attitude about clinical trial participation with socio-demographic variables using multivariate analysis.

Method

Study setting

This specific research was conducted in Nagampet Village of Jammikunta mandal in Karimnagar district located in Telengana state, South India in June 2018. One of the residents had passed away due to adverse effects of repeated participation in clinical trials. This village had been making headlines in the news for the past one year as pharma companies from Hyderabad in Telengana, Bengaluru in Karnataka and other areas attract healthy volunteers from remote areas.

Study design

The study design was cross-sectional and has Institutional Ethics Approval.

Sampling and Participants

The unit of analysis was head of household. Sample size n=221 was calculated with a proportion of 73% people not aware or heard of clinical trials [taken from PARTAKE study[13]], effect size = 0.06 assuming overall knowledge of community people fluctuates between 6% points (ie. 67% and 79%), $Z_{0.05}$ at 95% confidence interval and 5% non-response rate.

The village panchayat office had the list of households N = 406, which formed the sampling frame. Circular systematic sampling methodology was used. The sampling interval k=N/n = 406/221 = 1.8 ≃ 2. Random start from random number table was r = 2. Of the every second household visited, 12 refused, 10 consented but withdrew in the middle of the survey, 5 absent and 2 abandoned households. Data was collected from 192 heads of households after taking informed consent.

Material

The study tool was a semi-structured interview schedule on Knowledge, Attitude, Practice and Educational/Informational materials about clinical trial participation. A pre-validated questionnaire by Burt et al., 2013methodological, and operational reasons. There are indications that the public is unaware or misinformed, and not sufficiently engaged in clinical research but studies on the topic are lacking. PARTAKE – Public Awareness of Research for Therapeutic Advancements through Knowledge and Empowerment is a program aimed at increasing public awareness and partnership in clinical research. The PARTAKE Survey is a component of the program. Objective To study public knowledge and perceptions of clinical research. Methods A 40-item questionnaire combining multiple-choice and open-ended questions was administered to 175 English- or Hindi-speaking individuals in 8 public locations representing various socioeconomic strata in New Delhi, India. Results Interviewees were 18–84 old (mean: 39.6, SD±16.6[13] was used. It was reviewed for completeness, supplemental questions added and checked if it matches with this study's objective. The questionnaire underwent translation and back-translation from English-Telugu-English. Uday Pareek's socioeconomic scale and Kuppuswamy's monthy family income[17] updated for 2017 was used to collect socio-demographic information.

Data analysis

SPSS 16 was used to analyse data. The KAP component in Objective 1 and Objective 2 was analysed using Descriptive analysis. For Objective 3, the association between following variables was conducted using two-way multivariate analysis of variance (MANOVA). $P < 0.05$ was considered a significant difference.

Dependent variable 1	**Total knowledge score**
Dependent variable 2	Total attitude score
Between-group independent variables	Education Occupation Monthly family income Socio-economic status Willingness to participate in clinical trials

Results

Descriptive analysis

99% of heads of household were married men. 69.8% were Hindus. Half of the respondents belonged to Lower caste (50.5%), followed by Artisan caste (17.2%), Schedule caste (17.2%), Agriculture caste (14.1%) and Prestige caste (1%). Only 10.9% were graduates, 54.2% studied upto Middle and High School, and 34.9% had less than a primary education. In terms of occupation, majority were labourers (42.7%) with monthly family income in the range Rs. 6214 – Rs. 10356 (53.6%). Totalling the scores obtained using Modified Kuppuswamy Socio-Economic Status Scale revealed that 69.8% were from Lower Middle Class and 30.2% were from Middle Class.

The mean knowledge score was 22.24 ± 3.291 SD (n=192). Majority (86.5%) were not aware about clinical trial process. Almost all of them (96.9%) expressed that financial gain was the reason for taking part in clinical trials, a means of additional source of income. In the event of any side-effects from taking medicines during clinical trial participation, it is surprising to see that there were respondents who did not consider it important to take medical help. There were five respondents who felt that the volunteers of such clinical trials should keep it discrete and not tell anyone, for the fear of being scolded, rejected by family or treated differently by society.

The mean attitude score was 8.45 ± 1.439 SD (n=192). Though a majority of respondents (91.7%) considered experiments on humans essential to developing new treatments, they (76%) did not favour such experiments on humans. Most respondents (98.4%) said it is important to keep family members informed about clinical trial participation. Contrastingly, more than half the respondents (68.8%) opined that family members should reject the individual's voluntary decision about taking part in clinical trials. 77.6% respondents remarked such experiments are harmful to society. When asked, "given an opportunity, would they take part in clinical trials?" Majority (81.8%) said 'no'.

Regarding materials that educated them about participation in clinical trials, majority preferred to have messages through TV (17.2%), brochure (15.8%), messages in mobile (10.4%) and other means. The respondents wanted local government support in the form of monetary compensation for victims' family (10.9%) and panchayat meetings addressing this issue through expert advice (9.4%).

Two-way MANOVA

Two-way MANOVA is used to find out if there is an interaction between independent variables and the two dependent variables.

Checking correlation

The Pearson correlation for the dependent variables was within acceptable limits for MANOVA outcomes ($r=0.5$).

Checking assumptions

Levene's Test for homogeneity of variance assumption for dependent variables indicated that there is no homegeniety of between-group variance for knowledge ($p=0.001$) and attitude scores ($p= 0.008$). The Box's M value of 66.374 had a non-significant association with a p-value of 0.099. The covariance matrices between the groups were assumed to be equal.

Multivariate outcome

MANOVA was conducted to test null hypothesis that group mean vectors are all equal to one another. Wilks' Lambda is chosen. As shown in Table 1, a significant multivariate effect is obtained for the combined dependent variables of knowledge and attitude in respect of:

Education: λ = 0.868, $F(4,280) = 5.15$, p=0.001, partial eta squared = 0.069. Power to detect the effect was 0.868.

Occupation: λ = 0.852, $F(10,280) = 2.33$, p=0.012, partial eta squared = 0.077. Power to detect the effect was 0.852.

Education*Occupation: λ = 0.842, $F(14,280) = 1.79$, p=0.039, partial eta squared = 0.082. Power to detect the effect was 0.842.

Monthly family income*Willingness to participate in clincal trials: λ = 0.954, $F(2,140) = 3.34$, p=0.038, partial eta squared = 0.046. Power to detect the effect was 0.954.

Whereas, socio-economic status (p=0.194), monthly family income (p=0.269), willingness to participate in clinical trials (p=0.324) were not significantly associated with knowledge and attitude towards clinical trial participation.

Univariate statistics

Both dependent variables differed significantly in knowledge about clinical trial participation in respect of independent variables [education $F(2,141) = 9.886$, p<0.001) and occupation $F(5,141) = 4.64$, p=0.001)]. But not so with repect to attitude score [education $F(2,141) = 0.087$, p=0.917) and occupation $F(5,141) = 4.501$, p=0.775)].

Similarly, both dependent variables differed significantly in knowledge about clinical trial participation in respect of education*occupation*monthly family income $F(1,141) = 5.52$, p=0.02). Both dependent variables differed significantly in attitude score in respect of education*occupation*willingness to partcipate in clinical trials $F(1,141) = 5.069$, p=0.026).

Post-hoc analysis

Education

Since there did not exist equal variances across independent variables, Games-Howell outcome for knowledge and attitude scores is referred to. It indicated that graduates or those heads of households with higher levels of education were more knowledgeable (p<0.001; mean difference between 'graduates & above' and 'primary & below' is 8.32, 95% CI [6.97,9.67] whereas mean difference between 'graduates & above' and 'middle & high school' is 6.5, 95% CI [5.12,7.89]) and had better attitude towards clinical trial participation (p<0.001; mean difference between 'graduates & above' and 'primary & below' is 1.76, 95% CI [0.98,2.55] whereas mean difference between 'graduates & above' and 'middle & high school' is 6.50, 95% CI [0.66, 2.10]).

Occupation

As the hierarchy of occupation increases from low-skilled to professional jobs, there is an increase in knowledge score about clinical trial participation. Those in the Service sector, such as teaching and hospital have better understanding about clinical trial process than labourers. Mean difference between 'service-oriented occupation' and 'labourer' is 1.89, 95% CI [0.86, 2.93]

Table 1: Results of Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Wilks' Lambda	0.028	2.467	2	140	0.000	0.972
Education	Wilks' Lambda	0.868	5.154	4	280	0.001	0.069
Socio-economic status	Wilks' Lambda	0.977	1.659	2	140	0.194	0.023
Occupation	Wilks' Lambda	0.852	2.328	10	280	0.012	0.077
Monthly family income	Wilks' Lambda	0.964	1.304	4	280	0.269	0.018

Cont... **Table 1: Results of Multivariate Tests**

Willingness to participate in clinical trials	Wilks' Lambda	0.984	1.137	2	140	0.324	0.016
Education*Occupation	Wilks' Lambda	0.842	1.797	14	280	0.039	0.082
Monthly family income* Willingness to participate in clinical trials?	Wilks' Lambda	0.954	3.345	2	140	0.038	0.046

Discussion

While there had been studies in the past about awareness on clinical research with sampled population from general public and hospital patients who either had no knowledge[11,13,14] or some knowledge about clinical trial process[10], the very little knowledge that the heads of households of this study possessed about clinical trial participation is from the news that spread through the death of one of their residents in the neighbourhood who had secretly taken part in many clinical trials one after another, which made headlines in local news channels. With this, the villagers developed hatred towards pharma companies/CROs and felt that clinical trial volunteers are not taken care or treated properly by CROs.

This study brings out what the people want in order to avert another death or another unforeseen event in their village due to clinical trial participation. They want a professional such as teacher, doctor or nurse to explain to them the crucial steps in clinical trial participation such as informed consent, side effects, trial compensation, etc during gram sabha and special village gatherings. They would also like to have such information disseminated to them through radio, television and other means.

The multivariate analyses indicated that not all socio-demographic variables differed significantly in respect of a combination of knowledge and attitude towards clinical trial participation. Subsequent univariate analyses showed that there were significant effects for education and occupation in respect of knowledge and attitude scores. Games-Howell post hoc analyses suggested having educational qualification beyond high school and holding better jobs reflected in better knowledge and attitude about clinical trials process and participation.

Conclusion

The very few (13.5%) heads of households knew something about clinical trial process through word-of-mouth. They end up gathering wrongful information about clinical trials, developing negative attitude about it. This is reflected in victims fearing to take support from family or medics. One way to overcome this would be to disseminate the study findings to local village governance that will help in planning and conducting specific educational programs, tailored to appropriate cultural content and language and can be scaled to other rural settings in India with similar demographic and socio-economic characteristics.

Although the poor financial status of the family is the driving factor for the head of the household to discretely partake in clinical trials without his family's knowledge, it is not his socio-economic status that influences his awareness and perception about clinical trials but his education and occupational status. The educated masses from the community can be identified, training provided to them who in turn can educate the villagers, especially about making well-informed decision-making in clinical trial participation through reliable sources, encourage them to take medical help when in need and not to be lured by middle-men or agents.

Ethical Clearance: Expedited Ethics Review Committee approval from School of Public Health, SRM-IST

Source of Funding: Self

Conflict of Interest: Nil

References

1. Pulla P. Lured by blood money: serial volunteers set a disturbing trend. The Hindu. December 2017.
2. Krishna S, Prasad NP. Ethical issues in recruitment of "healthy volunteers": study of a clinical research organisation in Hyderabad. Indian J Med Ethics.

2014;XI(4):228–32.

3. Mondal S, Abrol D. Clinical Trials in India: A systematic review. Institute for Studies in Industrial Development. March 2015.
4. Walker RL, Cottingham MD, Fisher JA. Serial Participation and the Ethics of Phase 1 Healthy Volunteer Research. J Med Philos. 2018 Jan 12;43(1):83–114.
5. Pandey K. Illegal drug trial in Rajasthan: Why are poor treated as guinea pigs, ask rights groups. DownToEarth. April 2018.
6. Foster C, Aisha, Malik A. The Elephant in the (Board) Room: The Role of Contract Research Organizations in International Clinical Research. Am J Bioeth. 2012 Nov 16;12:49–50.
7. Drabu S, Gupta A, Bhadauria A. Emerging trends in contract research industry in India. Contemp Clin Trials. 2010 Sep 1;31(5):419–22.
8. The Lancet. Strengthening clinical research in India. Lancet. 2007;369(9569):1233.
9. Shah JY, Phadtare A, Rajgor D, Vaghasia M, Pradhan S, Zelko H, et al. What Leads Indians to Participate in Clinical Trials? A Meta-Analysis of Qualitative Studies. PLoS One. 2010;5(5):1–9.
10. Sridharan K, Mehta M, Sivaramakrishnan G. Awareness and attitude of general public about clinical trials from a developing country. Am J Exp Clin Res Vol 3, No 1. January 2016.
11. Joshi V, Kulkarni AA. Public awareness of clinical trials: A qualitative pilot study in Pune. Perspect Clin Res. 2012;3(4):125–32.
12. Edelblute HB, Fisher JA. Using "clinical trial diaries" to track patterns of participation for serial healthy volunteers in U.S. phase I studies. J Empir Res Hum Res Ethics. 2015/01/20. 2015 Feb;10(1):65–75.
13. Burt T, Dhillon S, Sharma P, Khan D, MV D, Alam S, et al. PARTAKE Survey of Public Knowledge and Perceptions of Clinical Research in India. PLoS One. 2013 Jul 16;8(7):e68666.
14. Choi YJ, Beck S-H, Kang WY, Yoo S, Kim S-Y, Lee JS, et al. Knowledge and Perception about Clinical Research Shapes Behavior: Face to Face Survey in Korean General Public. J Korean Med Sci. 2016/03/15. 2016 May;31(5):674–81.
15. Johnson RA, Rid A, Emanuel E, Wendler D. Risks of phase I research with healthy participants: A systematic review. Clin Trials. 2017;13(2):149–60.
16. Urooj M, Husain GM, Khan MA, Kazmi MH. Compensation to clinical trial participants in India: A gap analysis. Int J Pharm Investig. 2017;7(2):41–6.
17. Singh T, Sharma S, Nagesh S. Socio-economic status scales updated for 2017. Int J Res Med Sci Int J Res Med Sci. 2017;5(7):3264–7.

Combination Of Walking Practices And Yogic Practices On Low Density Lipoprotein (Ldl) Among Middle Aged Women

James Rathinaraj. S[1]., P. Yoga [2], K. Alaguraja[3], K. Selvakumar[4]

[1]Research Scholar, [2]Assistant Professor, [3]Research Scholar, [4]Research Scholar, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamilnadu, India

Abstract

The purpose of the present study was to investigate the efficacy of combination of walking practices and yogic practices on low density lipoprotein (LDL) among middle aged women. To achieve the purpose of the study thirty school students were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 35 to 45 years. The selected subjects were divided into two equal groups consists of 15 middle aged women each namely experimental group and control group. The experimental group underwent a combination of walking practice and yogic practices programme for six weeks. The control group was not taking part in any training during the course of the study. Low density lipoprotein was taken as criterion variable in this study. The selected subjects were tested on low density lipoprotein was measured through heparin precipitation method. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to combination of walking practice and yogic practices given to the experimental group on low density lipoprotein when compared to control group.

Keywords: *combination of walking practice and yogic practices, low density lipoprotein and't' ratio.*

Introduction

Everyday the human body have received some unwanted food store from the individual habits and its leads to some acute and chronic issues. Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations). To practising yoga regularly it can make you into sound body and sound mind. Yoga is the costless permanents treatment for more diseases, alaguraja, k[1]. It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole, alaguraja, k. et.al.,[2].

One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures), alaguraja, k. et.al,[3]. The science of Yoga Nidra is based on the receptivity of consciousness. When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical, yoga, p. et. al., 2019[4]. Training is a chain process that can be able to attain certain needs of the person's goal, alaguraja, k.[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports, alaguraja, k. et.al.,[6]. Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy, alaguraja, k. et.al,[7]. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person, alaguraja, k.[8]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual, alaguraja, k. et.al,[9]. Today's there is an escalating emphasis on appearing smarter, feeling etter and living longer. In order to achieve these ideals

as, scientific evidence tells us that one of the keys is high fitness and exercises, alaguraja, k. et.al,[10]. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs of the person. It's a scientific process the person must be follow the basic principles yogasana practice[11]. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all, selvakumar, k. et.al,[12]. Yogic action, or inner technique, such as breath control, parthasarathy., s. et.al,[13].

Research Methodology

Selection of subjects

The purpose of the study was to find out the effect combination of walking practices and yogic practices on low density lipoprotein (LDL) among middle aged women. To achieve this purpose of the study, thirty middle aged women were selected as subjects at random. The age of the subjects were ranged from 35 to 45 years.

Selection of variable

Independent variable

- Combination of walking practice and yogic practices

Dependent variable

- Leg Explosive Power

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as a combination of walking practice and yogic practices group (Experimental Group) and control group. The experimental group underwent combination of walking practice and yogic practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following bio chemical variable namely low density lipoprotein was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable low density lipoprotein was measured through heparin precipitation method at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis of the Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the pre and post tests of experimental and control group on Low density lipoprotein (Scores in mg/dl)

Variables	Group	Mean		Degree of freedom	't' ratio
		Pre	Post		
Low density lipoprotein	Control Group	101.11	101.16	14	1.37
	Experimental Group	101.18	100.70	14	15.87*

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on low density lipoprotein were 101.11 and 101.16 respectively. The obtained 't' ratio was 1.37, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on low density lipoprotein were 101.18 and 100.70 respectively. The obtained 't' ratio was 15.87* since the obtained 't' ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in low density lipoprotein. It may be concluded from the result of the study that experimental group improved in low density lipoprotein due to six weeks of combination of walking practice and yogic practices.

Figure-1

Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on Low density lipoprotein

Discussions on Findings

The result of the study indicates that the experimental group, namely combination of walking practice and yogic practices group had significantly improved the selected dependent variable, namely low density lipoprotein, when compared to the control group. It is also found that the improvement caused by combination of walking practice and yogic practices when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on low density lipoprotein after the training period.
2. There was a significant improvement in low density lipoprotein. However the improvement was in favor of experimental group due to six weeks of combination of walking practice and yogic practices.

Source of Funding : Self funding

Conflict of Interest: Nil.

Ethical Clearance

With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research.* 2019; *9,* (10), pp. 73-74.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. *International Journal of Yoga, Physiotherapy and Physical Education.* 2017; *2*(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. *Indian Journal of Applied Research,* 2019; *9,* (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. *International Journal of Advanced Education and Research,* 2019; *4* (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research,2019; 9,* (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. *International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3* (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. *Journal of Information and*

*Computational Science,*2019*; 9*(8), pp. 483-487.

8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 2019; 9* (10), pp. 73-74.
9. Alaguraja, K., & Yoga, P. Analyze of pranayama technique on physiological parameter among rural school students. *Journal of Information and Computational Science, 2019; 9*(8), pp.545-550.
10. Alaguraja, K., Yoga, P., James Rathinaraj, S., R., & Selvakumar, K. A study on yoga intervention on maximal oxygen uptake among stress patient. *Indian Journal of Applied Research,2019; 9* (9), pp. 38-39.
11. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 20019; 9*(10), pp. 73-74.
12. Selvakumar, K., & Yoga, P. (2019). Influence of yogic practice on flexibility among college students. *Indian Journal of Applied Research,2019; 9,* (7), pp. 45-46.
13. Parthasarathy., & Dhanaraj. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. *Indian Journal of Applied Research,2019; 9*(11), pp. 45-46.

Risk Factors Leading to Mental Illness among Patients: A Retrospective Study

Jiji Benny[1], Shivakumara J[2], Thereza Mathias[3]

[1]P G Student -M.Sc Nursing (Psychiatric Nursing),[2]Professor, [3]Professor and HOD, Department of Mental Health Nursing, Laxmi Memorial College of Nursing, A J Towers, Balmatta, Mangaluru

Abstract

Background: Mental disorder is a psychological factor reflected in the behavior, which affect the normal development of a person's culture. The burden of mental health problems is increasing globally. Most mental disorders are result of a combination of several different factors rather than just a single factor. Knowing the risk factors leading to mental illness, may help in future to reduce the incidences of mental illness by taking possible preventive measures.

Aim: The main aim of this study was to determine the risk factors leading to mental illness among patients.

Materials and Method: Case control study design with quantitative non experimental descriptive survey approach was used .Mini mental status examination tool was used to select 100 psychiatric patients based on inclusion criteria and 100 general populations to find the odds ratio. Data was collected using a demographic proforma and risk factors assessment check list.

Results: In biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162), feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

Conclusion: Most of the subjects are having one or other risk factors for developing mental illness**.** Hence we need to take care about risk factors and maintain good lifestyle to promote optimal mental health.

Keywords: *Risk factors of mental illness; psychiatric patients; general population; retrospective study.*

Introduction

Mental health as an adjustment of human being to the world and to each other with maximum of effectiveness and happiness.[1] Mental illness is often disorders of the brain that disrupts a person's thinking, feeling, mood, and ability to relate to others. Mental illnesses are of different types and degrees of severity. Some of the major types are depression, anxiety, schizophrenia, bipolar mood disorder, personality disorders, and eating disorders etc. [2]

The causes of mental disorders are complex and interact and vary according to the particular disorder and individual. Genetics, early development, drugs, a loss of a family members, disease or injury, stress, bereavement, relationship breakdown, physical and sexual abuse, unemployment, social isolation, and major physical illness or disability neuro cognitive and psychological mechanisms and life experiences, society and culture can all contribute to the development or progression of different mental disorders.[3] According to WHO, one in every four people develops one or more mental disorders at some stages in life. In India, the reported rate is 73 per 1000 population.[4]

Corresponding author:
Mr. Shivakumara J
Professor, Department of Mental Health Nursing,
Laxmi Memorial College of Nursing,
A J Towers, Balmatta, Mangaluru
Contact number-09886594682,
Email- chethu1977@gmail.com

The report of District Health and Family Welfare Office of Dakshina Kannada showed that nearly 238 neurotic and 300 psychotic cases of mental disorder were recorded during the year 2007-2008. Among these only 59 neurotics and 77 psychotic cases had approached for the treatment.[5]

The National Institute of Mental Health and Neuro Science (NIMHANS) report shows that in India 70 million people suffer from mental ailments and yet, 50-90% of them are not able to access corrective services due to less awareness and negative attitude or stigma towards mental illness.[6]

Community- based surveys conducted during the past two decades in India showed that the total prevalence of psychiatric disorder was around 5.8% and depression will be one of the biggest health problems worldwide by the year 2020.[7]

Materials and Method

The study was conducted over a period of two years at selected hospitals, Mangalore, India. Case-control study design with quantitative non experimental descriptive survey approach was used. Formal permission was obtained from the director and administrative department of selected hospitals. The researcher used the Mini Mental Status Examination tool for assessing the level of insight of the patients and followed by the researcher was selected 100 psychiatric patients who has the insight and 100 general populations in a similar background and setting by purposive sampling technique based on sampling criteria to find odds ratio of mental illness. The investigator used demographic proforma and risk factors assessment check list to determine the risk factors leading to mental illness.

Mini Mental Status Examination tool :(Folstein MF, Folstein SE and MC Hugh PR, 1987): It is a standardized tool for assessing the level of insight of psychiatric patients. The reliability of the tool was 0.98. It consisted of five characteristics namely, orientation, registration, attention and calculation, recall, language with total number of score 30 and it is graded as (24-30 no cognitive impairment, 18-23 mild cognitive impairment, 0-17 severe cognitive impairment).

Demographic Proforma: This is for assessing the background information of samples. Which consisted of 11 characteristics namely, age, gender, education, occupation, and marital status, types of family, number of children, number of siblings, birth order, duration of illness and number of previous admission in psychiatric unit.

Risk factors assessment checklist: To determine the risk factors leading to mental illness. Tool was prepared on five aspects of the risk factors such as biological factors (36 items), socio economic factors (9 items), environmental factors (5 items), psychological factors (24 items), and personal factors (15 items) with a total of 89 items in five areas with check responses provided as yes or no answers.

The gathered data was analysed using SPSS software system of version 16. Frequency and percentage distribution was calculated to analyse the sample characteristics and risk factors leading to mental illness. The chi-square test was computed to analyse the association of risk factors leading to mental illness with selected demographic variables. Odds ratio was calculated to compare the magnitude of various risk factors for that outcome.

Results

Section –1: Description of Sample characteristics

The study finding shows that highest percentages (27%) of the psychiatric patients were in the age group of 20-29 years in case group where as in control group, highest percentage (30%) of the samples were in the age group of 30-39 years' old. Majority (57%) of psychiatric patients were female where as in control group, majority (60%) of samples were female. Educational status of the psychiatric patients revealed that highest percentage (26%) of patients had studied up to secondary education where as in control group, highest percentage (27%) of them had studied up to secondary education. Majority (53%) of the patients were unemployed in case group where as in control group, highest percentage (38%) of them was unemployed. Most (69%) of the patients were married where as in control group, most (92%) of the patients were married. Majority (72%) of the patients belonged to nuclear family where as in control group, majority (73%) of them belonged to nuclear family. Majority (34%) of the patients had two children where as in control group, majority (44%) of them had two children. Number of the siblings of the psychiatric patients revealed that majority (52%) of the patients had more than 3 siblings where as in control group, majority (63%) had 3 siblings. Orders of birth in the case group, majority (42%) were first born where as in control group,

majorities (35%) were second child. Majorities (26%) of the patients were having mental illness for less than a year. Number of previous admission in the psychiatric unit revealed that majorities (41%) of the patients were admitted once to the psychiatric ward previously.

Section II: Assessment of Risk Factors Leading To Mental Illness

Table 1: Frequency Percentage Distribution of Risk Factors Leading To Mental Illness

Sl. No.	Risk factors	Case (N=100)	Control (N=100)	Chi-square value	df	P- value
		(f)	(f)			
I	**Biological factors**					
1	**Physical deprivation**					
1.1	Poor nutrition	7	0	0	0	0.014
1.2	Sleep disturbance	71	13	69.048	1	0.000*S
2	**Present physical illness**					
2.1	Hypertension	16	28	4.196	1	0.041
2.2	Epilepsy	9	2	4.714	1	0.030
2.3	Thyroid dysfunction	13	2	8.721	1	0.003
3	**Family history of Paternal**					
	Father	19	9	4.153	1	0.042
	Brother/sister	23	9	7.292	1	0.007
	Maternal					
	Uncle	6	1	3.701	1	0.054
	Cousins	8	2	3.789	1	0.052
	Brother/sister	9	0	0	0	0.003
II	**Socioeconomic factors**					
4	Financial problems	32	13	10.351	1	0.001
5	Joint family	24	11	5.853	1	0.016
6	Family migration	5	0	0	0	0.059
III.	**Environmental factors**					
7	Place of residence					
7.1	Slum area	26	10	8.672	1	0.003
8	Adverse influence of mass media (computer, radio, newspaper)	5	0	0	0	0.059
IV.	**Psychological factors**					
9	Stress full life events					
9.1	Love failure	8	0	0	0	0.007
9.2	Feeling of loneliness	22	2	18.939	1	0.000
10	Loss of a significant person					
	Father	18	3	0	0	0.001
V.	**Personal factors**					
11	Chronic smoking	14	1	12.180	1	0.000
12	Family conflict	13	3	6.793	1	0.009
13	Difficulty at school					
13.1	Fear of punishment	5	0	0	0	0.059

Data depicted in [Table 1] shows that the following risk factors are significantly predisposed to mental illness among cases (psychiatric patients) such as poor nutrition (P=0.014), sleep disturbance (P=0.000), hypertension (P=0.041), epilepsy (P=0.030), thyroid dysfunction (P=0.003), paternal-father (P=0.042), brother/sister (P=0.007), maternal-uncle (P=0.054), maternal-cousins (P=0.052), maternal-brothers/sisters (P=0.003), financial problems (P=0.016), family migration (P=0.059), slum area (P=0.003), adverse influence of mass media (P=0.059), work related stress (P=0.069), love failure (P=0.007), feeling of loneliness (P=0.000), loss of significant person (father) (P=0.001), chronic smoking (P=0.000), family conflict (P=0.004), and fear of punishment (P=0.054) along with case and control group.

Section III: Determination of Odds ratio of Risk Factors Leading To Mental Illness

Table 2: Odds ratio of risk factors for mental illness among psychiatric patients and general population n=200

SL. No	Risk Factors			Odds Ratio
		Case (100)	Control (100)	
I	**Biological factors**			
	• Sleep disturbance	71	13	16.385
II	**Socioeconomic factors**			
	• Financial problems	32	13	3.149
III	**Environmental factors**			
	Place of residence			
	• Slum area	26	10	3.162
IV	**Psychological factors**			
	• Feeling of loneliness	22	2	13.821
V	**Personal factors**			
	• Chronic smoking	14	1	16.116

Data in Table 2 shows that in biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162), feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

Section IV. Association of risk factors of mental illness with selected demographic variables.

Table 3: Association of demographic variables with risk factors of mental illness in case and control group n=200

Sl. No.	Demographic factor with Risk Factors	Case(100)		Control (100)	
		Chi-square value	P Value	Chi-square value	P Value
1	Occupation (sleep disturbance)	9.460	0.051*	3.057	0.548
2	Gender (diabetes mellitus)	0.672	0.412	4.001	0.045*
3	Age(hypertension)	9.008	0.016*	0.814	0.937
4	Marital status(hypertension)	15.534	0.004*	1.036	0.309
5	Education(epilepsy)	5.328	0.5036	16.667	0.020*
6	Type of family(epilepsy)	3.846	0.050*	0.548	0.459
7	Marital status(migraine)	9.789	0.048*	0.524	0.469
8	Age (thyroid dysfunction)	17.880	0.001*	2.211	0.697
9	Marital status (joint family)	5.606	0.231	6.238	0.013*
10	Type of family (joint family)	41.009	0.000*	25.612	0.000*
11	Type of family (riot prone area)	3.725	0.054*	1.118	0.290
12	Gender (work related stress)	6.206	0.013*	0.174	0.677
13	Occupation (work related stress)	20.572	0.000*	2.245	0.691

*- significant

Data presented in Tables 3 shows that there is a significant association between the risk factors of mental illness like sleep disturbance, diabetes mellitus (control), hypertension, epilepsy, (both case and control group) migraine, thyroid dysfunction, joint family (both case and control group), riot prone area, work related stress with selected demographic variables. Hence the null hypothesis is rejected and research hypothesis is accepted. There is no significant association found between the rests of the risk factors of mental illness with selected demographic variables.

Discussion

There is a paucity of literature looking to identify the various risk factors leading to mental illness. The present study intended to identify the risk factors leading to mental illness among patients in selected hospitals, Mangalore.

The present study findings are consistent with a longitudinal study conducted on sleep disturbances and depression: risk relationships for subsequent depression and therapeutic implications shows that 90% of patients with depression will have sleep quality complaints. About two third of the patients undergoing a major depressive episode will experience insomnia, with about 40% of patients complaining of problems initiating sleep (sleep onset difficulties), maintaining sleep (frequent awakenings), and/or early-morning awakenings (delayed or terminal insomnia), and many patients reporting all three. Hypersomnia occurs in about 15% of patients. Sleep problems sometimes emerge as a symptom of depression or as a side effect of treatment.[8]

The present study showed that in biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162),

feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

The study findings are supported by an epidemiologic study of sleep disturbances and psychiatric disorders shows that the risk of developing new major depression was much higher in those who had insomnia at both interviews compared with those without insomnia (odds ratio, 39.8; 95% confidence interval, 19.8 to 80.0).[10]

Study on loneliness in the general population: prevalence, determinants and relations to mental health shows that a total of 10.5% of participants reported some degree of loneliness (4.9% slight, 3.9% moderate and 1.7% severely distressed by loneliness). Loneliness declined across age groups. Loneliness was stronger in women, in participants without a partner, and in those living alone and without children. Controlling for demographic variables and other sources of distress loneliness was associated with depression (OR=1.91), generalized anxiety (OR=1.21) and suicidal ideation (OR=1.35).[11]

The present study shows that there is a significant association between the risk factors of mental illness like sleep disturbance, diabetes mellitus (control), hypertension, epilepsy, (both case and control group) migraine, thyroid dysfunction, joint family (both case and control group), riot prone area, work related stress with selected demographic variables. Hence the null hypothesis is rejected and research hypothesis is accepted. There is no significant association found between the rests of the risk factors of mental illness with selected demographic variables.

The study findings are supported by a study on relationships of occupational stress to insomnia and short sleep in Japanese workers shows that in men, high occupational stresses were significantly associated with insomnia, especially a high level of Effort Reward Imbalance (defined as the presence of high effort and low reward), had a remarkably higher odds ratio. In women, high occupational stresses were significantly associated with insomnia as well. High occupational stresses were significantly associated with short sleep in men. However, in women, only Effort Reward Imbalance showed a significantly association with short sleep.[12]

Conclusion

Most of the samples are having one or other risk factors for developing mental illness**.** Some of the most relevant risk factors are sleep disturbance, financial problems, slum area, feeling of loneliness, chronic smoking etc. Hence we need to take care about these risk factors and maintain good lifestyle to promote optimal mental health.

Financial support and sponsorship- NIL

Conflicts of Interests- There are no conflicts of interests

Ethical Clearance: obtained from Institutional Ethics committee of A J Ethics committee, Mangalore.

References

1. Sreevani R. A guide to mental health & psychiatric nursing. 3rd ed. Jaypee Brothers Medical Publishers (P) Ltd. p. 1.
2. Department of Health. Australian Government. What is the mental illness? [Online]. May 2007. Availablefrom:URL:http://www.health.gov.au/internet/publications/publishing.nsf/Content/mental-pubs-w-whatmen-toc~mental-pubs-w-whatmen-what
3. Chentwitter M. Mental illness is a global crisis. 2017 Oct 26.
4. What is mental illness: mental illness facts? National Alliance of Mental Health. Available from: URL: www.namihelps.org.
5. The District Health and Family Welfare Office, Dakshina Kannada District. Statistics of mental illness of the year 2007-2008.
6. Murali MS. Epidemiological study of prevalence of mental disorders in India. Indian Journal of Community Medicine 2001; 26(4):10-2.
7. Kumar S G,Das A,Bhandary PV, Soans SJ, Harsha K, Kotian MS. Prevalence and pattern of mental disability using Indian disability evaluation assessment scale in a rural community of Karnataka. Indian J Psychiatry 2008 Jan-Mar;50(1):21-30.
8. Franzen PL, Buysse DJ. Sleep disturbances and depression: risk relationships for subsequent depression and therapeutic implications. Dialogues in Clinical Neuroscience 2008; 10(4).
9. Daniel E, Ford MD, Douglas B. Kamerow. Epidemiologic study of sleep disturbances and psychiatric disorders. JAMA Network 1989; 262(11):1479-84.

10. Beutel ME, Eva M, Klein EM, Brähler E, Reiner I, Jünger C, Matthias Michal M, WiltinkJ, Philipp SW, Thomas M, Lackner KJ, Tibubos AN. Loneliness in the general population: prevalence, determinants and relations to mental health. BMC Psychiatry 2017; 17:97.

11. Utsugi M. Saijo Y. Yoshioka E. Horikawa N. Sato T. Gong Y and Kishi R. Relationships of occupational stress to insomnia and short sleep in Japanese workers. Occupational Stress and Sleep 2005; 28(6): 728-35.

A Cross Sectional Study to Assess the Impact of Knowledge, Attitude and Practice (KAP) of Parents on Immunization Coverage of their Children

Juny Sebastian[1], Gurumurthy Parthasarathi[2], Mandyam Dhati Ravi[3]

[1]Lecturer, Department of Pharmacy Practice, JSS College of Pharmacy, JSS Academy of Higher Education and Research, Mysuru, Karnataka, India, [2]Director, Pharmacovigilance and Clinical Trials, Botswana Medicines Regulatory Authority, Gaborone, Botswana, [3]Professor, Department of Department of Pediatrics, JSS Medical College and Hospital, JSS Academy of Higher Education & Research, Mysuru, Karnataka, India

Abstract

Background: Many studies proved that, parents' knowledge on the risks and benefits of vaccination is directly proportional to the attitude and practice in immunizing their children. As parents are the decision makers, their KAP towards vaccination play a major role in achieving adequate immunization coverage of the community.

Objective: To assess the impact of parent's KAP on immunization coverage of their children.

Method: A cross sectional study enrolled parents of children aged 2-5 years visiting the pediatric department of JSS Hospital, Mysuru. A validated KAP questionnaire in local language was used as the study tool. Median split method was used to categorize the parent's KAP into adequate and inadequate. Statistical analysis was performed using independent t-test and One Way ANOVA.

Results: The mean KAP score of the study population was 15.25 and 56.54% (n=95) of them scored more than the mean KAP. The adequate KAP score was observed among 51.19% of the study population and 48.81% had inadequate KAP scores. The study identified a statistically significant association between the KAP scores of the parents and the immunization coverage of their children. Significant association was also observed between the KAP scores and factors such as number of kids, place of stay , educational and socioeconomic status of the parent.

Conclusion: It is important to understand the KAP of parents towards immunization of their children and develop and implement suitable interventions/strategies to improve the immunization coverage.

Key words: *Immunization coverage, Impact of education, Knowledge Attitude and Practice, Parental KAP, Vaccination*

Introduction

Immunization prevents 2-3 million deaths globally and an additional 1.5 million deaths could be avoided if the global immunization coverage improves.[1,2] With the exception of safe water, no other modality, have had such a contributing effect on population growth and reduction in mortality.[2] Globally, the number of infants missing basic vaccines were estimated as 21.8 million.[3]

Though there is slight improvement in the immunization coverage in recent years, still India, have 7.4 million unimmunized children and is responsible for more than five lakh deaths annually.[4] According to the United Nations International Children's Emergency

Corresponding Author:
Dr Gurumurthy Parthasarathi
Director, Pharmacovigilance and Clinical Trials,
Botswana Medicines Regulatory Authority, Gaborone,
Botswana, Phone number: + 267 73 016 202
E-mail: partha18@gmail.com

Fund and National Family Health Survey-4 (NFHS-4), the percentages of children fully vaccinated between the age groups of 12 to 23 months were only 62% in India and 55% in one of the south Indian state, Karnataka.[5,6]

Lack of awareness on benefits of vaccination and completion of vaccination schedule, wrong ideas on vaccination, child sickness, cultural diversity and conflicting priorities of parents and Adverse Events Following Immunizations (AEFIs) are some of the important barriers for India to lag behind in immunization coverage.[3] Another important reason for vaccine hesitancy among the parents is anti-vaccine movements, which encourage them to refuse vaccination for their children and lead to a reduction in the expected herd immunity.[7] Previous studies proved that the parents' knowledge on the risks and benefits of vaccination will directly influence the attitude and practice in immunizing their children.[8] This study was conducted to assess the impact of knowledge, attitude and practice (KAP) of parents on the immunization coverage of their children.

Materials and Method

This cross sectional study was conducted over a period of six months at the pediatric department of Jagadguru Sri Shivarathreeshwara Hospital, Mysuru, Karnataka, India. Ethical clearance was obtained from institutional human ethics committee before the commencement of the study. Study enrolled either of the parents of children aged between two to five years visiting the study site for any reason and who are able to provide the immunization card to the researcher. Eligible parents were counseled and enrolled in to the study after taking the informed consent.

Validated self-administered KAP questionnaire[9] was used as the tool to collect the data from the enrolled parents. If the child had received all immunizations required until the age of two as per the immunization card was classified under 'complete immunization' and others were under 'partial immunization'.[10] KAP questionnaire scoring was done by allotting zero and one point for each incorrect and correct answer respectively. Median split method was used to categorize the parent's KAP into adequate and inadequate.[9,11] Parents having an aggregate KAP score lower than 17, the calculated median, were categorized under inadequate KAP on immunization. Independent t test and one-way ANOVA were performed wherever necessary. *P* value of <0.05 was considered statistically significant with 95% confidence interval.

Results

From the total 168 parents enrolled in the study, 57.14% were males, 80.95% were from the rural area and 37.50% belonged to upper middle socioeconomic class. Mean age of the fathers and mothers enrolled in this study were 32.7 5.58 and 27.9 5.86 years respectively. Among the study population, 80.95% completed the vaccination schedule of their children as per the age of two years.

Knowledge Domain

The mean knowledge score of the study population was 9.79, which was 65.2% of the total score. The knowledge (11.61) level was high among the parents who had two children whereas the knowledge (5.84) scores were less among the parents having three children. People living in urban residential area (15.59) and the parents who were graduates or postgraduates (19.0) had better Knowledge scores when compared to others.

Practice domain

Among the study population, partial immunization coverage was identified in 19.05% of the study population. Various reasons for non- completion of immunization schedule was news about AEFIs [n=16(09.52%)], child sickness [n=08(04.76%)], child receiving many injections [n=08(04.76%)], forgetfulness [n=02(01.19%)] social or religion reasons/ lack of transport facilities / non availability of vaccines [n=01 (0.59%)each] and there was no specific reason among 02.97% of the study population.

Attitude Domain

Only 82.92% of population answered that they support immunization program of the country and 23.80% answered that they do not recommend immunization to others. Also, 82.15% of parents answered that they are favoring the immunization program of the country.

KAP Scores of study population

The mean KAP score of the study population was 15.25 and 56.54% (n=56.54%) of the study participants scored more than the mean KAP. The adequate KAP score was observed among 51.19% of the study population, whereas 48.81% had inadequate

KAP scores. 68.45% of parents who completed the immunization schedule had adequate knowledge and 31.54% of the parents who completed the immunization schedule had inadequate knowledge. The adequate KAP score was observed for the parents whose children completed the vaccination schedule [80.35%(n=135)] as per their age where as very low level KAP [07.73%(n=13)] was observed among the parents whose children didn't complete the schedule. KAP scores of the study population are presented in table I. There was statistically insignificant difference in the KAP scores of both parents, where as a significant association was identified between the KAP scores and the number of children, place of stay and the immunization status of the children (table II).

Table I: KAP scores of study population

Particulars		Mean Knowledge Score ± SD	Mean Practice Score ± SD	Mean Attitude Score ± SD
Parent Enrolled	Father	9.7±4.69	2.4±1.05	3.3±1.39
	Mother	9.9 ± 4.69	2.3±1.03	3.1±1.37
Age of the parent	21–30 years	9.01±4.70	2.41±1.03	3.32±1.37
	31-40 years	9.58 ±4.70	2.05±1.06	2.85±1.40
	41-50 years	13.47±4.66	2.9±1.03	3.85±1.37
Number of children	One child	9.2 ±4.67	2.6 ±1.03	3.67± 1.37
	Two children	11.61±4.71	2.62±1.03	3.54±1.36
	Three children	5.84 ±4.66	0.84±1.06	1.0±1.41
Place	Rural	8.62 ±4.75	2.43±0.96	3.45±1.28
	Urban	10.07±4.67	2.33±1.05	3.14 ±1.39
Educational status	Graduate or post-graduate	12.2 ± 4.72	2.88±1.03	3.91±1.36
	Intermediate or post high school diploma	12.27±4.80	2.81±0.98	3.72±1.30
	High school certificate	8.83±4.70	2.35±1.04	3.75±1.38
	Middle school certificate	5.5±4.72	1.5±0.97	3.0±1.33
	Primary school certificate	6.74±4.67	1.53±1.05	1.63±1.39
Socioeconomic Class	Lower	09.0	1	1
	Lower middle	7.73±4.67	1.57±1.03	2.16±1.37
	Upper Lower	8.32±4.70	2.32±1.04	3.27±1.40
	Upper Middle	11.36±4.67	2.87±1.03	3.87±1.37
	Upper	13.0 ± 4.70	2.77± 0.95	3.66 ±1.27
Status of immunization	Complete Immunization	11.16±4.68	2.92±1.03	3.86±1.37
	Partial Immunization	5.69 ±4.66	1.21±1.05	0.64±1.41

Table II. The relationship of KAP and various parent related factors

Particulars		Mean Total Score ± Standard Deviation	*P* Value
Parent Enrolled	Father	15.32 ± 5.89	*.349*
	Mother	15.38 ± 6.80	
Age of the parent	21–30 years	14.78 ± 6.28	*.001*
	31-40 years	14.49 ± 6.33	
	41-50 years	20.23 ± 6.29	
Number of children	One child	15.59 ± 6.42	*.001*
	Two children	17.78 ± 6.29	
	Three children	7.68 ± 6.30	
Place of residence	Rural	14.50 ± 6.57	*.040*
	Urban	15.55 ± 4.88	
Educational status	Graduate or post-graduate	19.0 ± 6.31	*.001*
	Intermediate or post high school diploma	18.81± 6.30	
	High school certificate	14.94 ± 6.31	
	Middle school certificate	10.0 ± 6.22	
	Primary school certificate	9.91± 6.28	
Socioeconomic Class	Lower	9.00 ± 5.9	*.001*
	Lower middle	11.46 ± 6.24	
	Upper Lower	13.91 ± 6.26	
	Upper middle	18.11 ± 6.32	
	Upper	19.44 ± 6.30	
Status of immunization	Complete immunization	17.41 ± 5.11	*.001*
	Partial immunization	7.54 ± 0.55	

Discussion

The result of this study was similar to the findings of studies from various parts of the world.[7,11-14] Almost half of the enrolled study population had adequate knowledge on immunization. The percentage of parents in our study who knew that the vaccination prevents disease was 91.1% and a similar result was obtained from a study conducted in Pakistan (94%).[15] Studies from other Asian countries also had similar findings on knowledge of vaccination.[11,14] The study population was immunizing their children as a routine practice however their knowledge that the vaccination improves

the child's immunity against a particular Vaccine preventable diseases (VPD) was very less among the study population. One of the reasons for incomplete vaccination was the news about the occurrence of VPD even after the vaccination[15] that make them feel that the vaccine administered through EPI are not effective hence vaccination is not important.

History of severe allergic reaction during the previous dose of vaccine or to a component of vaccine is the only contraindication applicable to all vaccines.[15] The study participants, only 19.0% answered that any acute illness was a contraindication for vaccination and the remaining couldn't answer the question, similar to other published studies.[11,16] Only 65.5% of the parents answered that government provides many vaccines freely to Indian citizens, the others considered the consultation fee charged at the hospitals were the cost of the vaccinations.

The immunization status was categorized as complete vaccination among 75% of our study population and the finding is almost in line with other studies from other parts of India also categorized 78% of the children under the category of complete immunization.[10,13] In a study from Iraq, only 56.3% of the children were considered to have received complete immunization, the difference in the percentage may be due to the cultural and political situation in the country.[4,11]

Percentage of parents (82.15%) favoring the immunization program and recommending the vaccination to others (83.92%) was less in our study compared to an Iraqi study, where 94% and 96% of parents favoring the immunization program and recommending the vaccination to others respectively.[11] In a studies from Pakistan and Saudi Arabia, 57.7% and 89.3% of parents respectively recommended the vaccination to others though 96% and 100% respectively favored the vaccination program.[14,17] The difference in the attitude pattern could be related to the environmental and socioeconomic status prevailing in each of these countries.[11] There are studies published that describes the influence of religion on parental decision on vaccination as an excuse for non-vaccination.[18,19] However the current study couldn't assess the influence of religion on vaccination coverage, as there were no sufficient representative sample from different religion.

Previous studies conducted couldn't find a statistically significant association between the education status and socio-economic background of the children with the immunization coverage whereas our study showed a statistically significant correlation of KAP with educational status and socioeconomic background of parents.[17] Parents with more than three children had shown a better KAP scores in a previous study from Saudi Arabia.[20] Low education and low socio economic status might have contributed for the difference in the KAP score observed in our study when compared to the study from Saudi Arabia.[19] Similar to our study, the previous studies also found a significant association between the knowledge about vaccination and the completeness of immunization schedule.[11] This clearly describes the need of education to parents to improve the immunization coverage of the community. Study population answered that side effects of vaccines were one of the major reason for non-administration of vaccine in our population similar to previously published literatures.[20]

Conclusion

KAP of the parents about immunization is the key for the immunization coverage of their children. It is important to understand the KAP of parents towards immunization of their children and develop and implement suitable strategies to improve the immunization coverage. The strategies can vary based on the culture and education of the population. Personalized education to the parents may be useful in improving the KAP and there by the immunization coverage.

Limitations: The study represents the KAP of the parents who were literate. The illerate people were excluded from the study as the tools used for the study was a self administered questionnaire.

Acknowledgement: Authors would like to thank the faculty and students and administrators of department of pediatrics, and clinical Pharmacy, JSS Hospital for their support during study

Conflict of Interest: None

Funding Source: None

References

1. Global manual on surveillance of adverse events following immunization. World health organization 2014. [cited 2018 Jan 8].Available from www.who.int

2. Plotkin SL, Plotkin SA. "A short history of vaccination," In: Plotkin S, Orenstein W, Offit PA. Vaccines, 5th edition, Philadelphia: Saunders, 2008.
3. World Health Organization (WHO). Progress in global measles control and mortality reduction, 2000–2007, Weekly Epidemiological Record, Geneva: WHO, 2008: 83(49):441–448.
4. Vashishtha VM, Kumar P. 50 years of Immunization in India: Progress and Future. Indian Pediatrics 2013; 50:111-8.
5. Chitkara AJ, Thacker N, Vashishtha VM, Bansal CP, Gupta SG. Adverse Event Following Immunization (AEFI) Surveillance in India: Position Paper of Indian Academy of Pediatrics (2013) Indian Pediatrics 50: 739-741
6. National family health survey 4 (2015-16), India. Database that strengthen India's demographic and health policies and programmes [internet] [cited 2017 September 12]. Available from http://rchiips.org/nfhs/nfhs4.shtml
7. Smith PJ, Humiston SG, Marcuse EK, Zhao Z, Dorell CG, Howes C, et al. Parental delay or refusal of vaccine doses, childhood vaccination coverage at 24 months of age, and the Health Belief Model. Public health reports 2011;126(2):135-46
8. Nath B, Singh JV, Awasthi S, Bhushan V, Kumar V, Singh SK. KAP Study on Immunization of Children in a City of North India – A 30 Cluster Survey. Online J Health Allied Scs. 2008;7(1):1-6
9. Sebastian J, Parthasarathi G, Ravi MD. Development of Knowledge, attitude and practice questionnaire of parents towards vaccination: Process, Challenges and Solutions. Indian Journal of Pharmacy Practice 2017; 10(2):115-120
10. Al-lela QB, Bahari MB, Al-Qazaz HK, Salih MRM, Jamshed SQ, Elkalmi RM. Are parents' knowledge and practice regarding immunization related to pediatrics' immunization compliance? a mixed method study. MC Pediatrics 2014;14:20:1-7.
11. Al-lela OQB, Al-Qazaz H K, Bahari M B, Elkalmi RM, Jamshed MQ, Salih MRM (2014) Are parents' knowledge and practice regarding immunization related to pediatrics' immunization compliance? a mixed method study**.** BMC Pediatr 14: 20.
12. Ankushe RT, Doibale MK, Gaikwad AK, Mohan K, Kumar P, Kuril BM et al. Is mothers' knowledge and practice regarding childhood immunization compliant with immunization completeness?. Int J Community Med Public Health 2015; 4(3):775-780
13. Qidwai W, Ali SS, Ayub S, Ayub S. Knowledge, attitude and practice regarding immunization among family practice patients. Jduhs 2007;1 (1): 15-19
14. How vaccines strengthen your babies immune system. [internet] 2017 Jul 17 [cited 2018 Dec 12] Available from: https://www.cdc.gov/vaccines/parents/infographics/strengthen-baby-immune-system.html
15. Abate HJ, Bakir J, Caruso M, Chiossone A, Debbag R, Firpo V, Gentile A, Lucion MF (2011) Delayed vaccine schedule and missed opportunities for vaccination in children up to 24 months: a multicenter study. Arch Argent Pediatria 109(3):219–225.
16. Athira A, Doddayya H, Lakshmi MDT, Naresh N, Sarfaraz Md, Sree Anoohya R, (2017) Assessment of knowledge, attitude and perception among mothers towards immunization in a tertiary care teaching hospital. Int J Community Med Public Health 4(9): 3429 – 3435.
17. Pelcic G, Karacic S, Mikirtichan GL, Kubar OL, Leavitt FJ, Tai MC et al. Religious exception for vaccination or religious excuses for avoiding vaccination. Croat Med J 2016; 57(5): 516 -21
18. Shrivastwa N, Gillespie BW, Kolenic GE, Lepkowski JM, Boulton ML. Predictors of vaccination in India for children aged 12-36 months. Vaccine 2015; 33(4): D99-105
19. Al Hatim RF, Alrashidi AA, Alsubhi RA, Bukhari MA ,Habib RF, Saadawi DW, Saleh A. Assessment of knowledge, attitude and practice of parents towards immunization of children in Saudi Arabia, 2018. The Egyptian Journal of Hospital Medicine 2018; 71(2): 2585-89.
20. Vonasek BJ, Bajunirwe F, Jacobson LE, Twesigye L, Dahm J, Grant MJ, et al. Do Maternal Knowledge and Attitudes towards Childhood Immunizations in Rural Uganda Correlate with Complete Childhood Vaccination? PLoS ONE 2016;11(2): 1-16

Estimation of Copper and Zinc Levels in Oral Cancer Patients

Leya Mathews[1], Saveetha[2], Shyamala Chandrasekar[3]

[1]BDS student, Saveetha Dental College, [2]Senior Lecturer, Department of Oral Pathology, Saveetha Dental College, [3]Professor, Department of Orthodontics, Saveetha Dental College, Saveetha Dental College, Saveetha University, Chennai

Abstract

Backgroun: Prevalence of oral cancer is high in India , other Asian countries, Brazil and France. Micro nutrients like copper and zinc are increasingly recognized for their role during the onset and progression of pre malignant and malignant oral lesions.

Aim -To determine serum levels of copper and zinc among oral cancer patients

Objective -To estimate and compare the serum levels of copper and zinc in healthy and cancer patients and to derive Cu/Zn ratio, to establish a possible relationship between micro nutrients and oral cancer.

Materials and Method - 25 patients clinically diagnosed with oral cancer (study group) and 25 healthy individuals (control group) in the age group of 30-50 years were included in the study. Blood samples were collected and serum copper and zinc values for both cancer and control group were estimated using ERBA CHEM 5 semi auto analyser. Mean and standard deviation of serum copper and zinc values for both the groups were determined and compared. .

Results- Significantly higher values ($p < 0.04$) were noted for serum copper level (mean value 249.39 ± 58.3 µg/dl) for study group compared to control group (123.95 ± 16.2 µg/dl). However there was no significant difference in serum zinc values between both the groups.

Cu /Zn ratio of 1.43 and 2.86 for control and study group respectively was derived from the above estimated value

Conclusion -Mean serum copper value in study group was significantly higher than in the control group mean may be considered as a biological marker for oral cancers.

Keywords : *Zinc, copper , oral cancer , serum levels, micronutrients*

Introduction

Oral cancer is one of the most prevalent and 6th most common type of cancer in the world [1]. Prevalence of oral cancer is higher in, India, Asia Brazil and France compared to other countries globally. Incidence and distribution vary by age, ethnic group, culture and lifestyle associated factors [2]. Alcohol, viruses, genetic mechanisms, candida, and chronic irritation have modifying effects on the etiology of oral cancer .Tobacco can cause genetic damage and can lead to development of oral cancer. Smoking and alcohol consumption are major risk factors [3]. It mostly affects the tongue, buccal mucosa, gingivae, lips, and palate [4] .It was also found that higher intake of fruits and vegetables had lower risk of oral cancer but an unbalanced diet has been related to an elevated risk. [5]

Clinical and histopathological examination of oral lesions plays a major role in the diagnosis of oral cancer. In addition, it has been reported that levels of trace elements or micro nutrients such as copper, zinc, iron

Corresponding author:
Saveetha
Senior Lecturer, Department of Oral Pathology,
Saveetha Dental College

and selenium are altered in serum, plasma and tissues of pre malignant oral lesions [2] [6]

Copper, zinc, iron are chemical elements required in minute quantities for vital biochemical reactions such as free radical formation and cellular homeostasis[2]. The enzymes of trace elements are an important part of certain biological and chemical reactions. [7]. Zinc is also an important constituent of biological bio membranes and contributes to membrane stability. It modulates activities of ribonucleic acid and deoxyribonucleic acid polymerase enzymes [8, 9].The need of zinc for a healthy immune system, cell division, skin, hair, and muscle growth cannot be overemphasized.

Copper is involved in the release of energy during cell formation of red blood cells, collagen production, and iron absorption.

However, it was found that there is a potential link between trace elements and carcinogenesis. The ratio of copper to zinc is also believed to be a reliable biomarker in the development and progression towards malignancy [10]. Copper and zinc are often recognized for their possible role in the prevention and modulation of diseases but recent studies have proved increased level of copper and decreased level of zinc in cancer [11].

The present study was undertaken to evaluate and compare the levels of copper and zinc in the blood serum of normal and patients with oral cancer.

Materials and Method

The sample for the present study consisted of 50 individuals. 25 healthy individuals from the outpatient clinic accepted to participate in the study as controls. 25 patients diagnosed with oral cancer were included as the observational study group from the outpatient department, Oral Cancer Institute of Sabetha dental college. The study was approved by the Institutional Ethical Committee and informed consent was obtained from the patients prior to the blood sample collection. The participants were chosen based on the following inclusion and exclusion criteria. Inclusion criteria included patients diagnosed with carcinoma, in the age group 30 – 50 years, and for control group, healthy individuals with no history of systemic disorders were chosen. Exclusion criteria included immuno compromised adults, patients diagnosed with endocrine disorder, coronary artery disease and infectious diseases like tuberculosis or syphilis. Methodology included collection of 5ml of blood sample under absolute asepsis and transferred to acid washed test tubes .The blood collected was centrifuged at 2500rpm for 15 minutes and preserved in a frozen state until analysis. The samples were then analyzed using ERBA CHEM 5 semi auto analyzer. Serum levels of zinc and copper were assessed with the help of reagents provided.

The data obtained, was statistically analyzed using the SPSS software. Range of values of all the samples for serum copper and zinc were evaluated and grouped (Tables Me, II). Mean and standard deviation for serum copper and zinc of both the groups were determined and compared for statistical significance $p<0.05$ (Table III). Cu/Zn ratio was then derived from the above estimated value.

Results

Analysis of the data revealed that serum zinc values ranged from 60 µg/dl to 119 µg/dl in both the groups. (Table I). However a maximum of 8 samples were in the range of 100- 109 µg/dl in controls , and a maximum of 7 samples were in the range of 90 - 100 µg/dl in the study group. The mean value for serum zinc in control group was 86.64±17.4 µg/dl ,while the serum zinc level in the study group was found to be 85.17±14.98µ/dl (Table III). There was no statistically significant difference in the mean serum zinc values between study and control groups.

Table 1 Frequency table and range of serum zinc values

Zinc serum level observed in the study	No. of samples in cancer study group (n=25)	No. of samples in control group (n=25)
60-69 µg/dl	3	3
70-79µg/dl	2	4
80-89µg/dl	4	5
90-100µg/dl	7	5
100-109µg/dl	3	8
110-119µg/dl	6	0

On the contrary, the serum copper level ranged from 180-340ug/dl in study group while in the control group it

varied from 110-160ug/dl. (Table II). A maximum of 8 samples were in the range of120-129 µg/dl in the control and a maximum of 8 were in the range of 300-339 µg/dl in the study group. The mean serum copper values were found to be higher in study group 249.39±58.3 µg/dl, compared to that of healthy control group 123.95±16.2 µg/dl. (Table III). Mean serum zinc levels showed no changes.

Cu /Zn ratio was1.43 and 2.86 for control and study group respectively.

Table III: Mean values and standard deviation of serum copper and zinc values

Table II a	
Serum copper level in control group	**No of samples (n=25)**
110-119µg/dl	4
120-129µg/dl	8
130-139 µg/dl	5
140-149 µg/dl	4
150-159 µg/dl	4

Table II b	
Serum copper level in study group	**No of samples (n=25)**
180-219µg/dl	6
220-259µg/dl	5
260-299µg/dl	6
300-339µg/dl	8

Trace metals	**Mean Value ± sd in Control Group**	**Mean Value ± sd in Study Group**	**p value**
Zinc	86.64±17.4µg/dl	85.17±14.98µg/dl	0.67
Copper	123.95±16.2µg/dl	249.39±58.3µg/dl	0.04
Cu/ Zn Ratio	1.43	2.86	

p <0.05value

Discussion

Trace elements Copper (Cu), zinc (Zn), selenium (Se) and molybdenum (Mo) are required in small concentration and have important role in many biochemical reactions. They are essential for proper functioning of life supporting processes and are an essential component of biologically active constituents [13, 14]. Copper is found in plasma (90-95%) as part of oxidative enzyme ceruloplasmin [15]. It is also a part of various enzymes like tyrosinase, cytochrome oxidase etc., and participates in oxidative process in cell metabolism. Zinc another micro nutrient is essential for gene transcription and cell multiplication and critical for activation of RNA and DNA polymerase activity. Decreased zinc levels are associated with increased oxidative stress at cellular level [16].

The normal serum copper and zinc levels are 0.6 - 1.6µg/ml and .6 -1.5µg/ml respectively where atomic absorption spectrometry has been used for analysis [17]. Others [10] have reported 114.20±38.69 mg/dl, 64.57±31.54 mg/dl as copper and zinc values respectively in their control sample by means of calorimeter. The values of these trace elements estimated in the present study were performed with ERBA CHEM 5 semi auto analyzer.

Concentrations of copper when exceeds the optimal level turns toxic. It breaks down the DNA strands or modifies the bases and deoxyribose. [12]. Sliwinski et al observed that zinc did not induce DNA damage in normal cells but exerted a protective effect against DNA damaging agents but increased cytotoxic effect on cancer cells[11] . A number of studies have estimated copper and zinc levels in serum, blood and saliva in various carcinomas especially oral squamous carcinoma and have established a positive correlation with the incidence of malignancy. Significant alteration in serum levels of the trace elements have been reported in head and neck cancer, lung and breast cancer [2, 18]. The increased levels of copper and zinc in cancer reported earlier have been 209.85± 160.28 mg/dl, 113.51± 52.30 mg/dl respectively [10] . In the present study, copper showed a significant increase [249.39±58.3µg/dl] in oral cancer group compared to control group [123.95± 16.23µg/dl]. Similar findings have also been reported by Khanna et al, Amitkumar et al, Yunus et al, Ayinam pudi BK, Jayadeep A et al and Shetty SR et al. [2, 6, 10, 17, 19, 20, and 21] they observed increased copper levels in sera of patients in oral pre malignant and malignant patients.

The increased level of serum copper in OSMF patient was attributed by Khanna et al to high copper content in areca nut, the major physiological factor in the pathogenesis of OSMF [17] it initiates fibrin genesis and inhibit collagen degradation. It has also been explained that increase in serum copper levels in cancer patients is a consequence of increased production of copper containing ceruloplasmin an oxidative enzyme which is precipitated by an inflammatory response to cancer or decrease in catabolism by serum ceruloplasmin [16] . Jayadeep et al also suggested that rise in copper levels might be due to increased turnover of ceruloplasmin, a copper carrying globulin with oxidative activity [19] .

Review of literature indicates low serum zinc level in several forms of cancer like cancer of breast, gallbladder, lung, colon and oral cancer [22, 23] . Serum zinc level in a present study did not reveal a similar finding. The serum zinc level among cancer patient in the present study was marginally lower or similar to control group. Contrary to this finding statistically significant decrease in mean serum zinc levels have been reported by various other studies [18, 20, and 24]

Amit kumar et al [6] suggested that zinc deficiency impair protective mechanism designed to protect against DNA damage, enhance susceptibility to DNA damaging agents and ultimately increased risk of cancer

Increased copper zinc ratio seen in oral sub mucous fibrosis (OSMF) and oral squamous cell carcinoma (OSCC) was also noticed in patients with pancreatic cancer, breast cancer, lymphoma etc. Yunus et al concluded that alterations in serum copper, zinc, copper zinc ratio can be used as potential biomarkers in early detection of oral pre cancerous lesion and their malignant transformation to frank cancer at early stages [2].In the present study the ratio was 1.43 in control, and increased to 2.86 in the study group, probably due to increased copper values. Other reports have shown that Cu/Zn ratio was 0.97 in health and 1.10 in cancer patients, but the diff was not statistically significant [17,25].

This study confirms the earlier reports on the possible relation between serum copper level and oral cancer and can be considered as a biochemical marker for oral cancer, but needs further evaluation on a larger sample including patients with oral premalignant lesions.

Conclusion

Trace element copper level in oral cancer patients did

show a significant increase compared to control group. Serum zinc level however did not show any difference between study and control groups. Alterations in serum copper level are suggestive of its important role in oral carcinogenesis and needs further research on larger population.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. Krishnaswamy K , Prasad MP, Krishna TP , Annapurna VV , Reddy GA. A case study of nutrient intervention of oral precancerous lesions in India. Eur J Cancer B Oral Oncol 1995; 31: 41-8
2. Shaikh Mohd Yunus ,Prakash Gadodia,Ritish Wadwani,Namratha N Patil,Vinod Kumar Patil.,Vanita Murgod, Abhishek Singh Nayyar. Estimation and comparison of serum levels of copper,Zinc, Cu/Zn ratio as markers of disease activity in oral submucous fibrosis(OSMF) and oral squamous cell carcinoma(OSCC) patients. Clinical cancer investigation Journal. 2017; 6(1), 51-55
3. Bouquot H,Whitaker SB.Oral leukoplakia rationale for diagnosis and prognosis of its clinical subtypes or phases. Quintessence Int.1994;25:133-40
4. Paul RR , Chaterjee J , Das AK , Cerevera ML, de la Guardia M , Chaudhari k . Altered elemental profile as indicator of homeostatic imbalance in pathogenesis of oral sub mucous fibrosis. Biol Trace elem Res 2002 ; 87:45 -56
5. Winn DM .Diet and Nutrition in the etiology of oral cancer . Am J ClinNutr , vol 61 , pp.437 -445 , 1995
6. Amit kumar, Suchetha Kumar,Dharnappa Poojary, Hiren Darji,Rashmi, K.S.Estimation of serum Micronutrient Levels and The Possible Risk of Oral Cancer And Premalignancy. International Journal of Research in Science Engineering and Technology 2014; vol 13:issue 1,8360-4
7. World Heaith Organisation .Trace elements in human nutrition and health 1996.
8. Cho GS, Han MW, LeeB, RohJL, Choi SH, ChoKJ et al Zinc deficiency may be a cause of burning mouth syndrome, zinc replacement therapyhas therapeutic effects.J Oral Pathol med 2010; 39:722-7
9. ShettyR ,Babu S , Kumar S , Shetty P, Vijay R, Karikal A.. Role of trace elements in oral pre cancer and oral cancer – A biochemical study. J Cancer Res Treat 2013; 1 : 1-3
10. Maryam Baharvand, SoheliaManifar. Reihaneh, Hamed MortaZavi, Siamak Sabour .,Serum levels of ferritin, copper and zinc in patients with oral cancer. Biomedica,l Journal ;2014;37 :331-336
11. Sliwinski T1, Czechowska A, Kolodziejczak M, Jajte J, Wisniewska-Jarosinska Zinc salts differentially modulate DNA damage in normal and cancer cells. CellBiol Int. 2009 Apr;33(4):542-7.
12. TheophandesT ,AnastassopoulouJ.Copper and carcinogenesis . Critt Rev OncolHematol 2002 ;42:57-64
13. Schwartz,M.Rok of trace elements in cancer. Cancer Res.1975 ;35:3481-7.
14. Braverman. ER, Pfeiffercc. Essential trace elements and cancer orthomol Psychiatry 1982 ;11(1):28-41
15. Sham berger RJ.Antioxidants and cancer Se-sex and age adjusted human cancer mortality. Anh Environ_Health 1976;31:231-3
16. Andrews GS. Studies of plasma zinc, copper,cerulo plasmic and growth harmone with special reference to carcinoma of the bronchus J.Clin Pathol 1979;32:(4) 325-33
17. SunaliKhanna,A.C.Udas,G.KiranKumar,S. Suvarna,F.R.Karjodkar,Trace elements (copper,zinc,selenium and molybdenum) as marker in oral submucous fibrosis and oral squamous cell carcinoma.J Trace Elem Med Biol 2013;27:307-311.
18. Vashistha A,Singh.M, Chaudhary.M, Kaur.G, Alterationsinserumlevelofcopper,iron,zinc,vitamin c and lipid profile in patients with oral cancer and oral submucous fibrosis J.Chem.Pharm.Res 2015;7:261-265
19. Jaya Deep.A,Raveendran.P.K,Kannan.S,Naline Kumar K.R,MathewB, Krishnan NM, Serum levels of copper,zinc,iron,ceruloplasmin in oral leukoplakia and squamous cell carcinoma.J.Exp. Clin.Can.Res 1997;16:295-300
20. Jha IN,Singh HB, Prasad V,Serum Copper/Zinc ratio in oral Carcinoma. Indian J.Med.Res.1985;81; 602-6

21. Ayinampudi BK,Narasimhan M,Salivary Copper and Zinc levels in premalignant and malignant lesions J.oral maxilla pathol 2012;16:175-802

22. Margalith EJ,Schenker JG, Chevion M, Copper and Zinc levels in normal and malignant tissues. Cancer 1983;52:8672

23. Estimation of Serum Copper, Zinc and Iron in Patients with Oral Cancer . Keerthika*, Vishnu Priya V, Gayathri.R Saveetha Dental College Chennai . Int. J. Pharm. Sci. Rev. Res. 39(1) , August 2016 , 251-254

24. Varghese I, Suganathan CK, Balasubramaniyan G, Vijaykumar T,Serum Copper and Zinc levels in pre malighnant & malighnant lesions of oral cavity. Oncology 1987;44:224-7

25. Copper and Zinc Level in Oral Submucosal Fibrosis (OSMF) Patients. Srilekha. M Saveetha Dental College. Journal of Pharmaceutical Sciences and Research Vol. 7(8), 2015, 573-574

Prevalence of Black Stains in School Going Children in age Group 6-12 Years

Leya Meriam Mathews[1], Dhanalakshmi Ravikumar[2]

[1]Graduate Student, Saveetha Dental College, Saveetha University, Chennai, [2]Senior Lecturer, Department of Paedodontics, Saveetha Dental College, Saveetha University

Abstract

Introduction: Black stains are extrinsic discoloration in primary dentition that can also occur along with dental caries. It clinically presents as pigmented, dark lines or as an incomplete coalescence of dark dots rarely extending beyond the cervical third of the crown. This has often been a concern of dental aesthetics and its frequent recurrence, makes it necessary to find the causative factor and the treatment needed.

Materials and Method: In this cross sectional study, 93 children aged between 6-12years were examined clinically for the presence of black stains using mouth mirror and dental probe by one examiner. The DMFS / deft index were recorded in children with and without black stains.

Results: In the limited sample size recorded, it was observed that 11 children had black stains. Black stains were also found along with dental caries in 3 children. The p value was 0.85373, found to be insignificant

Conclusion: The prevalence rate of black stains is estimated to be 10% from the sample size, as per data collected, Black stains can occur along with caries but the incidence is less. In conclusion , the results of our study , indicates the prevalence of caries along with the black stains in children within the age group 6-12 years , highlight the need to do further investigations

Keywords : *Stains, intrinsic , extrinsic, iron , children , black stains, caries*

Introduction

Tooth discoloration can be defined as any change in the color, hue or translucency of a tooth due to a cause. It is an altered physical appearance of the tooth which is a common clinical finding and a concern of aesthetics, found more often among the children thereby having significant effects on their personality and self-confidence. There are several causes of tooth discoloration like food, drinks, poor dental hygiene, and medications [1].

Corresponding Author :
Dr Dhanalakshmi Ravikumar
Senior Lecturer , Department of Paedodontics, Saveetha Dental College., Saveetha Institute of Medical and Technical Sciences , Saveetha University , 162 Poonamalle High Road , Chennai 600077, Tamil Nadu, India. Phone :9003821299.
Email : leahmathews23@yahoo.com

Tooth discoloration can vary based on their location, etiology, appearance and composition. Historically, tooth discoloration can be classified, based on their location, to extrinsic, intrinsic and internalized [2]. Intrinsic Discoloration refers to the change that occurs due to the disturbance in the structural composition or thickness of the dental hard tissues. It occurs when the tooth structure is penetrated by pigmented materials, usually during tooth development. Extrinsic discoloration refers to the deposit or stain that occurs on the surface of the tooth or in the acquired pellicle. The origin of the stain might be metallic or non-metallic. Internalized discoloration is the presence of an external stain within the tooth following dental development. It is mostly seen in case of any enamel defects and in the porous surface of dental caries. This stain or discoloration can also be an acquired defect due to tooth wear, gingival recession and restorative materials [3, 4].

A common extrinsic discoloration is the black stain which appears as a dark line or an incomplete

coalescence of dark dots formed on the cervical third of the tooth and following the contour of the gingival margin, firmly attached to the tooth surface. It affects mostly the primary dentition and its prevalence seen in both the sexes [5]. Black stain is a form of dental plaque that covers a great surface of the tooth including the grooves, pits and fissures.

According to Ried et.al, the black pigmentation is considered to be an insoluble ferric compound, most likely a ferric sulfide, which arises from the interaction in the saliva or gingival fluid between hydrogen sulfide produced by the bacteria present in the periodontal environment and iron [6]. The microbiological composition of Black stain is hypothesized to be bacterial strains of Acitnomycetes, Lactobacillus and prevotella melaningenica [7].

The origin of Black stain has been discussed for over a century, since 1890. However, the criteria to diagnose the black stain have still not been established. Shourie used the following criteria for classifying black stain: 1) no line 2) incomplete coalescence of pigmented spots and 3) a continuous line formed by the pigmented spots. Further additional classification by Koch et.al, depending on the size of the spots and the presence of cavitation on the tooth surface, and, depending on the area of the tooth surface have also been used in different studies [8].

Tooth discoloration has been frequently associated with medical problems and sometimes due to certain medications or even restorative treatment. Few of the conditions like malnutrition, rubella, measles, and developmental disorders like gametogenesis imperfect show black stain as one of the manifestation. Another important differential diagnosis is the dental caries. Most of the studies show the occurrence of Black stain with lower caries experience which could imply that caries resistance in children with black stain could be a result of lower caries activity than a localized effect [9].

This study was done to find the prevalence of black stain in school children, aged 6-12 years, among the Chennai population. The children were also asked about their families and their place of residence to help evaluate the risk factors associated with the black stain.

Materials and Method

Sample Selection

A total of 93 children were aged from 6-12 years of age, were examined for black stains from the areas of Old Washermenpet and Perangallthur, Chennai. None of the children had any systemic or infectious diseases and were both physically and mentally well. A written informed consent was obtained from the parents of all the children enrolled in this study. The inclusion criteria and exclusion criteria were as follows;

Inclusion Criteria

- Age group 6-12 years
- Children with black stains

Exclusion Criteria

- Immunocompromised Patients
- Children with any systemic disease
- Enamel hypoplasia

Clinical Examination for Black Stains

The Clinical examination was performed under natural light with plane mouth mirrors and dental probe in the community halls of the respective places. The diagnosis of the black stains was examined based on the criteria given by Shourie and Koch et.al. [8].

A record was maintained for every child with Black stain, where the vestibular and the palatal surface was registered for the maxillary teeth and the vestibular and the lingual surface was registered for the mandibular teeth. In order to record the pigmentation location and extension, every tooth surface illustrated was segmented into three sectors – gingival, middle third and the incisal or occlusal surface.

The DMFS/deft index was recorded in children with and without black stains. The PUFA/pufa index was also recorded to check for any visible pulp, ulceration of oral mucosa, fistula and abscess, if present.

Statistical Analysis

After the examination, the data was processed and a statistical analysis was done using the Social Science Statistics Software for Windows, Version 20.0. Statistical Significance was considered at 5%.

Results

Out of 93 children examined, black stains were

observed in 11 children, 10.23 % of the sample size. 7 children belonged to the age group 6-9 years and 4 of them in the 10 -12 years of age. 82 children did not have any black stains, 76.26% of the sample size. Black stains were found to be more prominent in the lower age group as shown in Table 1

Table 1 - Number of children with Black stains and without

Age group	Black stains (%)	Non - Black stains
6years-12years	7 (6.27)	46 (46.73)
10years-12years	4 (4.73)	36 (35.27)

Dental caries were observed in 3 children black stains. It was observed that in Children without any black stains, dental caries were present in 45 children. (Table 2). The prevalence of caries was found to be insignificant ($p>0.05$)

Table 2 – Prevalence of caries and p value in children with and without black stains

	Black stains	Non - Black Stains	P value
Caries Present	3 (5.68) [1.26]	45 (42.32) [0.17]	0.853
Caries Absent	8 (5.32) [1.35]	37 (39.68) [0.18]	0.853

Discussion

This study was done to estimate the prevalence of black stains in children aged from 6 to 12 years. Additionally, this study helps to show the association between black stains and dental caries in a population based study. Out of 93 children examined, only 11 children were observed with black stains, indicating this type of condition, as a rare disorder, as shown in Table 1. This rare condition observed in this study agrees with other studies which showed similar results [10, 11]. Most of the studies took place in 1970's in different countries. Brazilian studies show a prevalence of 9.3 % of black stains for children aged from 6-13 years of age and 2.5 % for children aged from 3-5 years from different areas of the country [12]. Koch et.al reported a prevalence of 19.9% for school children, aged 7-15 years in Switzerland and 4.6% for children aged 6-10 years in Germany [8]. The different prevalence recorded in different studies could be due to different habitats and lifestyles of different populations, which could be possible etiological factors.

Though etiology behind the formation of black stains still remains unknown, studies show a possible correlation between various risk factors and black stains. Various etiological factors include gender, socioeconomic factors like maternal education, family income, and diet and fluoride level in water consumed. These factors were also commonly associated with the development of caries [13]. With this understanding, Franco et.al found a significant association between black stains and lower income. Children from families with lower income showed a higher prevalence of black stains [14]. Consumption of vegetables, fruits and dairy products also consume black stains development. Certain studies contradict to the fact with the association between sex and black stains prevalence. However, due to insufficient data, the etiology still remains unclear making it difficult to distinguish factors associated with its formation [15, 16].

The association between dental caries and black stains is debatable because of the varying results from different studies. Gallardo et.al stated that there is no association between dental caries and black stains [13]. Contradicting to this, other studies show similar findings demonstrating lower level of caries experience along with black stain Gasparetto et al. Showed a negative correlation between black stains and dental caries, but

did not find any association between the presence of black stains and caries prevalence. Similarly, Koch et al. found a tendency for children with black stains in primary dentition to present less dental caries, but the difference was not statistically significant [8,17] . Other Findings show that both black stains and dental caries had common co-variables, like socioeconomic factors and behavioral which could be reasonable enough to help hypothesize that there could be a possible association [12].

The results of our study suggest that black stains can occur along with dental caries as shown in Table 2. The data revealed that the prevalence of caries in this study was lower among the children with black stains (0.3%) than those of without black stains (36%) ,this finding is in accordance with study done by Gasparetto A et al.10 , Koch et al.8. and Sutcliffe [18] . The mean DMFS values were found to be statistically significant between children with black stains and those without black stains. The mean value of DMFT was 1.5 ± 0.7, which is a bit higher than the mean value observed in another study done in Udaipur for the same age range, which tells us the need for further exploration to find the causative factors responsible [19].

Various hypotheses relating to caries development and black stains have been put forward to understand the biological interaction between microbiota related to the extrinsic pigmentation. Morphological stains reported by Ried et.al and Thaelide et.al confirmed that this kind of stain is a special kind of dental plaque characterized by its flora and its tendency to calcify . The most prominent organisms involved are Actinomyces and Prevotella melaninogenicus. The tendency towards calcification within the black material benefits a high level of calcium and phosphate that gives to a reduction in the enamel dissolution and an increase in the buffering capacity [6, 20]. The saliva of the children with black stains showed a higher content of total calcium, inorganic phosphates, copper, sodium and total protein and less glucose than in controls [21].

With this understanding, and the inverse relationship between dental caries and calculus stated by Duckworth and Hunnigton, Gasperrato et.al proposed that calcium and phosphate are part of the reaction for black stain formation and together with fluoride and pH conditions are the main tooth remineralization components. Because caries development is a demineralization process due to the acids produced by oral bacteria, the presence of a larger amount of minerals in the oral cavity – which could be the case in children with black stains – increases the remineralization process, to keep the oral cavity in a balanced equilibrium and reducing the risk for caries development [12].

Another hypothesis states that low cariogenic oral micro flora is associated with the presence of black stains. The bacteria related to black stains could establish a competitive environment for bacteria related to caries development, impairing the adhesion of these bacteria to dental surfaces or changing the characteristics of the dental biofilm, reducing the potential for caries to develop [22].

The management of extrinsic stains involves proper diet and maintaining oral hygiene. Whitening toothpastes with abrasives help remove extrinsic stains. Other methods include Selective polishing , where polishing is done over a specific tooth using prophylactic angle and rubber cup , with the right toothpaste and use of prophylactic paste , air jet polishing , ultrasonic scaling etc. . However, due to unclear etiology, black stains have a tendency to recur and frequent use of these modalities can lead to enamel removal, which is highly undesirable [23].

In conclusion , the results of our study , indicating the prevalence of caries along with the black stains in children within the age group 6-12 years , highlight the need to do further investigations and statistical analysis with multivariable analysis to help understand the biological mechanism. This in turn will help find a possible solution to help treat this condition.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. In Jablonski S Dictionary of dentistry (1992) ,p253 retrieved from http://www.reference.md.files
2. Addy M, Moran J. Mechanisms of stain formation on teeth, in particular associated with metal ions and antiseptics. Adv Dent Res. 1995; 9(4):450-6.
3. Watts a, Addy M. Tooth discoloration and staining: Tooth discoloration and staining: a review of the literature. Br dent J. 2001; 190(6):309-16.

4. Priyanka.S.R, Dr.Veronica .Tooth discoloration due to endodontic materials and Procedures (Saveetha Dental College, Saveetha University, India). JDMS 2013 : 9(4) : 32-36
5. Rachid F, Mehdi HE. Black Stains in Primary Teeth: Overview. Pediatr Dent Care. 2016; 1(123):2.
6. Reid JS, Beeley JA, MacDonald DG. Investigations into black extrinsic tooth stain. J Dent Res; 56(8):895-9.
7. Shah HN, Bonnett R, Mateen B, Williams RA. The porphyrin pigmentation of subspecies of Bacteroides melaninogenicus. Biochem.J. 1979; 180(1):45-50.
8. Koch MJ, Bove M, Schroff J, Perlea P, García-Godoy F, Staehle HJ. Black stain and dental caries in schoolchildren in Potenza, Italy. ASDC journal of dentistry for children. 2001; 68(5-6):353-5.
9. Heinrich-Weltzien R, Bartsch B, Eick S. Dental caries and microbiota in children with black stain and non-discoloured dental plaque. Caries Res. 2014; 48(2):118-25.
10. Caldas CT, Mialhe FL, Silva RP. Prevalence of extrinsic black dental stains and its relation to dental caries in the municipality of Santa Terezinha de Itaipu—PR. Rev Fac Odontol UPF. 2008; 13:22-6.
11. Franco KD, Issao M: Black stains and their relationship to dental caries. Rev Paul Odontol 1990; 12: 23–30.
12. Gasparetto A, Conrado CA, Maciel SM, Miyamoto EY, Chicarelli M, Zanata RL. Prevalence of black tooth stains and dental caries in Brazilian schoolchildren. Braz Dent J. 2003; 14(3):157-61.
13. França-Pinto CC, Cenci MS, Correa MB, Romano AR, Peres MA, Peres KG, Matijasevich A, Santos IS, Barros AJ, Demarco FF. Association between black stains and dental caries in primary teeth: findings from a Brazilian population-based birth cohort. Caries Res. 2012; 46(2):170-6.
14. Meurman PK, Pienihäkkinen K. Factors associated with caries increment: a longitudinal study from 18 months to 5 years of age. Caries Res. 2010; 44(6):519-24.
15. Żyła T, Kawala B, Antoszewska-Smith J, Kawala M. Black stain and dental caries: a review of the literature. BioMed Res. Int.; 2015.
16. J. M. G. Martin, M. G. Garcia, J. S. Leston, S. L. Pendas, J. J. D. Martin, and M. J. Garcia-Pola, "Prevalence of black stain and associated risk factors in preschool Spanish children," Pediatr Int. 2013 ;55(3):355-9.
17. Sarah Banu1 and Shanmugaavel. Different mode of management of anterior teeth with early childhood caries. IJCAR 2017; 6(4); 3184-3186.
18. Sutcliffe P: Extrinsic tooth stains in children. Dent Pract 1967; 17: 175–179.
19. .Bhat S. Black tooth stain and dental caries among Udaipur school children. IJPHD. 2010; 1(1):13-7.
20. Theilade J, Slots J, Fejerskov O. The ultrastructure of black stain on human primary teeth. Scand J Dent Res 1973; 81:528-532.
21. Slots J. The micro flora of black stain on human primary teeth. Scand J Dent Res 1974;82:484-490
22. Surdacka A. Chemical composition of the saliva in children and adolescents with black tartar. Czas Stomatol 1989;42:525-533
23. Prathap S, Rajesh H, Boloor VA, Rao AS. Extrinsic stains and management: a new insight. J Acad Indus Res. 2013; 1(8):435-42.

Complications of Root Canal Irrigation - A Review

Leya Meriam Mathew[1], Jayalakshmi Somasundaram[2]

[1]Graduate Student, Senior Lecturer,, Department of Conservative and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India

Abstract

Root canal irrigation plays an important role in the debridement and disinfection of the root canal. Most commonly used irrigants have good benefits of tissue dissolving and disinfection capability. However, it also produces toxic effects on the vital tissues resulting in ulcer, necrosis etc. The aim of this review is to analyze the factors causing or affecting the Root canal irrigation during a root canal treatment.

Keywords : *Root canal , irrigants , infection, microbial , complications, toxicity .*

Introduction

The main aim of a root canal treatment is to ensure complete removal of connective tissue and destruction of residual microorganisms found in the infected root canals[1]. The complexity of root canal system, presence of numerous dentinal tubules in the roots, invasion of the tubules bymicroorganisms and preservation of healthy dentin after achieving the primary objectives of complete shaping and cleaning of root canal systems are done with the help of a proper irrigation [2]. However many mishaps can occur while cleaning and shaping the root canals with irrigating solutions ranging from damage to the patient's clothing, splashing the irrigant into the patients or operators eye, to allergic reactions. The ideal properties of an irrigant [3] include, a potent tissue debris solvent ,low toxicity, low surface tension, lubricant, sterilizing agent, removal of smear layer, low cost and inactive endotoxin

Endodontic Irrigants

Non-bactericidal irrigants

Some general dental practitioners either use saline, local anaesthetics and/or distilled water. These have no antibacterial action and will not lessen bacterial significantly. These irrigants may be used regularly as they are easy to use, readily available and safety. However, irrigants have no role in handling infected root canals..

Bacteriostatic/bactericidal irrigants

These include a collection of solutions which also kill bacteria or enable their death by allowing other irrigants to come into contact with the bacteria.

Sodium Hypochlorite (NaOCl)

Sodium hypochlorite was first recognized as an antibacterial agent in 1843 and used as a hand wash . Its advantages are pulpal dissolution and antimicrobial effect. Studies show that a decrease in microbial numbers is achievable when using NaOCl for endodontic treatment of teeth with apical periodontitis. It was used as an endodontic irrigant ,with low viscosity ,effective antimicrobial properties but low tissue dissolving capabilities acceptable shelf life , easily available and inexpensive [4]. The mechanism of action involvesbreak down of protein by dissolution of amino acid content of vital and necrotic tissue by the available free chlorine in NaOCl

However, certain disadvantages of this irrigant are the toxicity to the vital tissues which includes cytoxicty, foul smell and foul taste, fabric bleach on accidental spillage and corrosive on metals [5].

Hydrogen Peroxide

Hydrogen peroxide (H_2O_2) is a colorless liquid and has been used in dentistry in concentrations varying from 1% to 30% [6]. H_2O_2 degrades to form water and oxygen. It is active against microbes via the production of hydroxyl free radicals which attack proteins and DNA [7]. It has been shown that NaOCl, combined with H_2O_2, is no more effective against E. faecalis than NaOCl alone [8] , however, CHX combined with H2O2 was a better antimicrobial agent than either one on their own.

Chlorhexidine

Chlorhexidine digluconate is widely used in disinfection because of its excellent antimicrobial activity. It is highly antimicrobial especially at pH 5.5-7.0 and is known for its longlasting effectiveness even after the removal of the solution [9] .It is a positively charged hydrophilic and lipophilic molecule which relates with phospholipids and lipopolysaccharides in cell membranes. Consequently, there is disruption of the cell membranes which allows CHX molecules to enter the cell to cause intracellular toxic effects, such as coagulation of the cytoplasm. Other advantages include available in acceptable flavor and not injurious to the surrounding tissues. Chlorhexidine has a persistent residual antimicrobial action.. Commonly, Chlorhexidine is used in conjunction with NaOCl as an irrigant as it raises the effectiveness of the irrigation protocol [10] .

However, in spite of the advantages chlorhexidine cannot be considered as an ideal root canal irrigant because of its inability to dissolve necrotic tissue remnants [11] .But capable of dissolving the smear layer [12] . Additionally studies have revealed the presence of desquamategingivitis, discoloration of teeth and tongue or dysgeusia associated with it .Laboratory findings showed chlorohexidine to be highly cytotoxic to human periodontal cells, fibroblast via inhibition of protein synthesis [13] While it does not appear to cause any long term damage to host tissues, it may still cause an inflammatory response in these tissues if expressed beyond the root canal [14] .

MTAD

MTAD is a mixture of 3% doxycycline, 4.25% citric acid and detergent developed by Torabinejad et.al. The irrigant has a combination of both chelating and antibacterial properties [15] . The citric acid may serve to remove the smear layer, allowing doxycycline to enter the dentinal tubules and exert an antibacterial effect [16] MTAD is considered to be more superior to Cholorhexidine in antimicrobial activity and is also7more biocompatible and enhances bond strength [17] . MTAD was seen to be less toxic than eugenol, 3% H2O2, CA (OH) 2 paste, 5.25% NaOCl, Peridex (a CHX mouthwash with additives) and EDTA, however, was more lethal than NaOCl in absorptions of 2.63%, 1.33% and 0.66%. The procedure for clinical use of MTAD is 20 minutes with 1.3% NaOCl followed by 5 minutes of MTAD . This irrigant is based on a tetracycline isomer; there may be problems with staining, resistance and sensitivity.

EDTA

Ethylenediaminetetraacetic acid (EDTA) is a synthetic amino acid and the sodium salts of EDTA (Na2EDTA) are used in dentistry. It is often used as a chelating agent. EDTA is not bactericidal nor bacteriostatic but inhibits the growth of, and eventually kills, bacteria . EDTA at concentrations of 15–17% removes calcium from dentine leaving a softened matrix of dentine. It also emulsifies soft tissue and removes the smear layer with no deleterious effect to pulpal or periapical tissues. EDTA reacts with the calcium ions in dentine and forms soluble calcium chelates. It is reduces the intracranial microbial flora and also helps to detach biofilms adhering to root canal walls [18] However irrigation with 5%NaOCl or alternated with 17% EDTA, significantly increased the tooth strain .It reduces the chlorine in solution, rendering the sodium hypochlorite irrigant ineffective on bacteria and necrotic tissue [16] . A one minute application of 17% EDTA combined with ultrasonic is efficient for smear layer and debris removal in the apical region of the root canal [19]. EDTA is available in a liquid form for irrigation and a gel form for lubrication .

Other Irrigating Solutions

The other irrigating solutions are sterile water, physiologic saline, iodine compounds, ureaperoxide, etidronic acid, citricacid, maleic acid, tetraclean, chlorine dioxide etc [20]

HEBP is also known as etidronic acid or etidronate and has been proposed as an alternative potential alternative to EDTA or citric acid because it shows no reactivity with NaOCl [19] .It is nontoxic but h owever, the demineralization kinetics was lower than those of 17% EDTA.

Maleic acid is a mild organic acid used as acid conditioner in adhesive dentistry. Ballal et.al reported that the final irrigation with 7%maleic acid for 1minute was more efficient than 17% EDTA in the removal of smear layer [20]

Iodine Compounds are bactericidal, fungicidal, and virucidal. 2% iodine in 4% potassium iodide has been used in endodontics. It shows less toxicity and a

decreased tendency to stain dentine.. However it is not the first choice as an irrigant. Despite its antimicrobial activity, iodine is a very potent allergen thereby causing a risk for allergy [21]

Curcuma longa (Turmeric): Curcumin, possesses anti-inflammatory,anti-oxidant,anti-microbial andanti-canceractivity. In an in vitro study conducted by Prasanna Neelakantan, it has been shown that curcumin has significant anti-bacterial activity against E.faecalis and can be used as an alternative to sodium hypochlorite for root canal irrigation [22, 23] .

Complications during Root Canal Irrigation

Root canal irrigation is an integral part of the rootcanal treatment to ensure proper debridement and disinfection of the root canal system. A review of these complications have been described briefly below, which necessitates the need to carry out effective techniques in order to avoid complications .

Damage to Clothing

Sodium Hypochlorite, a common bleaching agent can cause a concern of damage. Accidental spillage of minute quantities can lead to rapid, irreparable bleaching [24, 25] . When using an ultrasonic device for root canal irrigation the aerosol may also cause damageto the clothing. These mishapsshould be prevented by proper shield of the patients' clothing. When using hand irrigation, oneshould reassure that the irrigation needle and syringe are tightly attached .

Damage to the Eye

Mild burns with the alkali such as sodium hypochlorite can result in significant injury causing blurring of vision and patchy coloration of cornea [26] .Irrigant in contact with patients or operators eyes can result in immediate pain, intense burning and erythema. Immediate ocular irrigation with large amounts of tap water or sterile saline should be performed by the dentist.

Damage to Oral mucosa and Skin

Skin injury with an alkaline substance requires an immediate irrigation with water as alkalis combine with proteins or fats in tissue to form soluble protein complexes or soaps which could further cause irritation to the mucosa. Accidental swallowing of irrigant by patient requires proper monitoring. It is possible that skin injury can result from secondary contamination [27, 28].

Allergic reactions

Various allergic reactions to Chlorhexidine have been described. It is known to elicit allergic contact dermatitis, generally after repeated application. It can also contact urticarial,photosensitivity, fixed drug eruption and occupational asthma [29] .

The allergic potential of sodium hypochlorite was first reported by Sulzberger when a 32 year old female reported a rapid onset of pain, swelling and difficulty in breathing [30] . A subsequent allergy skin scratch test performed two weeks later confirmed a positive result to sodium hypochlorite. Other symptoms include burning sensation, shortness of breath [31] .

Complications arising from the irrigant extrusion beyond root canal apex

Chemical Burns and necrosis

When sodium hypochlorite is extruded beyond the root canal into the periradicular tissues, the effect is a chemical burn leading to localized or extensive tissue necrosis. This can further lead to tissue swelling both intra orally and extra orally. The swelling could later produce a sudden onset of pain, associated bleeding, acute sinusitis, ecchymosis of the mucosa [32].

Neurological Complications

The major complications include parathesia and anesthesia affecting the mental, inferior dental and infraorbital branches of the trigeminal nerve.

Facial nerve damage was first described by Witton et al. in 2005, where the buccal branch of the facial nerve was affected in 2 cases. Both patients exhibited a loss of the naso-labial groove and a down turning of the angle of the mouth. Both patients were reviewed and their motor function, was regained after several months [33].

Upper Airway Obstruction

Without adequate tooth isolation, sodium hypochlorite can lead to the leakage of the solution into the oral cavity and ingestion or inhalation by the patient. This could result in throat irritation and the upper airway could be compromised [34]. Ziegler presented a case of a 15-month-old girl who presented a complication of root canal irrigation with acute laryngotracheal bronchitis, stridor and profuse drooling from the mouth as a result

of ingestion of a high concentration of household sodium hypochlorite.

Air Emphysema

Studies show cases of emphysema which occurs when the root canal is dried with compressed air after injecting hydrogen peroxide into it. Symptoms and signs include a rapid swelling and erythema in the region of the treated tooth, emphysema of the face, the suborbital region, and neck. The mainsymptom is a crepitus of the swelling [35] .

Flare up

An endodontic flare-up is a complication of endodontic treatment which is defined as an acute exacerbation of asymptomatic pulp, after the initiation or continuation of root canal treatment. Excessive pressure during irrigation will cause large amounts of irrigant to come in contact with the periapical tissues, thereby a possible etiological factor for Flare up [36].

Conclusion

Thus, it is important to carry out an effective technique in order to avoid complications. In the event of an accidental extrusion of any solution, treatment guidelines should be applied as may be relevant to each case.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. Endodontic Irrigants: A Comprehensive Review ; Soumya Abraham,Dr.James.D.Raj, MurvindranVenugopal ,Soumya Abraham et al, J. Pharm. Sci. & Res. Vol. 7(1), 2015, 5-9 .
2. Torabinejad M, Handysides R, Khademi AA, Bakland LK. Clinical implications of the smear layer in endodontics: a reviewOral Surg Oral Med Oral Pathol Oral RadiolEndod. 2002 Dec;94(6):658-66.
3. Taft J. A practical treatise on operative dentistry. London: Trubner and Co, 1859:244.
4. H. R. Spencer, V. Ike & P. A. Brennan · Review: the use of sodium hypochlorite in endodontics — potential complications and their management British Dental Journal 2007 Nov; 202, 555–559
5. **Sena NT**, **Gomes BP**, **Vianna ME**, **Berber VB**, **Zaia AA**, **Ferraz CC**, **Souza-Filho FJ**In vitro antimicrobial activity of sodium hypochlorite and chlorhexidine against selected single-species biofilms.I ntEndod J. 2006 Nov; 39(11):878-85.
6. Steinberg D, Heling I, Daniel I, Ginsburg. Antibacterial synergistic effect of chlorhexidine and hydrogen peroxide against Streptococcus sobrinus, Streptococcus faecalis and Staphylococcus aureus. J Oral Rehabil. 1999 Feb; 26(2):151-6.
7. Seal GJ, Ng YL, Spratt D, Bhatti M, GulabivalaK .An in vitro comparison of the Streptococcus intermedius biofilms in root canals. IntEndod J. 2002 Mar; 35(3):268-74
8. AzharIqbal, BDS, FCPS .Antimicrobial Irrigants in the Endodontic Therapy.Int J Health Sci (Qassim). 2012 Jun; 6(2): 186–19
9. Carlos Estrela, Julio Almeida Silva, Ana Helena Gonçalves de Alencar, Claudio Rodrigues Leles, Daniel Almeida Decurcio. Efficacy of sodium hypochlorite and chlorhexidine against Enterococcus faecalis – a systematic review 2008.J. Appl. Oral Sci. vol.16 no.6
10. Naenni N, Thoma K, Zehnder M. Soft tissue dissolution capacity of currently used and potential endodontic irrigants.J Endod. 2004 Nov;30(11):785-7.
11. Mohammadi Z, Abbott PV . The properties and applications of chlorhexidine in endodontics. IntEndod J. 2009 Apr;42(4):288-302.
12. Torabinejad M, Khademi AA, Babagoli J, Cho Y, Johnson WB, Bozhilov K, et al . A new solution for the removal of smear layer. J Endod. 2003;29:170–5.
13. DeivanayagamKandaswamy and Nagendrababu . Root canal irrigants J Conserv Dent. 2010 Oct-Dec; 13(4): 256–264.
14. Babich H, Wurzburger BJ, Rubin YL, Sinensky MC, Blau An in vitro study on the cytotoxicity of chlorhexidine digluconate to human gingival c L ells. Cell BiolToxicol. 1995 Apr; 11(2):79-88.
15. Torabinejad M, Cho Y, Khademi AA, Bakland LK, Shabahang S The effect of various concentrations of sodium hypochlorite on the ability of MTAD to remove the smear layer. J Endod. 2003 Apr; 29(4):233-9.

16. Zehnder M, Schmidlin P, Sener B, WaltimoT,Chelation in root canal therapy reconsidered. J Endod. 2005 Nov; 31(11):817-20.
17. Zehnder M. Root canal irrigants. J Endod 2006; 32(5):389-8.
18. Von Der Fehr FR, NygaardÖstbyB. Effect of EDTAC and sulfuric acid on root canal dentine. Oral Surg Oral Med Oral Pathol. 1963;16:199–205.
19. De-Deus G, Zehnder M, Reis C, Fidel S, Fidel RA, Galan J Jr, PaciornikSLongitudinal co-site optical microscopy study on the chelating ability of etidronate and EDTA using a comparative single-tooth model. J Endod. 2008 Jan; 34(1):71-5
20. Ballal NV, Kandian S, Mala K, Bhat KS, Acharya SComparison of the efficacy of maleic acid and ethylenediaminetetraacetic acid in smear layer removal from instrumented human root canal: a scanning electron microscopic study. J Endod. 2009 Nov; 35(11):1573-6.
21. M. Hülsmann& W. Hahn Complications during root canal irrigation – literature review and case reports .IntEndod J. 2000 May;33(3):186-93
22. Prasannaneelakantan, chandanasubbarao, chandragirivenkatasubbarao. Analysis of antibacterial activity of curcumin against enterococcus fecalis, International journal of current research and review, 9, 2011
23. Pratishta Jain, Manish Ranjan . Role of herbs in root canal irrigation-A review IOSR Journal of Pharmacy and Biological Sciences 2014, Volume 9, Issue 2 Ver. VI , PP 06-10.
24. Ingram T A. Response of the human to accidental exposure to sodium hypochlorite. J Endod 1990; 16: 235–237.
25. Rutala W, Weber D J. Uses of inorganic hypochlorite (Bleach) in health-care facilities. Clinical Microbiology Reviews 1997; 10: 597–610.
26. Marx, Hockberger, Wallis. Rosen's emergency medicine. 6th edn. pp 931–933. UK: Mosby Elsevier, 2006.
27. Krautheim AB, Jermann TH, Bircher AJ Chlorhexidine anaphylaxis: case report and review of the literature. Contact Dermatitis. 2004 Mar; 50(3):113-6
28. Serper A, Ozbek M, Calt S. Accidental sodium hypochlorite-induced skin injury during endodontic treatment. J Endod 2004; 30: 180–181
29. Caliskan M K, Turkun M, Alper S. Allergy to sodium hypochlorite during root canal therapy: a case report. IntEndod J 1994; 27: 163–167.
30. Mehra P, Clancy C, Wu J. Formation of a facial hematoma during endodontic therapy. J Am Dent Assoc 2000; 131: 67–71
31. Sulzberger M B. Dermatologic allergy: an introduction in the form of a series of lectures. Springfield, IL, USA: Charles C. Thomas, 1940.
32. Gernhardt C R, Eppendorf K, Kozlowski A et al. Toxicity of sodium hypochlorite used as an endodontic irrigant. Int Dent J 2004; 37: 272–280.
33. Witton R, Henthorn K, Ethunandan M et al. Neurological complications following extrusion of sodium hypochlorite solution during root canal treatment. IntEndod J 2005; 38: 843–848.
34. Ziegler D S. Upper airway obstruction induced by a caustic substance found responsive to nebulised adrenalin. J Paed Child Health 2001; 37: 524–525
35. Adnan Torgay, ErdinicAydin, UlkemCilasun, LaleDurmaz, GulnazArslan Subcutaneous emphysema after dental treatment: a case report 2004,16:3 , 314- 317
36. Priyanka.S.R , Dr.Veronica, Saveetha Dental CollegeFlare-Ups in Endodontics – A Review IOSR- Journal of Dental and Medical Sciences, 2013, Volume 9, Issue 4, 26-31

Phytochemical and Antimicrobial Analysis of *Portieria Hornemannii*, A Marine Red Macro Algae

Louis Cojandaraj[1], Gurdyal Singh[2], John Milton[3]

[1]Assistant Professor, Department of Medical Laboratory Sciences, Lovely Professional University, Phagwara, [2]Plant Head, Affy Parenteral, Baddi, Distt. Solan, H.P. India, [3]Associate Professor, PG & Research Department of Advanced Zoology and Biotechnology, Loyola College, Chennai

Abstract

The present study was designed to evaluate the phytochemical activity of *Portieria hornemannii*. The primary metabolites from *Portieria hornemannii* were obtained by soxhlet extraction using various solvent like acetone, chloroform, ethyl acetate and methanol. The phytochemical analysis determined the presence of flavonoids, terpeniods Saponins, Phenol and Cardiac Glyciosides. The extracts of ethyl acetate exhibited a higher phenolic content of **764.413 ± 22.11 mg/GAE.** The antibacterial activity determined that the extracts of ethyl acetate exhibited a good zone of inhibition of 19mm and 14mm at 20µg against *Klebsiella pneumonia* and *Staphylococcus aureus.* and in the case of antifungal activity no zone of inhibition was obtained in any of the extracts.

Key words: *Portieria hornemannii, Seaweed, Phytochemical Analysis, Red algae, Antibacterial activity, anti-fungal activity.*

Introduction

Seaweeds are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities and because of these properties they are considered to be the most predominant source for bioactive compounds. Seaweeds during metabolic process, infrequently suffer serious photodynamic damage even though they grow in a harsh environment. This fact suggests that seaweed cells possess some protective compounds and mechanisms.[1] Marine algae, like other photosynthesizing plants, are exposed to a combination of light and oxygen that leads to the formation of free radicals and other strong oxidizing agents. However, the absence of oxidative damage in the structural components of macro algae (i.e., polyunsaturated fatty acids) and their stability to oxidation during storage suggest that their cells have protective anti-oxidative defence systems which are similar to vascular plants[1,2].

Corresponding Author:
Louis Cojandaraj
E-mail: louis.2333@lpu.co.in

In developing countries diseases are the major cause of death and accounts to 50% of it. Antimicrobial agents are essentially important in reducing the global burden of infectious diseases. But pathogens with resistance develop and spread, because of which the effect of those antibiotic drugs is reduced. This kind of resistance by bacterial species to the antimicrobial agents invoke a serious threat worldwide[3,4]. Bacterial resistance to antibiotics increases mortality likelihood of hospitalization and also increases the period of hospitalization.[5] Hence, there occurs an urge of antimicrobials with alternate strategies.[6,7] It has been well established by several scientific teams that seaweeds belonging to all three major pigments exhibit inhibitory action against both Gram negative and Gram positive bacteria. Antibacterial activity of nine species of seaweeds belonging to all major pigmentations revealed that brown and red seaweeds had greater antibacterial activity than the green and brown algae.[8] This study reveals the antibacterial and the phytochemical aspects exhibited by the marine red algae. *Portieria hornemannii* is a small red marine algal species which is widely distributed in tropical and subtropical water bodies of the Pacific and Indian Ocean.[9] Portieria belongs to the family Rhizophyllidaceae. The family Rhizophyllidaceae

includes 4 genera Contarinia, Ochtodes, Nesophila and Portieria. The geographical distribution of the species belonging to the genera is interesting and exclusive.[10–12]with an evaluation of the ordinal classification of the Florideophyceae (Rhodophyta The present study was designed to investigate the presence of major phytochemical compounds present in *Portieria hornemannii*.

Materials and Method

The crude metabolites from the sample were extracted using Soxhlet extraction method using solvents like acetone, chloroform, ethyl acetate and methanol. The extracts were subjected to phytochemical analysis to detect the presence of following biomolecules using the standard qualitative and quantitative procedures as described by Trease and Evans[13] and Total phenolic assay was determined by using Folin-Ciocalteu assay.[14]

The screening of anti-bacterial and antifungal activity against fastidious pathogens was performed with extracts of *Portieria hornemannii* by determining the zone of inhibition using disc diffusion method.[15–17]

Result and Discussion

The phytochemical characters of *Portieria hornemannii* were determined for all the crude extracts derived from the solvents after condensation in rotary vacuum evaporator.[13] From the present study, it was observed that Flavonoids, Terpenoids, Phenol and Cardiac glycosides were present in all the four crude extracts derived from acetone, Ethyl Acetate, Chloroform and methanol. However, Saponins were present only in methanol and ethyl acetate extracts (Table 1).

Table 1: Qualitative analysis of Phytochemicals from*Portieria hornemannii.*

Phytochemicals	Solvents			
	Acetone	Methanol	Ethyl Actetate	Chloroform
Tannins	-	-	-	-
Saponins	-	+	+	-
Flavanoids	+	+	+	+
Terpenoids	+	+	+	+
Alkaloids	-	-	-	-
Cardiac Glycosides	+	+	+	+
Phenol	+	+	+	+

The seaweeds are known for their secondary active metabolites which are used in several medical and pharmaceutical industries. Metabolites like Tannins, Saponins, Flavanoids, Terpenoids, Alkaloids and phenolic compounds have a great medicinal value and are extensively used for the manufacturing of new drugs.[13] Saponins are widely used in the treatment of hypercholesterolaemia and hyperglycaemia. It is also used as a mild detergent. Apart from this saponins also possess several medical properties like anti-microbial, cholesterol lowering, anti-oxidant, anti-cancer, anti-carcinogenic, and immune modulatory activities. It also helps in the treatment of congestive heart failure by inhibiting Na^+ and Ca^{2+}antipotal by producing cytosolic Ca^{2+} which reduces congestive heart failure by strengthening heart muscles.[18]

Tannins possess antibacterial anti-cancerous and anti-viral activities, is also used for the inhibition of HIV replication.[19] Flavonoids also possess similar activities

like tannins like antioxidant, anti-inflammatory, anti-cancer, antimicrobial and anti-allergic activity.[20]

Determination of Total phenols

Earlier reports have stated that the polyphenols obtained from marine algae possess a good anti-oxidant property [21,22]. Total phenolic content of the extracts was calculated from the regression equation of calibration curve (Y = 0.001+ 0.25x; R2 = 0.966) and expressed as mg gallic acid equivalents (GE) per gram of sample in dry weight (Figure 1) The Results of the phenolic content of *Portieria hornemannii* determined the ethyl acetate extract has high phenolic content followed by methanol extract comparing to other extracts (Table 2; Figure 2). The differences between the content of phenolic compound between each solvents and extraction methods were statistically significant ($p < 0.05$) (Table 3). The presence of high phenolic compound could be useful for the prevention of oxidative activities of the extract.

Table 2. Mean ± SD of Total Phenolic Content of *Portieria hornemannii*

Solvent	Total Phenolic Content (mgGAE/g)
	Mean ± Std. Deviation
Acetone	486.206 ± 4.84
Methanol	696.146 ± 3.85
Ethyl Acetate	764.413 ± 22.11
Chloroform	449.026 ± 14.43

Table 3. Two way ANOVA Total Phenolic Content of *Portieria hornemannii*

	Sum of Squares	Degrees of freedom	Mean Square	F-Value	Sig.
Between Groups	216040.115	3	72013.372	391.723	0.000
Within Groups	1470.699	8	183.837		
Total	217510.814	11			

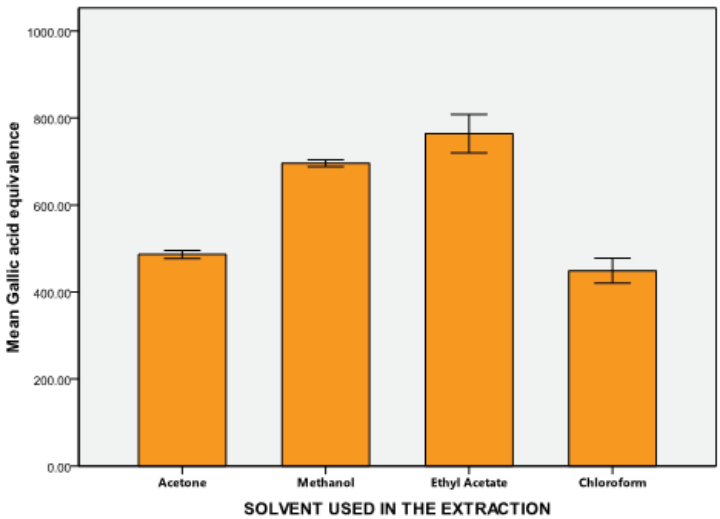


Figure 1. Mean ± SD of Total Phenolic Content of *Portieria hornemannii.*

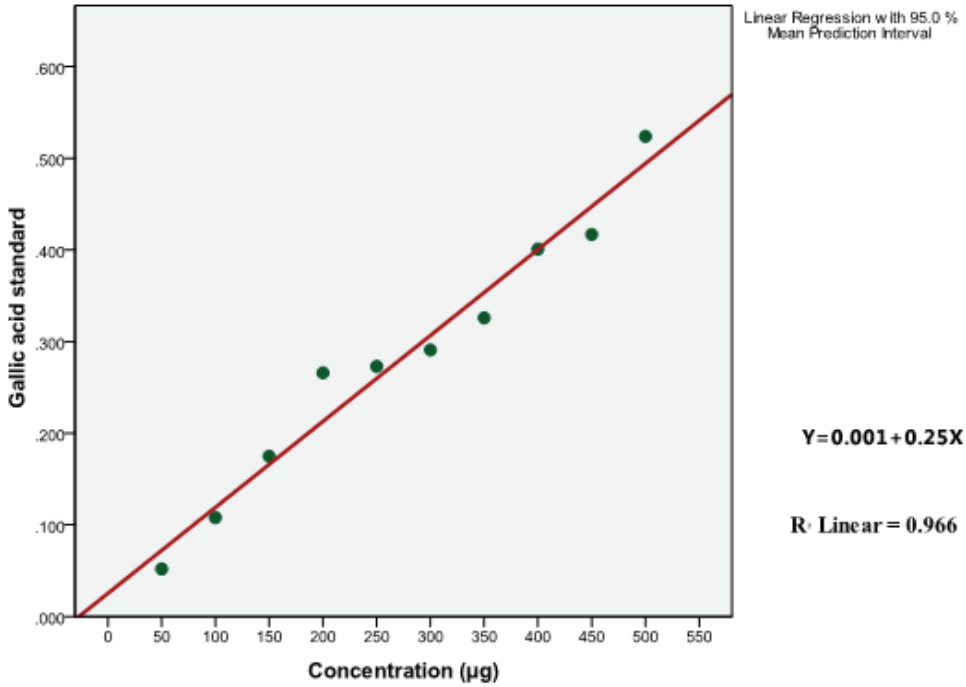


Figure 2. Gallic Acid Equivalence

Phenols are the most significant constituent in seaweed as of for their scavenging activity due to presence of the hydroxyl groups [23]. Pedersen reported that the increase in the phenolic content depends upon two major factors i.e. it increases with the aging of the tissue and also the salinity concentration of its habitat. [24] The bioactive compounds of macro algae is determined by certain aspects like environment, salinity, maturity of the algae and climatic conditions.[25] A lower phenolic content range of 1.5 to 4.1 mg GAE/g, with crude methanolic extracts of red seaweeds which is comparatively very lower with the range obtained with present study [26]. The Phenolic compounds derived from the marine algae play a vital role against the abiotic and biotic stress conditions through cell defense mechanism.[27]8 Phaeophyta and 23 Rhodophyta. In general, the biological activities of the seaweed are reflected by the phenolic compounds present in the seaweed.

Antimicrobial Activity

Antibacterial activity

In this present study the screening of the antibacterial activity was performed against five different bacterial strains *Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumonia, Escherichia coli, Pseudomonas aeruginosa* under various concentration of each crude extracts ranging from 2, 5, 10, and 20µg. From the study, the zone of inhibition of *Bacillus subtilis* was obtained at a concentration range of 20µg only in chloroform extracts (10 mm). Whereas, in *Klebsiella pneumonia*, the zone of inhibition (10 mm and 19 mm) was obtained at a conc. range of 20µg in both the acetone and ethyl acetate extracts. Also, the zone of inhibition against, *Escherichia coli* was observed at a conc. range of 20µg in the extracts of ethyl acetate (11 mm), methanol (10 mm) and chloroform (12 mm). Apparently, the zone of inhibition against *Staphylococcus aureus* was observed at a conc. range of both 10µg and 20µg in the extracts of acetone (10 mm, 11 mm), and ethyl acetate (10 mm, 14 mm). Finally, the zone of inhibition against *Pseudomonas aeruginosa* was observed at a conc. range of 20µg only in the extracts of chloroform (10 mm) (Table 4). Therefore the highest zone of inhibition was seen only in the ethyl acetate extracts comparing with other extracts and also the ethyl acetate extracts inhibited the growth of three bacterial strains followed by acetone and chloroformic extracts which inhibited two bacterial strains and finally methanolic extracts inhibited only a single bacterial strain (Table 4).

Table 4. Antibacterial activity of *Portieria hornemanii*

Bacterial Species	Acetone				Ethyl Acetate				Methanol				Chloroform			
	Concentration in µg															
	2	5	10	20	2	5	10	20	2	5	10	20	2	5	10	20
Bacillus subtilis	-	-	--	--	-	-	--	--	-	-	--	--	-	-	--	10
Klebsiella pneumonia	-	-	--	10	-	-	--	19	-	-	--	--	-	-	--	--
Escherichia coli	-	-	--	--	-	-	--	11	-	-	--	10	-	-	--	12
Staphylococcus aureus	-	-	10	11	--	--	10	14	-	-	--	--	-	-	--	--
Pseudomonas aeruginosa	-	-	--	--	-	-	--	--	-	-	--	--	-	-	--	10

The acetone extract of Caulerpa scalpelliformis showed broad spectrum antibacterial activity when compared to other seaweed extracts.[28,29] But in the present study the maximum zone of inhibition was obtained from the extracts of Ethyl acetate. The maximum antibacterial activity was observed in the methanol extract of Caulerpa scalpelliformis against Salmonella typhi, Micrococcus sp., and Shigella bodii. [30]. Ely *et al*., studied with the methanolic extracts of *Chadophorea profileria* exhibited a moderate antibacterial activity against *Staphylococcus aureus* and *Vibrio cholera* [31].

Anti-fungal activity

In the present study the screening of the antifungal activity was performed by agar disc diffusion method against five different fungal strains *Aspergillus niger, Aspergillus flavus, Aspergillus fumigatius, Fusarium solanum, Exoserohium species* under various concentration of each crude extracts ranging from 2, 5, 10, and 20µg. From the study, the zone of inhibition was not observed in any of the concentrations.

In contradiction to this, the methanolic extracts of *Aspergillus taxiformis* showed inhibitory activity against fungal species like *Fusarium solanum, Aspergillus flavus,* and *trichoderma species*. The organic extracts obtained from *Aspergillus taxiformis* showed low inhibitory zone against *Aspergillus fumigatius* [32]. From the reports of El-Baroty *et al*., it was observed that the hexane and ethyl acetate extracts of *Aspergillus taxiformis* showed a good anti-fungal activity against *Fusarium oxysporees* [33] .

Conclusion

The phytochemical (Flavanoids, Terpenoids, Saponins, Phenols and Cardiac Glycosides) studies were determined for *Portieria hornemannii.* Ethyl acetic extracts showed a significant amount of phenolic content on comparing with other crude extracts. The antibacterial activity for different solvents extracts was measured in range of 10 mm to 19 mm. The extracts of ethyl acetate showed a maximum zone of inhibition against *Staphylococcus aureus, Klebsiella pneumonia, E. coli* at 10µg and 20µg/ml. It was followed by chloroform and acetone extracts. *Portieria hornemannii* was also analyzed for antifungal activity against five ocular pathogens. But, there was no significant zone of inhibition in any of the extracts at any concentration. This algal species possesses a good antibacterial activity

which can be used for the drug developmental against various fastidious bacterial strains.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Clearance: Animal study was not involved in this research.

Source of Funding: Self

References

1. Matsukawa, R., Dubinsky, Z., Kishimoto, E., et al., A comparison of screening methods for antioxidant activity in seaweeds. *J. Appl. Phycol.*, 1997, **9**, 29.
2. Stein, E. M., Colepicolo, P., Afonso, F. A. K., and Fujii, M. T., Screening for antifungal activities of extracts of the Brazilian seaweed genus Laurencia (Ceramiales, Rhodophyta). *Brazilian J. Pharmacogn.*, 2011, pp. 290–295.
3. Levy, S. B. and Marshall, B., Antibacterial resistance worldwide: causes, challenges and responses. *Nat. Med.*, 2004, **10**, S122.
4. Mandal, S. and Mallick, N., Microalga Scenedesmus obliquus as a potential source for biodiesel production. *Appl. Microbiol. Biotechnol.*, 2009, **84**, 281–291.
5. Winstanley, T. G., Limb, D. I., Eggington, R., and Hancock, F., A 10 year survey of the antimicrobial susceptibility of urinary tract isolates in the UK: the Microbe Base project. *J. Antimicrob. Chemother.*, 1997, **40**, 591–594.
6. Basualdo, C., Sgroy, V., Finola, M. S., and Marioli, J. M., Comparison of the antibacterial activity of honey from different provenance against bacteria usually isolated from skin wounds. *Vet. Microbiol.*, 2007, **124**, 375–381.
7. Mandal, S., DebMandal, M., Pal, N. K., and Saha, K., Synergistic anti--Staphylococcus aureus activity of amoxicillin in combination with Emblica officinalis and Nymphae odorata extracts. *Asian Pac. J. Trop. Med.*, 2010, **3**, 711–714.
8. Kamat, S. Y., Wahidulla, S., D'Souza, L., et al., Bioactivity of marine organisms. VI. Antiviral evaluation of marine algal extracts from the Indian coast. *Bot. Mar.*, 1992, **35**, 161–164.
9. Guiry, M. D., AlgaeBase. World-wide electronic publication, National university of ireland, Galway. *http//www. algaebase. org/*, 2010.
10. Saunders, G. W., Chiovitti, A., and Kraft, G. T., Small-subunit rDNA sequences from representatives of selected families of the Gigartinales and Rhodymeniales (Rhodophyta). 3. Delineating the Gigartinales sensu stricto. *Can. J. Bot.*, 2004, **82**, 43–74.
11. Krayesky, D. M., Norris, J. N., Gabrielson, P. W., Gabriel, D., and Fredericq, S., A new order of red algae based on the Peyssonneliaceae, with an evaluation of the ordinal classification of the Florideophyceae (Rhodophyta). *Proc. Biol. Soc. Washingt.*, 2009, **122**, 364–391.
12. Verbruggen, H., Maggs, C. A., Saunders, G. W., Le Gall, L., Yoon, H. S., and De Clerck, O., Data mining approach identifies research priorities and data requirements for resolving the red algal tree of life. *BMC Evol. Biol.*, 2010, **10**, 16.
13. Trease, G. E. and Evans, W. C., Pharmacognosy, Saunders. *Elsevier, Amsterdam, the Netherlands*, 2002, **36**, 51.
14. Sadasivam, S. and Manickam, A., *Biochemical methods for agricultural sciences* Wiley eastern limited, 1992.
15. Kumar, G. and Sahoo, D., Effect of seaweed liquid extract on growth and yield of Triticum aestivum var. Pusa Gold. *J. Appl. Phycol.*, 2011, **23**, 251–255.
16. Patra, J. K., Rath, S. K., Jena, K., Rathod, V. K., and Thatoi, H., Evaluation of antioxidant and antimicrobial activity of seaweed (Sargassum sp.) extract: A study on inhibition of glutathione-S-transferase activity. *Turkish J. Biol.*, 2008, **32**, 119–125.
17. Bayer, E. A., Zalis, M. G., and Wilchek, M., 3-(N-Maleimido-propionyl) biocytin: a versatile thiol-specific biotinylating reagent. *Anal. Biochem.*, 1985, **149**, 529–536.
18. Oloyede, O. I., Chemical profile of unripe pulp of Carica papaya. *Pakistan J. Nutr.*, 2005, **4**, 379–381.
19. Haslem, E., Plant Polyphenols—Vegetable Tannins. Cambridge University Press, UK, 1989.
20. Pietra, F., Secondary metabolites from marine microorganisms: bacteria, protozoa, algae and fungi. Achievements and prospects. *Nat. Prod. Rep.*, 1997, **14**, 453–464.
21. Xu, N., Fan, X., Yan, X., Li, X., Niu, R., and Tseng, C. K., Antibacterial bromophenols from the marine red alga Rhodomela confervoides. *Phytochemistry*,

2003, **62**, 1221–1224.

22. Kuda, T., Tsunekawa, M., Hishi, T., and Araki, Y., Antioxidant properties of driedkayamo-nori', a brown alga Scytosiphon lomentaria (Scytosiphonales, Phaeophyceae). *Food Chem.*, 2005, **89**, 617–622.
23. Wang, T., Jonsdottir, R., and Ólafsdóttir, G., Total phenolic compounds, radical scavenging and metal chelation of extracts from Icelandic seaweeds. *Food Chem.*, 2009, **116**, 240–248.
24. Pedersen, A., Studies on phenol content and heavy metal uptake in fucoids. In *Eleventh International Seaweed Symposium* 1984, pp. 498–504.
25. Kumar, M., Kumari, P., Trivedi, N., et al., Minerals, PUFAs and antioxidant properties of some tropical seaweeds from Saurashtra coast of India. *J. Appl. Phycol.*, 2011, **23**, 797–810.
26. Ganesan, P., Kumar, C. S., and Bhaskar, N., Antioxidant properties of methanol extract and its solvent fractions obtained from selected Indian red seaweeds. *Bioresour. Technol.*, 2008, **99**, 2717–2723.
27. Zubia, M., Robledo, D., and Freile-Pelegrin, Y., Antioxidant activities in tropical marine macroalgae from the Yucatan Peninsula, Mexico. *J. Appl. Phycol.*, 2007, **19**, 449–458.
28. Thillairajasekar, K., Duraipandiyan, V., and Perumal, P., Antimicrobial activity of Trichodesmium erythraeum (Ehr) (microalga) from South East coast of Tamil Nadu , India Plant material Antifungal activity and minimum Gas chromatography-mass spectrometry Antimicrobial assay. *Int. J. Integr. Biol.*, 2009, **5**, 167–170.
29. Liao, W. R., Lin, J. Y., Shieh, W. Y., Jeng, W. L., and Huang, R., Antibiotic activity of lectins from marine algae against marine vibrios. *J. Ind. Microbiol. Biotechnol.*, 2003, **30**, 433–439.
30. TÜney, \.Inci, Cadirci, B. H., Ünal, D., and Sukatar, A., Antimicrobial activities of the extracts of marine algae from the coast of Urla (Izmir, Turkey). *Turkish J. Biol.*, 2006, **30**, 171–175.
31. Ely, R., Supriya, T., and Naik, C. G., Antimicrobial activity of marine organisms collected off the coast of South East India. *J. Exp. Mar. Bio. Ecol.*, 2004, **309**, 121–127.
32. Mtolera, M. S. P. and Semesi, A., Antimicrobial Activity of Extracts from Six GreenAlgae from Tanzania. 1996.
33. El-Baroty, G. S., Moussa, M. Y., Shallan, M. A., Ali, M. A., Sabh, A. Z., and Shalaby, E. A., Contribution to the aroma, biological activities, minerals, protein, pigments and lipid contents of the red alga: Asparagopsis taxiformis (Delile) Trevisan. *J. Appl. Sci. Res*, 2007, **3**, 1825–1834.

Transplantation of Human Organs: An Indian Legal Analysis

Hiranmaya Nanda[1], Shyamantak Misra[2]

Assistant Professor, Faculty of Legal Studies, Siksha 'O' Anusandhan University, Bhubaneswar, Odisha, India,
[2]Research Scholar, KIIT School of Law, KIIT University, Bhubaneswar, Odisha, India

Abstract

This article is an attempt made by the author to discuss the various aspects of transplantation of human organ and its legal features. Human organ and tissue transplantation was started in India in 1962. Earlier, the human organ transplant was unfettered, and human organ trafficking was rampant in the society. The parliament of India first drafted The Transplantation of Human Organ Act governing the transplantation which was passed in 1994. This act has been subsequently amended in 2011, and new rules came into force in 2014. This research paper discusses the significant mechanism of the act and spotlights on what all medical practitioners involved in transplant should know about the legal aspects of transplantation.

Keywords: *human organ, body, transplantation, medical*

Introduction

Transplantation of human organ is a great achievement in the medical history like the invention of antibiotics and anesthesia. The ancient Indian text and some of the Chinese literature narrated about the transplantation of organs. But first it was invented by a French surgon named Alexis Carrel who experimented in animals in the year 1902. The first human kidney was transplanted in the year 1946 and the liver in 1963 and the heart in 1967. After this many organs were transplanted like lung, pancreases, intestines etc. The WHO has now accepted transplantation of human organ as a well and standard recognized treatment. With the passage of time people have come forward for the donation of their respective human organs as a mark of true spirit of humanity and to save the precious lives. The Organ transplantation means "a medical procedure in which an organ is removed from one body and placed in the body of a recipient, to replace a damaged or missing organ. The donor and recipient may be at the same location, or organs may be transported from a donor site to another location." There are two parameters to get the consent for removal of organs from dead individuals firstly "the presumed consent in the absence of objection from the deceased when he was alive or from family members of the deceased, secondly informed consent based on the express consent of the deceased or the family members." The law relating to transplantation of human organs have been passed in Denmark, France, Sweden, Italy and Israel. Moreover "the permission of the relatives of the deceased unless the deceased has forbidden in his lifetime is assumed." For the first time in India, the Transplantation of Human Organ Bill was introduced in the parliament on 20th August 1992 and subsequently became the Transplantation of Human Organ Act in 1994.

Corresponding Author:
Hiranmaya Nanda
Assistant Professor, Faculty of Legal Studies, Siksha 'O' Anusandhan University, Bhubaneswar-751003, Odisha, India, Email-Id: hiranmayananda@soa.ac.in , Mob: 9861057452

Death and Transplantation in India:

According to the section 46 of the Indian Penal Code, 1860 it provides that, death denotes "death of a human being unless the contrary appears from the context." The definition of life in the context of death means the span of animate existence and the period between birth and death. Under the Part III of the Indian Constitution Article 21 broadly enumerates the meaning of life and guaranteed as a fundamental right of every citizen. Right to life includes right of the individual of his body in its completeness and without any dismemberment. The prohibition of any parts of the body or injury of the body/organ life cannot be enjoyed and is a violation of basic fundamental right.

Organ Transplantation has raised many ethical, moral, religious and legal issues. Science has advanced and biotechnology has also made a great contribution in the field of medicine. This organ transplantation is also very expensive procedure in India. Besides the cost of surgery the therapeutic care cost is added to the expensiveness.

Transplantation of Human Organ Act

This is an act "to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs and for matters connected therewith or incidental thereto." This act also "to provide for the regulation of removal, storage and transplantation of human organs for therapeutic purposes and for the prevention of commercial dealings in human organs"

The provision mandated that the donor must not be less than eighteen years of age and must voluntarily give his/her consent which is as understood from the Indian Contract Act, 1872. Section 12 of the Act also provides the consent of the donor must be informed consent. Section 3(4) of the act prohibits other than the medical practitioners no one can remove any organ from the donor. The most important of the guideline which prescribes that "no human organ removed from the body of a donor before his death shall be transplanted into a recipient unless the donor is a near relative of the recipient." The near relative means may be son, daughter, brother, sister, father, mother & spouse.

Section 6 of the act prescribes for Authority for removal of human organs from bodies sent for post mortem examination for medico-legal or pathological purposes that "where the body of a person has been sent for post-mortem examination- (a) for medico-legal purposes by reason of the death of such person having been caused by accident or any other unnatural cause; (b) for pathological purposes, the person competent under this Act to give authority for the removal of any human organ from such dead body may, if he has reason to believe that such human organ will not be required for the purpose for which such body has been sent for post-mortem examination, authorize the removal, for therapeutic purposes, of that human organ of the deceased person provided that he is satisfied that the deceased person had not expressed, before his death, any objection to any of his human organs being used, for therapeutic purposes after his death or, where he had granted an authority for the use of any of his human organs for therapeutic purposes after his death, such authority had not been revoked by him before his death."

Section 7 of the Act Provides for Preservation of human organs that, "after the removal of any human organ from the body of any person, the registered medical practitioner shall take such steps for the preservation of the human organ so removed as may be prescribed."

Prevention of Commercial Dealings in India

Commercialization of Organs in India is increasingly common. Many of the cases and instances have been reported relating to transplantation of human organ. This is seen almost in Rich & Poor Context. The poor who cannot fed his/her hungry stomach are easily ready for selling their one kidney by approaching the needy rich people. However Section 19 of the Act provides Punishment for commercial dealings in human organs that "whoever – (a) makes or received any payment for the supply of, or for an offer to supply, any human organ; (b) seeks to find person willing to supply for payment any human organ; (c) offers to supply any human organ for payment; (d) initiates or negotiates any arrangement involving the making of any payment for the supply of, or for an offer to supply, any human organ; (e) takes part in the management or control of a body of persons, whether a society, firm or company, whose activities consist of or include the initiation or negotiation of any arrangement referred to in clause (d); or (f) publishes or distributes or causes to be published or distributed any advertisement- (a) inviting persons to supply for payment of any human organ; (b) offering to supply any human organ for payment; or (c) indicating that the advertiser is willing to initiate or negotiate any arrangement referred to in clause (d), shall be punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and shall be liable to fine which shall not be less than ten thousand rupees but may extend to twenty thousand rupees: Provided that the court may, for any adequate and special reason to be mentioned in the judgment, impose a sentence of imprisonment for a term of less than two years and a fine less than ten thousand rupees."

Role of Judiciary on Transplantation of Human Organ

There are many cases discussed by the judiciary to tackle with the challenging issues of the transplantation

of human organs. In the case of *Aukland Health Board v. Attorney General,*[1] the court held that, "the values of human dignity and personal privacy belonged to everyone whether dead or alive. There are essentially two parameters to draw consent for removal of organs from a deceased person, (1) presumed consent, in the absence of objection from the deceased when he was alive or from family members, (2) informed consent, based on the express consent of the deceased or the family members." Generally the strict requirement of the consent is superseded by empowering the family to consent on behalf of the deceased. Medical hospitals that need an organ ask the permission of very close relatives of the deceased patient as normal procedure.

In an another case *Arup Kumar Das v. State of Orissa*,[2] the court observed that, "it is essential to point out various objectives of the Transplantation of Human Organ Act, 1994 and the intention of the legislature in enacting the present legislation appears to have not been properly understood by the statutory authorities who have been vested with the responsibilities of enforcing the said act. What have been prohibited under the statute is commercial dealings in authorization must be prevented and the commercialization dealings in human organs is prohibited, yet bona fide applicants may not be viewed in a suspicious manner since the act itself permits not only the donors from within the family but also permits non relative donors."

In an another case of *Jeewan Kumar Raut v. Central Bureau of Investigation*[3], the court observed that, "TOHO is a special Act. It deals with the subjects mentioned therein, viz., offences relating to removal of human organs, etc. Having regard to the importance of the subject only, enactment of the said regulatory statute was imperative. TOHO provides for appointment of an appropriate authority to deal with the matters specified in Sub-section (3) of Section 13 thereof. By reason of the aforementioned provision, an appropriate authority has specifically been authorized inter alia to investigate any complaint of the breach of any of the provisions of TOHO or any of the rules made there under and take appropriate action."

In another case *Mukesh Gandhi v. Deputy Secretary (Health) Medical Education and Research,*[4] the court held that, "as such there cannot be compulsion on the part of the recipient to have the liver transplanted in the very hospital, where it has been harvested. As observed earlier, situation of preservation of human organ through scientific mode is conceived under the Act. Therefore, there could be a transplantation of such human organ in different hospital than the hospital at which organ is removed. But of course with the requirement to be followed for ensuring that the preservation is under accepted scientific method and the viability for the purpose of transplantation is not lost. It is also required to be ensured that the transplantation takes place in the body of the recipient only, so that the purpose of donor for therapeutic use is fulfilled. What measures may be required to be undertaken are generally left to the authorization committee to decide and in any case, it would be required for the authorization committee also to ensure that, as and when such permission is granted, well accepted scientific methods are complied for preservation of such human organ, and the same is transplanted in the body of the recipient through recognized hospital having expertized for such purpose, and there is no misuse by any party during the course of transplantation."

Conclusion

Donation of human organ by a person who is dead or alive is considered to be the highest sacrifice. This sacrifice is for a giving life to other person. The transplantation act has evolved over last few decades and it is still in force. All the stakeholders who are part of this process, may it be Doctor, Doner, Donee & the relatives should aware of these rules & regulations so that misuse of human organs can be checked in the society.

Ethical Clearance: Not required, as the research article is based on Transplantation of human organ and its legal provisions. The research is doctrinally undertaken.

Source of Funding : Self

Conflict of Interest : Nil

References

1. High C. Auckland Area Health Board v. Attorney-General. The New Zealand law reports. 1992 Aug 13;1993:235.
2. Arup Kumar Das v. State of Orissa. AIR. 2011. p. 21.
3. Jeewan Kumar Raut v. Central Bureau of Investigation. SCC. 2009. p. 526.
4. Mukesh Gandhi v. Deputy Secretary (Health) Medical Education and Research. AIR. 2009. p. 7.

Factors Related to the Wasting in Child Under-Five Years in the the Sungai Bilu Public Health Center Working Area 2019

Ika Nirmala Febriyanty[1], Roselina Panghiyangani [2], Lenie Marlinae [3], Husaini [1], Meitria Syahadatina Noor[2]

[1]Master of Public Health Science Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia, [2]Medical Education Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia, [3]Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract

Sungai Bilu Public Health Center report in 2018 noted that there were 24 people who received complementary feeding packages from 78 wasting cases recorded in the E-PPGBM report. The children under-five years who got this complementary feeding were indicated to experience wasting nutritional status (Z-score <-3SD) which was 30.77%. This study aims to analyze the risk factors associated with the incidence of wasting in child under-five in the Sungai Bilu Public Health Center in 2019. The design of this study was observational analytic, using a case control study research design. This research was conducted in the Sungai Bilu Public Health Center working area. The total sample in the study was 72 people. Primary Data using the 2016 Ministry of Health Nutrition Monitoring Questionnaire. The factors associated with the incidence of wasting in children under-five in Sungai Bilu Public Health Center are age, mother's education level, history of exclusive breastfeeding, history of complementary feeding and number of children. The sex factor is not related to the incidence of wasting in children under-five of Sungai Bilu Public Health Center working area. Mother's education level are the factors that most influence on the incidence of wasting in children under-five in the Sungai Bilu Public Health Center working area.

Keywords*: age, mother's education level, history of exclusive breastfeeding, history of giving complementary feeding, number of children, wasting*

Introduction

Children under-five years from poor families have the potential for greater malnutrition, it is estimated that more than one third of under-five deaths are due to malnutrition.[1] In 2011, around 52 million (8%) children around the world suffered from wasting, more than half of them living in South Asia.[2] The prevalence of wasting in South Asia is above 15%, meaning that the wasting has become a critical public health problem. According to the 2014 Global Nutrition Report (GNR) shows that Indonesia is included in 17 countries among 117 countries that have high nutritional problems in infants, one of which is wasting 12.1%.[3]

The Local Government has a community nutrition improvement program in Banjarmasin City where wasting children under-five years receiving additional food in 2018 have reached 100% of the target of 838 people more than in 2017 (252 people). This shows the increasing cases of wasting in the city of Banjarmasin. The children under-five years who got this complementary food were indicated to experience very thin nutritional status (Z-score <-3SD) which was 30.77%. Waluyo's research (2017) shows that the age of giving MP-ASI that is not good <6 months has a 1.35 times chance of wasting compared to the age of giving MP-ASI good at age 6 months.[4] According to data from the annual report from Sungai Bilu health centers 2018 show that low educational level is still there which is about 34.7%.[5] The average number of people in a family

Corresponding Author:
Lenie Marlinae
Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Jalan A. Yani, Km.36, Banjarbaru, Kalimantan Selatan, Indonesia,
email: bintangara@ulm.ac.id

in Sungai Bilu Sub-District is 3.44% out of 2805 Family Heads.[6] According to the 2018 Sungai Bilu Public Health Center Annual Report shows that there are still 34.7% of families with more than 2 children.

Materials and Method

The design of this study was observational analytic, using a case control study research design. This research was conducted in the Sungai Bilu Public Health Center Working Area. The population is all wasting children under-five years that are found in the EPPGBM data December 2019 who are domiciled in the working area of the Sungai Bilu Public Health Center who lived at the time of the interview with 508 people. Samples taken from the existing population determined by purposive sampling. Case group are mothers with children under-five and wasting. Control was determined based on cases for one control (1:1) with the provisions of data on mothers with children under-five with normal nutritional status based on the body weight/height index with age 659 months, then matching with the closest address to the case or still in one neighborhood association area. The total sample in the study was 72 people. Primary data using the 2016 Ministry of Health Nutrition Monitoring Questionnaire. Data were analyzed using chi-square test and multiple logistic regression tests.

Findings and Discussion

Table 1. Characteristics of Respondent

Variable	Case		Control	
	F	%	F	%
Children under-five years Age				
High risk	28	77.8	11	30.6
Low risk	8	22.2	25	69.4
Gender				
High risk (male)	15	41.7	16	44.4
Low risk (female)	21	58.3	20	55.6
Mother's education level				
Low	27	75	8	22.2
High	9	25	28	77.8
History of exclusive breastfeeding				
No	23	63.9	9	25
Yes	13	36.1	27	75
History of complementary feeding administration				
Risky	24	66.7	13	36.1
No risk	12	33.3	23	63.9
Number of children				
Risky	24	66.7	9	25
No risk	12	33.3	27	75

Table 2. Bivariate Analysis Results

Independent Variable	Children under-five year wasting status						P value	OR
	Wasting		Good nutrition		Total			
	F	%	F	%	F	%		
Children under-five year age								
High risk	28	71.8	11	28.2	39	100	0.0001	7.955
Low risk	8	24.2	25	75.8	33	100		
Children under-five year Sex								
High risk (male)	15	48.4	16	51.6	31	100	1.000	.893
Low risk (female)	21	51.2	20	48.8	41	100		
Mother's education level								
Low	27	77.1	8	22.9	35	100	0.0001	10.500
High	9	24.3	28	75.7	37	100		
History of exclusive breastfeeding								
No	23	71.9	9	28.1	32	100	0.002	5.308
Yes	13	32.5	27	67.5	40	100		
History of complementary feeding administration								
Risky	24	64.9	13	35.1	37	100	0.018	3.538
No risk	12	34.3	23	65.7	35	100		
Number of children								
Risky	24	72.7	9	27.3	33	100	.001	6.000
No risk	12	30.8	27	69.2	39	100		

Relationship between age of children under-five years with wasting

Based on the results of the study, there was a relationship between the age of the child with the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center. The results of this study are similar to studies conducted by Mgongo et al (2017) which states that children under-five year age is associated with wasting events (p-value = 0.0001).[7] Devitasari›s research (2018) shows that children under-five years with poor nutritional status and psychomotor development that are not in accordance with their developmental age because of the mother›s ignorance of the importance of consuming nutritious food to achieve psychomotor development that is appropriate to the age of development and providing stimulation and monitoring of development that not do by old.[8]

The age groups most vulnerable to malnutrition are children who are growing up. As a child gets older the more the body needs the nutrients needed by the body to support the increasing and increasingly diverse physical activities. [9]

Relationship between the sex of children under-five with the incidence of wasting

Based on the results of the study, there was no relationship between the sex of children with the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center. The results of this study are in line with research conducted by Putri (2013) which shows that there was no significant relationship between sex and wasting status, but the proportion of child wasting is slightly greater in the group of boys (15.7%) compared to the group of female children (14.8%).[10] Lestari (2016) shows that the analysis of the relationship between sex and wasting shows that there was no significant relationship between sex and nutritional status of children (p value = 0.528).[11]

Gender is related to values towards a child. Gender inequality occurs when there are different assessments between boys and girls in a community that cause boys and girls to get different treatment, different health care, and different accessibility of resources. The lack of correlation in this study can be caused due to no existence of differences in view of the value of the adopted family to the presence of a child male and female of this region, so that treatment of the family in terms of patterns of parenting, giving meal, the opportunity to access sources of health is equal to boys and girls.

Relationship of mother's education level with the incidence of wasting in children under-five years

Based on the results of the study, there was a relationship between the level of maternal education with the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center. This study is in line with Khikmah's research (2014) which states that there was a relationship between maternal education and nutritional status of children.[12] Mothers who are highly educated are more likely to make decisions to improve nutrition and health in children, besides that mothers are also the primary caregivers for children so that the level of mother's education influences the incidence of stunting in children under-five years.[13]

Relationship history of exclusive breastfeeding with the incidence of wasting in children under-five years

Based on the results of the study, there was a relationship between the history of exclusive breastfeeding with the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center working area. The results of this study are in line with research conducted by Rochmawati (2016) which shows that there was a significant relationship between exclusive breastfeeding and the incidence of underweight nutrition in the work area of the Saigon and Perumnas II Public Health Center (p-value = 0.021).[14] Children who get exclusive or predominant ASI have better nutritional status than partial breastfeeding or who are given additional food/drink <6 months and who have never been breastfed.[15]

Relationship of complementary feeding giving history with the incidence of wasting in infants

Based on the results of the study, there was a relationship between a history of breastfeeding with the incidence of wasting in children under-five years in Sungai Bilu Public Health Center. This is in accordance with research conducted by Hariani et al. (2016), that the pattern of complementary feeding, is associated with infant growth. The better the pattern of complementary feeding, the better the children under-five years growth chart.[16]

Food plays an important role in the growth and development of children. Because children are

growing, their needs for food are different from those of adults. Lack of nutritious food will cause growth retardation of children, so that it can cause an increase in child morbidity and mortality.[17] Complementary feeding for children under-five years is nutritional supplementation in the form of complementary foods with special formulations and fortified with vitamins and minerals targeted at children under-five years group for recovery or fulfillment of nutritional status.[18]

The relationship between the number of children and the incidence of wasting in children under-five years

Based on the results of the study, there was a relationship between the number of children with the incidence of wasting in children under-five years in Sungai Bilu Public Health Center. The number of children under-five years in the family will affect parenting because the time and attention of the mother to the child is divided, which in turn will affect the nutritional status of the child. The number of children in families with sufficient socioeconomic conditions will result in reduced attention and affection received by children, especially if the child is too close. As for families with poor socioeconomic conditions, the large number of children will result in a lack of affection and attention to children, as well as primary needs such as food, clothing and even housing not being met. The birth distance between two babies that is too close causes the inability of the family to care for the children properly. In order for mothers to breastfeed their children during this time, an effort must be made at least 18 months to two years between the birth of one baby and the subsequent pregnancy.[9]

The most influential factor with the incidence of wasting in infants

Based on the results of the study, maternal education is the most influential factor on the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center working area (Exp. B = 31.919). The results of this study are in line with Rahayu's research (2018) which shows that there was a significant relationship between maternal education and nutritional status of children (OR = 2.36). Children under-five years with less nutritional status coming from groups of mothers with less education than with a group of highly educated mothers.[19]

The level of education affects a person in receiving information. People with better levels of education will be easier to receive information than people with less education levels. This information is used as a provision for mothers to care for their children under-five years in their daily lives. Perception itself can be interpreted as a person's perspective on something after gaining knowledge both directly and indirectly.[20]

Conclusion

The factors associated with the incidence of wasting in children under-five in the Sungai Bilu Public Health Center are age, mother's education level, history of exclusive breastfeeding, history of complementary feeding and number of children. The sex factor is not related to the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center working area. Education mother factors are the factors that most influence on the incidence of wasting in children under-five years in the Sungai Bilu Public Health Center working area.

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted to protect the human rights and security of research subjects.

Source Funding: This study was done by self-funding from the authors.

Conflict of Interest: The authors declare that they have no conflict interests.

References

[1] United Nations Children's Fund (UNICEF), World Health Organization, International Bank for Reconstruction and Development The World Bank. Levels and trends in child malnutrition: key findings of the 2019 Edition of the Joint Child Malnutrition Estimates. Geneva. 2019.

[2] Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, Ezzati M, Grantham-McGregor S, Katz J, Martorell R, Uauy R. Maternal and child development and overweight in low-income and middle income countries. The Lancet. 2013. 382 (9890); 427-451.

[3] Achadi LA. Nutrition Problems in Indonesia and Its Global Position. Presented at the Global Nutrition Report Dissemination in Commemoration of the 2015 National Nutrition Day Organized by the Ministry of PPN / Bappenas, Ministry of PMK and Ministry of Health of the Republic of Indonesia. 2015.

[4] Waluyo E, Marlenywati N. Relationship of Nutrition Knowledge and ASI Complementary Feeding Patterns to Nutritional Status at 6-59 Months in Selalong Health Center Work Area, Sekadau Hilir District, Sekadau Regency. Journal of Medicine and Health. 2017. 13 (1); 61-70.

[5] Sungai Bilu Public Health Center. Profile of Sungai Bilu Public Health Center in 2018. Banjarmasin. 2018.

[6] National Population and Family Planning Agency. Indonesia Demographic and Health Survey 2017. BKKBN Publisher. Jakarta. 2018.

[7] Mgongo M, et al. Underweight, Stunting and Wasting among Children in Kilimanjaro Region, Tanzania; a Population-Based Cross-Sectional Study. International Journal of Environmental Research and Public Health; 2018. 14 (509): 1-12.

[8] Devitasari V, Amelia C. Relationship of Nutritional Status with Psychomotor Development in Children under-five years Ages 3-5 Years in the Kinder Garden Kanak-Kanak in Belian District of Batam City Year 2015. Journal of Medicine STM (Science and Technology Medical). 2018. 1 (1); 1-7.

[9] Adriani M, Wirjatmadi B. Nutrition and Children under-five year Health . Kencana Publisher Prenada Media Group. Jakarta. 2014.

[10] Putri RF, Sulastri D, Lestari Y. Factors are Associated with Status Nutrition Children Children under-five years in Region Work Puskesmas Nanggalo Padang. Andalas Health Journal. 2015. 4 (1); 254-260.

[11] Lestari ND. Analysis of Determinants of Nutrition Less on Children under-five year on Kulon Progo , Yogyakarta. Indonesian Journal of Nursing Practice; 2016. 1 (1): 15-21.

[12] Ni'mah C, Muniroh L. Relationships level of education, level of knowledge and patterns of parenting mother with wasting and stunting in children under five families poor. Indonesian Nutrition Media; 2015. 10 (1): 84-90.

[13] Fikrina LT, Rokhanawati D. Relationship between Socio- Economic Level and Stunting Occurrence in Children under-five years Age 24-59 Months in Karangrejek Village, Wonosari Gunung Kidul . Universitas ' Aisyiyah Yogyakarta. 2017.

[14] Rochmawati et al. Nutrition thin (wasting) in children under five in the region work Puskesmas Pontianak. Journal of Health Vocations; 2016. 2 (2): 132-138.

[15] Fikawati S, Ahmad S, Khaula K. Mother and Baby Nutrition. Jakarta: PT Rajagrafindo Persada. 2015.

[16] Hariani RE, Amareta IN, Suryana AL. The pattern of giving care and food co- ation to chart the growth of the card toward healthy (kms). Journal of Scientific Innovation; 2016. 1 (1): 41-46.

[17] Soetjiningsih, Ruh IG, Gde N. Growing Flower Children. EGC Medical Book Publiser. Jakarta. 2013.

[18] Indonesian Ministry of Health. Nutrition Status Monitoring Results (PSG) and Explanation for 2016. Book Directorate of Community Nutrition. Jakarta. 2016.

[19] Rahayu, Ria M, Pamungkasari, Eti P, Wekadigunawan CSP. The Biopsychosocial Determinants of Stunting and Wasting in Children Aged 12-48 Months. Journal of Maternal and Child Health, 2018. 3 (2); 105-118.

[20] Margawati A, Astuti AM. Knowledge mother, patterns of eating and status of nutrition in child stunting aged 1-5 years in the Village Bangetayu, District of Genuk, Semarang. Journal of Nutrition Indonesia (The Indonesian Journal of Nutrition); 2018. 6 (2): 82-89.

Bifid Rib with Additional Oval Intercostal Space: A Rare Case of Anterior Chest Wall Deformity

Ishwar B. Bagoji[1], Gavishiddappa A. Hadimani[1], Ravi S. Bulagouda[2], Shardha Bai Rathod[3]

[1]Assistant Professor, [2]Professor & Head, Dept. of Anatomy, [3]Lecturer, Dept. of Dentistry, Sri B M Patil Medical College, Blde (Deemed To Be) University Bijapur, Karnataka, India

Abstract

Morphological variations in the anterior osseous thoracic skeleton are a rare entity. Its incidence includes accessory bones atypical fusion or non bony fusion of ribs and accessory foramina. Knowledge of these rare skeletal variants is vitally important for surgeons and radiologist performing thoracic surgeries and counting ribs, because such anomaly could mislead them during the procedure. During the routine dissection of adult male cadaver for undergraduate medical students, we observed a variation of bifurcation of anterior end of right third rib and corresponding costal cartilage. These bifurcated ends were joined together to form oval additional intercostal space. Bifid ribs are usually asymptomatic, and usually detected during routine radiographical procedures. It is peremptory that detection of bifid rib can help early diagnosis of Gorlin's syndrome.

***Key words**: Bifid ribs, Intercostal space, Radiographs, Gorlin's syndrome.*

Introduction

Ribs contribute majority of the thoracic skeleton in the mammals, which are twelve pairs of elastic arches that articulate ventrally and dorsally by sternum and vertebral column respectively, forming normally eleven fair of intercostal spaces. These osseochondral spaces contain thin multiple layers of muscular fibres from outside inwards intercostalis externa, interna and intimi respectively, and intercostal nerves and vessels courses through the intercostal groove formed between intercostalis interna and intimi[1]. The ribs are derived from ventral development of the sclerotomic mesenchyme that designs the vertebral arches, initially ribs develop as part of the cartilage model for each vertebra, but in the thorax region, the rib portion separates from the vertebra by the seventh to eighth week. The ossification of the rib takes place in the cartilage model, except for the anterior portion, which remains as the costal cartilage. Growth of the cartilage models for the ribs, sternum and vertebrae allow the enlargement of the thoracic cavity by providing the protection to vital organs. The thoracic skeleton act as dynamic, as it moves at is its various joints, increasing or decreasing the various diameter of the cavity for an extremely important process of respiration. A bifid rib is a congenital neuroskeletal abnormality of the anterior chest wall, which occurs in about 1.2% of humans[2]. Incidence of bifid rib is more common in male than female [3]. Additional intercostal space results from incomplete fusion of cephalic and caudal segments of sclerotomic mesenchyme during 4th to 6th week of intra uterine life[4]. During the mesenchymal and chondrogenic state of development, faulty fusion or anomalous chondrification may give rise to unusual fusion deformities of the ribs[5].

Corresponding Author
Ishwar B. Bagoji Phd
Assistant Professor, Dept. Of Anatomy, Sri B M Patil Medical College, Blde (Deemed To Be) University, Bijapur, Karnataka, India, Mobile: +919964669355
E mail ID: ishwarbagoji@gmail.com

Case Report

During routine dissection for medical students in Department of Anatomy, BLDE Deemed to be University's Shri B M Patil Medical College and Research Centre, Vijayapura. Right sided anterior chest wall variation was observed in a 68 year old male embalmed cadaver. Additional oval intercostal deformity was examined in detail and morphological measurements were recorded. Bifid third rib was present enclosing an

additional intercostal space. Its bifurcation point was near its costochondral junction, the dimensions of the additional space were about 3.4 cm in transverse length and 0.7 cm in vertical length. The upper arched bony bar above the window at costochondral junction measured 1cm in length and the lower arched bony bar below the window at costochondral junction measured 1.3 cm in length. The intercostal space between second and third rib was 1cm at costochondral junction and intercostal space between third and fourth rib costochondral junction was 1.8 cm. The additional external intercostal space was covered by thin fibrous external inter costal membrane. Deep to the membrane the internal costal space was covered by internal inter costal muscle, fibres running down and laterally. Posterior to the internal inter costal muscle, fibres of Sternocostalis muscle were extending over this region. The intercostal vessels were entering additional intercostal space from right internal thoracic artery. The 3rd intercostal nerve running in costal groove was giving a twig to additional intercostal space.

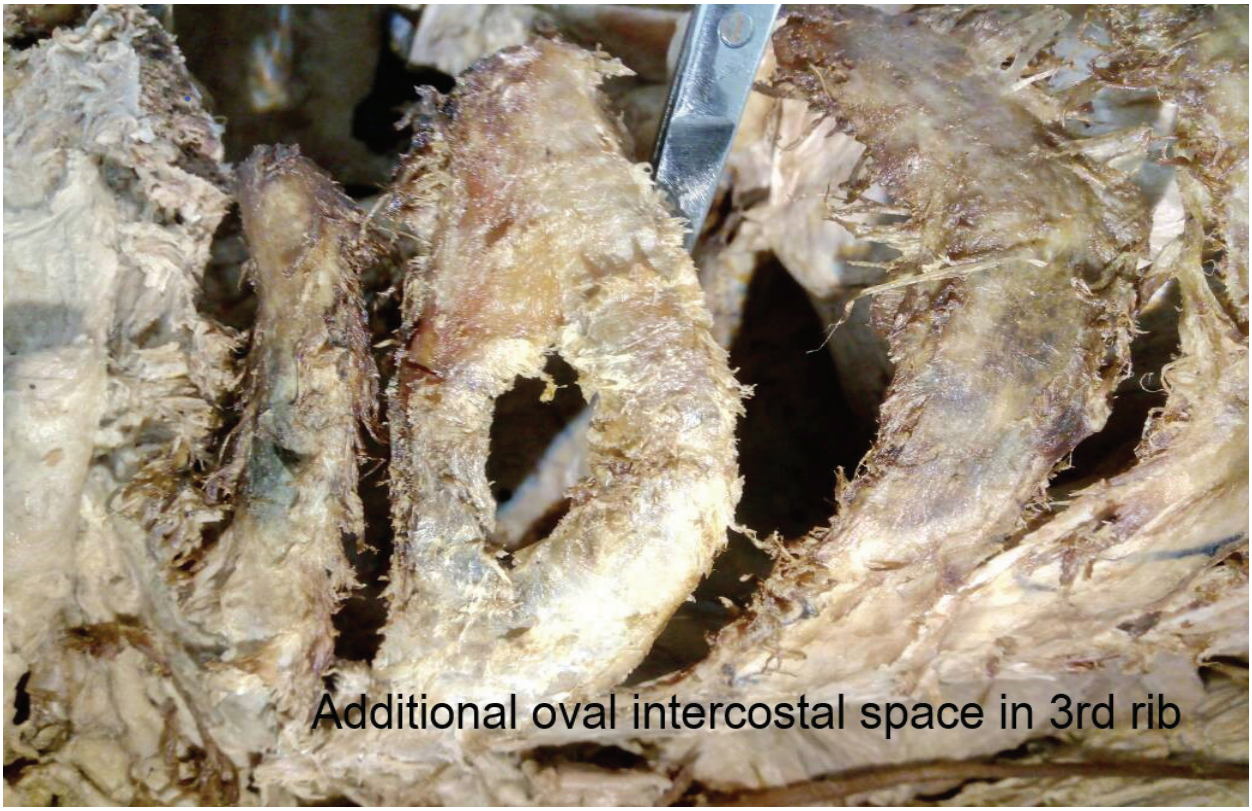


Figure 1 Dissection of Cadaveric thorax of right side showing oval intercostal space intervening between second and third intercostal spaces, encircled by bifid third rib and bifid third costal cartilage

Discussion

Skeletal anomalies in the bones of thorax are recognized as potential cause of thoracic out let syndrome (TOS). Bifurcation of ribs and presence of supplementary intercostal spaces is a very rare variation of the thoracic skeleton. This may be due to gene mutation that strongly alters the anatomy of bone development [6], and bifid rib immensely linked to the alteration of rib development during embryogenesis [7]. The ribs develop from sclerotomal cells of somite at approximately 7th to 8th weeks of gestation, and play a crucial role in subsequent body patterning by governing the formation of all adult segmented structures, the vertebrae and the intervertebral discs, the ribs, muscles, tendons, ligaments, dorsal root ganglia, peripheral spinal nerves, and blood vessels of the adult vertebrate trunk. Disturbance in the segmentation process in vertebrates can result in conditions characterized by fusion of the ribs and spinal deformities or truncations[8]. The segmental border of a somite is defined under the influence of Mesp2, a transcription factor that acts by suppressing the Notch signaling pathway [9], involved in the pace of somite formation. Each somite in the thoracic region

forms the caudal part of one rib and the cranial part of the next caudal rib. Finally, after their formation from unsegmented somatic mesoderm (PSM). Occurrence of congenital skeletal malformation in patients with mutations in Notch-associated genes which exhibit a short trunk due to multiple hemi vertebrae formation accompanied by rib fusions, bifurcations, and deletions. The dermomyotome derived from one somite contributes to the intercostal muscle [10]. Aberrations of ribs probably occur during the process of segmentation and re segmentation of the developing of costal processes from the somites [2]. Mesp 2 also plays a crucial role in defining these regions, by establishing the gene expression pattern within the two halves [9]. The formation of a rib follows a complex pattern that involves the caudal half and the rostral half of two adjacent somites, in children, the bifid and fused ribs are associated with pathologic malformations such as Gorlin-Goltz syndrome [3], which is a rare, autosomal dominant inherited condition. Rib anomalies are generally more common in females than in males, occur more frequently on the right side and usually they are asymptomatic. Studies reported that genetic background influence negative impact on rib development in children, such as trisomy 18, neurofibromatosis, achondroplasia, thalassemia major and mucopolysaccharidosis can increase the relative risk of ribs malformations. Progressive loss of bone matrix and demineralization occurs in case of overactive (hyper) parathyroid gland and vitamin D deficiency, also known as rickets happens when the there is hepato renal dysfunction. Prostaglandins medication, used to treat heart disease in children can also cause abnormal rib development; Additional intercostal space in our case gets nerve supply from 4th intercostal nerve. This indicates that the muscles of this additional space are originated from muscles of the fourth intercostal space. Development of the bifid rib is probably due to disrupted interactions between cephalic and caudal segments of sclerotome during embryogenesis, occurring around the 4th-6th week of fetal life[11].

Conclusion

Skeletal variations in the anterior chest wall may indicate underlying systemic disease. Mal-development of rib at upper end of thoracic cage is due to defective bone segmentation and also associated with variation in disposition of vessels and nerves. Identification of rib anomalies can yield important diagnostic clues in the work-up of patients with congenital bone dysplasia, acquired metabolic diseases, iatrogenic conditions, trauma, infection, and neoplasm's. Awareness of such variations is necessary for physician's radiologist and surgeons during clinical diagnosis and treatment.

Ethical Clearance- Not Taken (for Cadaveric study Ethical clearance is not applicable)

Source of Funding- Self

Conflict of Interest - Nil

References

1. Standring S – Thorax. In: Johnson D, Ellis H, Collins P editors - Gray's Anatomy, 39th ed. London: Elsevier Churchill Livingstone, 2006: 961-968.
2. Kumar N, Guru A, Patil J, Ravindra S, Badagabettu SN - Additional circular intercostal space created by bifurcation of the left 3rd rib and its costal cartilage: a case report. Journal of Medical Case Reports 2013, 7:6.
3. Song WC, Kim SH, Park DK, Koh KS - Bifid Rib: Anatomical Considerations in Three Cases.Yonsei Med J 2009; 50(2): 300-303.
4. Andrea Andrea, Gabrielle Tardieu, Christian Fisahn, Joe Iwanaga , Rod J. Oskouian, R. Shane Tubbs. Bifid ribs: a comprehensive review Anatomy 2016; 10(3):221–7.
5. Datta AK, Essentials of human embryology, 4th ed.2000, Culcutta; Current Book Internation, P No:289-91
6. Ishwar B. Bagoji, M. A. Doshi, Gavishiddappa A. Hadimani. Balappa M. Bannur. Proximal Radio-Ulnar Synostosis-Two case reports J. Chem. Pharm. Res., 2016, 8(4):1267-9.
7. Osawa T, Onodera M, Feng XY, Sasaki N, Nagato S, Matsumoto Y, et al. Two cases of bifid ribs observed in the fourth and the fifth rib. Dental J Iwate Med University 2002; 27:98-103.
8. Giampietro P.F. Progress in the understanding of the genetic etiology of vertebral segmentation disorders in humans. Ann. N. Y. Acad. Sci. 2009; 1151:38–67.
9. Morimoto M, Takahashi Y, Endo M, Saga Y 2005. The Mesp2 transcription factor establishes

segmental borders by suppressing Notch activity. Nature 435: 354–9.

10. P. D. Turnpenny, B. Alman, A. S. Cornier et al. Abnormal vertebral segmentation and the notch signaling pathway in man. Developmental Dynamics, vol. 236, no. 6, pp. 1456–1474, 2007.
11. Sadler TW-Skeletal and Muscular system – Langman's Medical embryology 9th ed. London: Lippincott Williams & Wilkins, 2004: 195-203.

Original article

Clinical Profile and Short-Term Outcomes of Neonates in Material Eclampsia

Jagjit Singh Dalal[1], Monika Dalal[2]

[1]Associate Professor, Department of Neonatology, [2]Associate Professor, Department of Obstetrics and Gynaecology, Pt. B.D. Sharma Post Graduate Institute of Medical Sciences, Rohtak, Haryana, India

Abstract

Introduction: Maternal Eclampsia has shown to contribute to neonatal mortality and morbidities. Aim of the study was to determine the clinical profile and short-term outcomes of neonates born to women with eclampsia at a tertiary care hospital

Method: In this retrospective study case records of all eclampsia mother and their newborn babies were analyzed, Data were recorded from case sheets of mothers, delivery register and baby files. Details were recorded till discharge/death of babies.

Results: Out of 11,661 deliveries there were 113 cases of eclampsia mothers (0.96%). Majority of newborn were born to unbooked mother (95.57%). 57% babies were born by Caesarean section. Out of 113 births, 80.5% babies were live born and 19.5% were still born. Perinatal deaths due to eclampsia was 23%. Out of 91 live births, 45 (49.4%) babies admitted to Neonatal intensive care unit. The common reasons for admission were small for gestational age (43.9%) and low birth weight, hypoglycemia (5.4%), respiratory distress (15.3%), severe birth asphyxia (7.6%) and 4 (4.3%) babies had neonatal death. 87/91 (95.6%) newborns were discharged.

Conclusion: Maternal Eclampsia is one of the prominent etiological factors for neonatal morbidity and mortality. Prematurity, growth restriction and low birth weight are the common neonatal complications seen in babies born to mothers with eclampsia.

Keywords: *Eclampsia, neonatal outcome, morbidity, morbidities, clinical profile*

Introduction

Fetal and neonatal outcomes related to hypertensive disorder varies widely across the world.

Perinatal mortality is higher where lack of neonatal intensive care facilities are Eclampsia is defined as the onset of seizure during pregnancy or postpartum in patients of preeclampsia with >20 weeks gestational age. Eclampsia is life threatening complication of pregnancy worldwide.[2,3] Study (GBD 2015 It is 10 times more in India and is known to contributes to maternal and perinatal mortality[4] Approximately 12-25% of the small of gestational age (SGA) and 15-20% of all preterm birth are attributable to preeclampsia[5]. This study was done to analyze the short-term outcome of babies born to eclampsia mothers.

Objective: To Study the clinical profile and short-term outcomes of neonates born to women with eclampsia at a tertiary care hospital

Method

In this retrospective study case records of all eclampsia mother and babies were analyzed for period of January 2018 to December 2018 at PGIMS, Rohtak, India. All the babies born to eclampsia mothers during this period were included in the study. If mother was

Corresponding Author:
Dr. Jagjit Singh Dalal
43/9J, Medical Enclave, Pt. B.D. Sharma PGIMS, Rohtak-124001, Haryana (India)
E-mail: jagjit.dr@gmail.com

a known case of seizure disorder was excluded from study. A total of 113 babies born with maternal history of eclampsia were included in this study. Information were collected from case sheet, delivery register and discharge cards. Information in detail of maternal profile and neonatal outcome were noted. Study variable of eclamptic patients like age, parity, booking status, gestational age at the time of admission, type of eclampsia, delivery; various perinatal and maternal outcomes e.g. Still births, maternal complications during the delivery were recorded. Neonatal weight, gestation, mode of delivery, apgar, growth category, and complications like respiratory distress, meconium aspiration, hypoglycemia, hypocalcemia, mortality etc were recorded. Data were collected till the time of discharge/death of babies.

Results

A total of 11661 patients delivered within the study period, out of which 113 patients developed eclampsia. The prevalence of eclampsia came out to be 0.96%. The age of eclamptic women in our study varied from 17 years to 32 years (Table 1). Eclampsia was found to be more common in young patients with age < 25 yrs. (74.2%).

Table 1 Maternal characteristics (N=113)

Maternal characteristics	**Percentage (n/N)**
Age < 20yrs	21(18.5%)
21-25 yrs	63 (55.7%)
26-30 yrs	26 (23%)
30-35 yrs	3 (2.6%)
>35 yrs	0 (0%)
Booked	5 (4.43%)
Unbooked	108(95.57%)
Caesarian	65(57.5%)
Vaginal	45(39.8%)
Instrumental	3(2.6%)
primigravida	66 (57.5%)

Maximum patient (57.5%) were primigravida in our study and 71% patient had antepartum eclampsia and only 27 % had postpartum eclampsia. 43% patient were in between gestational age group of more than 36 weeks and only 3.5% patients were <25 week. Most of the mothers were unbooked (95.6%). Fetal distress was the most common indication of caesarean section. (Table 1) Out of 113 babies, 91(80.5%) babies were live born and 22 (19.5%) were still born. Total percentage of perinatal deaths due to eclampsia was 23%.

Table 2 Clinical profile and short-term outcome of live birth babies

Variable	**Vaginal group (n= 91)**
Gestation (wks) mean	36.1±4.8
Birth weight (g) mean	2267
Intra-uterine growth categories Weight < 10th centile, n (%) Weight 10th- 90th centile, n (%) Weight >90th centile, n (%)	 40 (43.9) 49 (53.8) 2 (2.2)
Male gender, n (%)	51 (55)
Meconium stained liquor	10 (10.9)
Severe birth asphyxia	7 (7.6)
Hypoxic Ischemic Encephalopathy	3 (3.2)
Hypoglycemia	5 (5.4)
Hypocalcemia	2 (2.1)
Mortality	4 (4.3)
Respiratory distress	14 (15.3)
Clinical Sepsis	15 (16.4)
Bronchopulmonary dysplasia	3 (3.2)
Discharged	87 (95.6)

Out of 91 live births, 45 (49.4%) babies admitted to NICU and 4 (4.3%) babies had neonatal death. Causes of death include severe birth asphyxia (n=1), prematurity (n=1) and sepsis (n=2). 87/91 (95.6%) newborns were discharged normal. Postnatal complications observed in babies were jaundice, sepsis, meconium aspiration, hypocalcemia, syndrome, hypoglycemia and asphyxia.

Discussion

The prevalence of eclampsia in current study was 9.6 per 1000 deliveries. Higher rates of eclampsia at our center may be related to high referrals received from community health centers, primary health centers, rural hospitals, district hospitals and also from private hospitals.

43.9% babies had intrauterine growth restriction (IUGR) in the present study. Maji[6] showed 65% babies with low birth weight. A study by Kumari A et al[7] showed that a statistically significant higher incidence of number of low birth weight babies (61.8%), IUGR babies (47.2%), preterm deliveries (28.1%) , stillbirths (14.5%) and neonatal mortality (10.9%) in their study. Also similar to our study they also found poor perinatal outcome was associated most commonly with factors such as IUGR, prematurity and low birth weight. Study by Choudhary P et al[8] had stillbirths (14%), neonatal deaths (6%). Still births were lesser than our study but the neonatal death were slightly less in our study.

Study by Haque et found that 60.86% newborn were preterm and 56.52% were low birth weight. In half number of their newborns, Apgar score at 5 minutes was less than 7 but in our study, we had lesser incidence of severe birth asphyxia (7.6%). Birth asphyxia was recorded in 39.1% and low birth weight in 25.8% in another study[10]

Study by Pokharel et al[11] showed that abnormal fetal heart rate, still birth, intrauterine fetal death, birth asphyxia(46.7%), need for resuscitation, low birth weight (33.3%) and intrauterine growth retardation were significantly higher in cases than controls. Our study had 19.5% still born and 80.5% live babies and only 4.3% babies had neonatal death. Neonatal death were 10.9% in study by Kumari et al[7] which was higher than our study. The causes of perinatal death were prematurity, fetal growth restriction, fetal asphyxia and sepsis in our study. Many studies have shown a higher risk of low birth weight and fetal death in eclampsia[8,11–13] similar to our study. The babies also had more respiratory distress in our study possibly because of more IUGR babies who had poor lung growth and also because of meconium. The complications noticed in babies of eclampsia mother were on higher side than the general incidence in neonatal period. Antenatal care, early diagnosis, primary management and referrals need to be improved as in our study most of the mothers were unbooked. There is need to spread awareness and encourage the general public for antenatal care visits and institutional delivery[6].

V. Conclusion:

Eclampsia continues to be one of the prime etiological factors for fetal and neonatal morbidity and mortality. Booking and improved antenatal care of mothers can improve perinatal outcomes. Prematurity, growth restriction and low birth weight are the common neonatal complications seen in babies born to mothers with eclampsia.

Funding: None

Conflict of Interest: None declared

Ethical approval: *Not required*

References

1. Duley L. The global impact of pre-eclampsia and eclampsia. Semin Perinatol. 2009 Jun;33(3):130–7.
2. GBD 2015 Mortality and Causes of Death Collaborators. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016 Oct 8;388(10053):1459–544.
3. Berhe AK, Kassa GM, Fekadu GA, Muche AA. Prevalence of hypertensive disorders of pregnancy in Ethiopia: a systemic review and meta-analysis. BMC Pregnancy Childbirth [Internet]. 2018 Jan 18 [cited 2019 Dec 25];18. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5774029/
4. Onwuhafua PI, Oguntayo A. Perinatal mortality associated with eclampsia in Kaduna, Northern Nigeria. Niger J Med. 2006 Dec;15(4):397–400.
5. American College of Obstetricians and Gynecologists, Task Force on Hypertension in Pregnancy. Hypertension in pregnancy. Report of the American College of Obstetricians and

Gynecologists' Task Force on Hypertension in Pregnancy. Obstet Gynecol. 2013 Nov;122(5):1122–31.

6. Maji B, Samanta S, Banerjee S, Mullick TH, Saharay S, Sarkar D. Clinico-epidemiological profile of eclampsia patients admitted in an urban tertiary care hospital of West Bengal: a record based study. Int J Community Med Public Health. 2018 May 22;5(6):2416.
7. Department of Obstetrics and Gynaecology Government medical College, Nagpur, Kumari DA. Maternal and Neonatal outcome in eclampsia in a tertiary care hospital in India. jmscr. 2017 Jun 16;05(06):23522–33.
8. Choudhary P. Eclampsia: a hospital based retrospective study. Kathmandu Univ Med J (KUMJ). 2003 Dec;1(4):237–41.
9. Haque H, Thapa KK. Maternal and Fetal Outcome in Eclampsia: A Study From Tertiary Care Hospital. J Nepalgunj Med College. 2017 Jun 1;15(2):6–9.
10. Jido TA. Ecalmpsia: maternal and fetal outcome. Afr Health Sci. 2012 Jun;12(2):148–52.
11. Pokharel N, Shrestha M, Regmi M. Maternal, fetal and new born outcomes in pre-eclampsia and eclampsia: a hospital based study. Health Renaissance. 2014;12(2):106–10.
12. Ghimire S. Eclampsia: Feto-Maternal Outcomes in A Tertiary Care Centre in Eastern Nepal. JNMA J Nepal Med Assoc. 2016 Mar;54(201):24–8.
13. Agida ET, Adeka BI, Jibril KA. Pregnancy outcome in eclamptics at the University of Abuja Teaching Hospital, Gwagwalada, Abuja: a 3 year review. Niger J Clin Pract. 2010 Dec;13(4):394–8.

Effectiveness of Mother as a Rehabilitative Aid (MARA) Program in the Recovery of Children with Cerebral Palsy-An Assessor blinded Randomized Controlled Trial

Jayashree K R[1], Kovela Rakesh Krishna[2], Ajay Thakur[3], Pamidigantam Raghava Priya[4]

[1]Undergraduate Student, [2]Associate Professor, [3]Professor and Principal, [4]Lecturer, Vikas College of Physiotherapy, Mary hill, Airport Road, Mangalore

Abstract

Background: Cerebral Palsy is a non-Progressive neuromotor disorder which leads to various impairments and disabilities. There are evidence based Paediatric Physiotherapy approaches for rehabilitating the same. In the recovery of the child literature suggests that home program plays a major role.

Objectives; Till date there is a dearth in the literature which quantifies the home program. To provide Mother as a Rehabilitative Aid Program (MARA) to parents of children with cerebral palsy. To compare the effectiveness of MARA with traditional home program.

Methodology: Mother as a Rehabilitative Aid (MARA) is a unique program which helps the mothers to be a part of rehabilitative team. It is a quantified tailor made treatment protocol to be effectively used by the mothers. The present study aims to see the effectiveness of MARA over traditional approaches for home program in children with spastic diplegic Cerebral palsy children of age 5 to 10 years. The study design is Assessor Blinded Randomized Controlled Trial. The study population divided into MARA group and Controlled group

Results: MARA proved to be effective than traditional home program. T test was used in the statistical analysis. GMFM-88, PBS, Gait parameters all were statistically significant in MARA group than Control group.

Discussion: This study is correlated with previous studies and found to give a clear explanation for parent oriented program with quantifiable outcome measures.

Conclusion: It can be incorporated in the treatment of cerebral palsy children. Students Communication skills improved, Their Practical skills and service oriented mindset generated. They will get good ideas and can able to feel different problems that parents are facing and they got chance to plan their treatment accordingly. For Parents it generates hope and Trust on our profession. Their involvement will be more when their suffering is shared. Parents came to know different other challenges faced by other parents and they Got to know various other methods to overcome. This study leaves a benchmark for more high quality studies on MARA.

Keywords: *Cerebral Palsy, Home Program, Spastic Diplegia, Parent involved treatment*

Corresponding Author:
Mr. Kovela Rakesh Krishna,
Associate Professor, Vikas College of Physiotherapy, Mary hill, Airport Road, Mangalore.
Email id: rakeshkrishna.pt@gmail.com

Introduction

Physiotherapist will come across many children with disability and it's a daily routine that providing treatment and educating parents regarding the treatment and ask them to continue at home. Family centered home program for children with disability plays a

major role in their improvement.[1] Parents especially mother takes care of children most often in Indian scenario. We have noticed that Mothers were not able to give appropriate home program because of lack of quality in providing home program which gives them a clear idea of managing children at home. Mother's perceptions should be unique and focused for their child's improvement.[2,3]Thus we thought of conducting a program which empowers mothers and make them understand their abilities in providing appropriate home program for the early recovery of child suffering with cerebral palsy. Mother as a Rehabilitative Aid (MARA) Program idea was developed by Kovela Rakesh Krishna which gives tremendous insights into carryover and treatment follow up of children with disability.[4] Till date no high quality studies were done on MARA. If MARA is proved to be effective then it will help in setting a bench mark for home program for all the disabled children to have a faster recovery and thus reduces burden of parents. It will also help in maintaining continuity in the treatment as changes in the child will become quite evident. Objectives of the study are to provide Mother as a Rehabilitative Aid Program (MARA) to parents of children with cerebral palsy. To compare the effectiveness of MARA with traditional home program.

Methodology

Study setting was Paediatric Physiotherapy Unit of Vikas College of Physiotherapy. Mothers of Children with Spastic Cerebral Palsy were study population. Study Type was assessor blinded Randomized Controlled trial and Sample size was 30 (15 in each group)Study duration was 2 months, Sampling method was simple random sampling, Randomisation was computer generated random number table and allocation was sequentially numbered opaque sealed envelope. Inclusion Criteria was 1. Mothers of spastic cerebral palsy children of age 5-10 years either gender with GMFCS level I and II. 2. Mothers who are willing to spend time in giving home program and give a feedback every day and should maintain continuity coming to the department. 3. Mothers who can understand local language (Kannada, Tulu) Exclusion criteria: Mothers of Cerebral palsy children will be excluded if the children are suffering with fixed deformities, With recent surgeries involving spine and limbs, Under anti-epileptic medication.

Procedure: Institutional Ethical approval was received, children with spastic cerebral palsy visiting our department were screened for their GMFCS levels[5] and inclusion criteria. Once they met our inclusion criteria an informed consent and assent were taken from parents and children respectively. Parents of the included Cerebral palsy children were divided into two groups through computer generated random number table and allocation by sequentially numbered opaque sealed envelope (SNOSE) into Experimental and control groups. Experimental group received MARA program primarily aiming Gross motor function, balance and gait parameters and control group received traditional home program for one hour a week, for 8 weeks. On the first day of program and on the last day of program assessment was taken by blinded assessor experienced in taking outcome measures through GMFM-88, PBS, Cadence, Stride length and Gait Velocity.

MARA Program: All the mothers of the Cerebral palsy children in the experimental group (15) were asked to assemble in a room. Primary investigator with the help of the guide elaborated the present condition of each child through PPT presentation. Co-investigator elaborated the changes and rationale behind changes. Balance, Gait parameters and Gross motor function were given priority throughout the program. Mothers were given chance to ask their queries regarding treatment. Once their queries are answered, the primary investigator demonstrated the home program through charts with exercises, video recordings and practical demonstrations. Home program which requires minimal handling from mothers were taught to maintain professional integrity. Mothers are made to perform the exercises minimum five times in front of the concerned physiotherapist. Exercises to be done at home were drawn and given to mothers through charts. Mothers were requested to take video recordings every day while giving home program. They are also instructed to maintain a diary. After 8th week comparison was shown to each parent individually about the development of the child and ease in functional activity performance of their child. Finally after 8 weeks, Gross motor function, balance and gait parameters were measured and post treatment outcome measures of Gross Motor function, Balance and gait parameters were taken.

Traditional Home Program, Control group: Mothers in the control group were given home program and asked to give all exercises which are taught to them without fail for 5 days a week, for 8 weeks.

Outcome measures: To measure balance, Paediatric balance scale (PBS)[6] is used. To measure Gait

parameters, Cadence (steps/min), Stride length (cm)and Gait velocity(m/min)[7] was used. To measure Gross motor function, Gross Motor Function Measure (GMFM-88)[8] was used. To measure Lower extremity function, Gross Motor Functional Classification System (GMFCS) was used.

Results

T test was used in Data analysis with SPSS 21 Software

T-Test

Paired Samples Statistics: Table 1

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	GMFM_D_PRE	29.5333	15	2.97289	.76760
	GMFM_D_POST	30.1333	15	2.89992	.74876
Pair 2	GMFM_E_PRE	43.8000	15	4.70865	1.21577
	GMFM_E_POST	44.3333	15	4.56175	1.17784
Pair 3	GMFM_PERCT_PRE	67.8080	15	7.59743	1.96165
	GMFM_PERCENT_POST	69.4040	15	6.65237	1.71763
Pair 4	PBS_PRE	40.2000	15	3.09839	.80000
	PBS_POST	40.7333	15	2.98727	.77131
Pair 5	WALKINGVELOCITY_PRE	59.8000	15	5.25357	1.35647
	WALKINGVELOCITY_POST	59.7333	15	4.97805	1.28533
Pair 6	CADENCE_PRE	78.5333	15	5.13902	1.32689
	CADENCE_POST	79.0000	15	4.91354	1.26867
Pair 7	STRIDELENGTH_PRE	.6207	15	.01907	.00492
	STRIDELENGTH_POST	.6260	15	.01765	.00456

Paired Samples Correlations: Table 2

		N	Correlation	Sig.
Pair 1	GMFM_D_PRE & GMFM_D_POST	15	.961	.000
Pair 2	GMFM_E_PRE & GMFM_E_POST	15	.994	.000
Pair 3	GMFM_PERCT_PRE & GMFM_PERCENT_POST	15	.955	.000
Pair 4	PBS_PRE & PBS_POST	15	.986	.000
Pair 5	WALKINGVELOCITY_PRE & WALKINGVELOCITY_POST	15	.992	.000
Pair 6	CADENCE_PRE & CADENCE_POST	15	.996	.000
Pair 7	STRIDELENGTH_PRE & STRIDELENGTH_POST	15	.963	.000

Paired Samples Test: Table 3

		Paired Differences			
		Mean	Std. Deviation	Std. Error Mean	95% Confidence ... Lower
Pair 1	GMFM_D_PRE - GMFM_D_POST	-.60000	.82808	.21381	-1.05857
Pair 2	GMFM_E_PRE - GMFM_E_POST	-.53333	.51640	.13333	-.81930
Pair 3	GMFM_PERCT_PRE - GMFM_PERCENT_POST	-1.59600	2.33199	.60212	-2.88741
Pair 4	PBS_PRE - PBS_POST	-.53333	.51640	.13333	-.81930
Pair 5	WALKINGVELOCITY_PRE - WALKINGVELOCITY_POST	.06667	.70373	.18170	-.32305
Pair 6	CADENCE_PRE - CADENCE_POST	-.46667	.51640	.13333	-.75264
Pair 7	STRIDELENGTH_PRE - STRIDELENGTH_POST	-.00533	.00516	.00133	-.00819

Paired Samples Statistics Table 4

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	GMFM_D_PRE	25.1333	15	5.06905	1.30882
	GMFM_D_POST	29.0667	15	5.53517	1.42917
Pair 2	GMFM_E_PRE	37.0000	15	8.24621	2.12916
	GMFM_E_POST	40.9333	15	8.58126	2.21567
Pair 3	GMFM_PERCT_PRE	57.9067	15	12.11530	3.12816
	GMFM_PERCENT_POST	65.6840	15	12.96387	3.34726
Pair 4	PBS_PRE	39.8667	15	3.13657	.80986
	PBS_POST	43.7333	15	3.19523	.82501
Pair 5	WALKINGVELOCITY_PRE	61.2667	15	4.84719	1.25154
	WALKINGVELOCITY_POST	57.1333	15	4.54920	1.17460
Pair 6	CADENCE_PRE	80.0000	15	5.39841	1.39386
	CADENCE_POST	83.9333	15	5.04928	1.30372
Pair 7	STRIDELENGTH_PRE	.6387[a]	15	.00990	.00256
	STRIDELENGTH_POST	.7387[a]	15	.00990	.00256

a. The correlation and t cannot be computed because the standard error of the difference is 0.

Paired Samples Correlations Table 5

		N	Correlation	Sig.
Pair 1	GMFM_D_PRE & GMFM_D_POST	15	.993	.000
Pair 2	GMFM_E_PRE & GMFM_E_POST	15	.990	.000
Pair 3	GMFM_PERCT_PRE & GMFM_PERCENT_POST	15	.994	.000
Pair 4	PBS_PRE & PBS_POST	15	.973	.000
Pair 5	WALKINGVELOCITY_PRE & WALKINGVELOCITY_POST	15	.986	.000
Pair 6	CADENCE_PRE & CADENCE_POST	15	.991	.000

Paired Samples Test: Table 6

		Paired ...			
		95% Confidence ...			
		Upper	t	df	Sig. (2-tailed)
Pair 1	GMFM_D_PRE - GMFM_D_POST	-3.49097	-19.071	14	.000
Pair 2	GMFM_E_PRE - GMFM_E_POST	-3.25617	-12.458	14	.000
Pair 3	GMFM_PERCT_PRE - GMFM_PERCENT_POST	-6.87572	-18.501	14	.000
Pair 4	PBS_PRE - PBS_POST	-3.45508	-20.149	14	.000
Pair 5	WALKINGVELOCITY_PRE - WALKINGVELOCITY_POST	4.59508	19.199	14	.000
Pair 6	CADENCE_PRE - CADENCE_POST	-3.49097	-19.071	14	.000

Discussion

Results were analyzed using T tests and SPSS 21 Software. Boys were more in number than girls. Mean age group was 7. Results of control group are shown in tables 1-3. Results of Experimental group shown in tables 4-6. GMFM 88 D&E, Goal % were significantly improved in MARA Group than Traditional group. PBS and gait parameters were also significant in MARA than traditional group. This is the first study in MARA program with outcome measures.

Previous study by Racic M related to home program were shown that it is cost effective and easy to deliver.[9]

Previous study by Arthasarathy states that children with special needs have intimate relationship with parents with higher levels of motivation and protection, in which mothers have more role than fathers.[10] The results of the present study also proves the same that mothers have strong belief and can work harder to gain benefit in their children.

A study by Domenech Et al states that mother caregivers have a positive perception of the physical therapy treatment. They value and recognize the benefits of the treatment, by emphasizing that it provides for the physical, psychological and social recovery of their children.[11] the present study has proved that the mothers have positive perception and positive inclination to home program.

Conflict of Interest: None

Fund: Rajiv Gandhi University of Health Sciences, Bangalore.

Acknowledgement: Authors thank Rajiv Gandhi University of Health Sciences, Bangalore for funding the study

References

1. King S, Teplicky R, King G, Rosenbaum P. Family – Centered Service for Children with Cerebral Palsy and Their Families: A Review of the Literature. Seminars in Paediatric Neurology. 2004;11(1):78-86.
2. Hinojosa J, Anderson J. Mothers Perceptions of Home Treatment Programs for Their Preschool Children with Cerebral Palsy. American Journal of Occupational Therapy.1991;45:273-79.
3. Piggot J, Pterson J, Hocking C. Participation in home therapy programs for children with Cerebral Palsy: a compelling challenge. Qual Health Res.2002;12(8):1112-29
4. Krishna KR, Kumar DKU, Baliga MN. Mother as a Rehabilitative Aid (MARA) A Unique Program for Mothers of Disabled Children. International Journal of Creative research and thoughts.2018;6(1): 772-775.
5. Bodkin A, Robinson C, Perales F. Reliability and Validity of the Gross Motor Function Classification System for Cerebral Palsy. Pediatric Physical Therapy 2003;15(4): 247-252.
6. Franjoine MR, Gunther JS, Taylor MJ. Paediatric balance scale: A modified version of berg balance scale for the school-age child with mild to moderate motor impairment. Paediatr Phys Ther. 2003;15(2):114–28.
7. Kumar C, Ostwal P. Comparison between Task Oriented Training and Proprioceptive Neuromuscular Facilitation Exercises on lower extremity function in Cerebral Palsy-A Randomized Clinical Trial. J Nov Physiother 2016;6(2):1-9.
8. Ko J. Kim M. Reliability and Responsiveness of the Gross Motor Function Measure-88 in Children With Cerebral Palsy. Physical Therapy 2012;93(3):393-400.
9. Racic M, Kusmuk S, Krstovic-Spremo V. Effectiveness of the Home-based Habilitation Programme for Children with Cerebral Palsy. Indian Journal of Physical Medicine and Rehabilitation. 2014;25(1):6-12.
10. Dr. K. Arthasarathy D. Parent-Child Relationship: Perception of Differently Abled Children. International Journal of Scientific Research. 2012;2(4):360-361.
11. Domenech A, Tavares K, Ruedell A, Nobre J. Cerebral palsy: the meaning of physical therapy for mother caregivers. Fisioterapia em Movimento. 2016;29(4):757-766.

Effectiveness of Drumstick Leaves Juice on Hemoglobin Level among Reproductive Age Group Women in A Selected Community Area, Bathinda, Punjab

Jayasree GS[1], Shridhar.K.V[2], Mandeep Kaur[3], Simranjit Kaur[4]. Anita Rani[5]

[1]MSc. Nursing, Adesh College of Nursing, Adesh University, [2]Profesor Adesh College of Nursing, [3]Asst.Professor Adesh College, [4]Asst, Professor Professor Adesh College of Nursing

Abstract

Anemia is considered as most common cause of malnutrition and it has great significance in public health affecting children adolescents and reproductive age group women in worldwide.[1] **Objectives:** To assess the level of hemoglobin level among women in reproductive age group, before administration of drumstick leaves juice supplementation for both experimental and control group. To assess the effectiveness of drumstick leaves juice supplementation on hemoglobin among women in reproductive age group in experimental group. **Method:** The research approach was a quasi experimental study was done by one month of period, in 60 reproductive age group women (15-45) in the army cantonment area Bathinda Punjab. Drumstick leaves juice was freshly prepared and administer for 30 days .pre test and post test estimation of hemoglobin was done be using cyanmethamoglobin method. **Result**: The mean hemoglobin level of experimental group before administering 100ml drumstick leaves juice was 11.43 with a standard deviation ± 0.91 The mean hemoglobin level of experimental group after administering 100ml drumstick leaves juice was ±12.36 with a standard deviation is ± 0.69.the p value is 0.69. **Conclusion:** Comparing to control group the hemoglobin level of experimental group is improved.

Key words: *anemia, drumstick leaves, reproductive age.*

Introduction

Anemia is one of the most common nutritional disorders and it has public health importance in developing countries like India where it is the most widespread nutritional problem in adolescents and women of reproductive age.[2] WHO has estimated that prevalence of anemia in pregnant women is 14% in developed countries and 51% in developing countries while it is 65-75% in India. As a result, about one-third of the global population (over 2 billion) is anemic.[3] According to world health organization (WHO) the hemoglobin level should be 12 g/dl for women's. When the hemoglobin level less than 12 g/dl is considered as iron deficiency anemia.[4] WHO/UNICEF/ UNU graded the hemoglobin level . The most common type of anemia is due to nutritional factors and is also found especially among women of childbearing age group (15-49 years), pregnant, and lactating mothers.[5] Nutritional anemia is a worldwide problem, with the highest prevalence in developing countries. The etiology of anemia in India is not well established and the information available is limited in representativeness of the whole country.[6]

Objectives

1. To assess the level of hemoglobin level among women in reproductive age group, before administration of drumstick leaves juice supplementation for both experimental and control group.

2. To assess the effectiveness of drumstick leaves juice supplementation on hemoglobin among women in reproductive age group in experimental group.

3. To compare the level of hemoglobin among women in reproductive age group between control group and experimental group after post test.

Method

A quasi experimental (one group pre-test and post-test with control) design including demographical

variables and the hemoglobin level was assessed by cyanmethemoglobin method. The researcher approached the reproductive age group eligible women and those who were willing to participate in the study. Pre- test was conducted in the first day of data collection and Followed by that 100 ml of freshly prepared drumstick leaves juice was administered to the experimental samples. **Intervention**: Drumstick juice is prepared by boiling 1 kg of drumstick leaves with 4.5 liter of water and makes it boil 45 minutes and strain it well. It will give 4 litre of drumstick leaves juice then add two drops of lemon juice in it for every 100 ml of drumstick leaves juice**.** The juice administered continuously for 30 days and followed that 30th day hemoglobin level again assessed by same clinical method. Post- test was conducted for both experimental and control group

Design:

Quasi experimental (One group pre-test and post-test control group design)

Setting of The Study

Staff residence of cantonment, Bathinda

Sample Size

60 reproductive age group women.

Inclusion Criteria:

1. The reproductive age group women of 15 – 45 years.

2. Women who are willing to participate

3. Women who are having hemoglobin level between 7-13 gm/dl

Exclusion Criteria:

1. Persons who are having hemoglobin level less than 7 and above 13 gm/dl

2. Women who are having any other blood disorders such as sickle cell anemia,

And thrombocytopenia.

Tools and Methods of Data Collection

The data was collected by using standardized estimation of hemoglobin level by cyanmethemoglobin method.

Descriptive Statistics

Mean, medium and standard deviation

Inferential Statistics

Chi - Square

Results

1. Before administering drumstick leaves juice by conducting pre test estimation of haemoglobin was found that the mean value of hemoglobin in experimental group was 11.43 with a standard deviation is ±0.91 and control group mean haemoglobin level was 11.40 with a standard deviation was ±0.92

2. After the administration of drumstick leaves juice ,the mean haemoglobin value of The mean value of hemoglobin level for experimental group is 12.36 with a standard deviation is±0.69 and the control group mean value is 11.41 with a standard deviation is ±0.92.The p value is significant at **<0.001 level** of significance.

3. **T**here is a significance difference between pretest hemoglobin level mean value is (11.43) with a standard deviation (0.91) and posttest level of hemoglobin mean value is (12.36) with a standard deviation is (0.69).

4. In the present study paired t- test was done to compare between pre- test and post- test to compute the mean haemoglobin level. The results showed a significant difference, **(p<0.05)**.

Conclusion

- This study shows the effectiveness of drumstick leaves juice on hemoglobin level among reproductive age group women. The results provided valuable information to the effectiveness of drumstick leaves juice on improving haemoglobin level. And effectiveness of administration of drumstick leaves juice was seen from the results of post- test depicts that there was significant increase in the level of haemoglobin among reproductive age group women.

- This study concluded that the administration of drumstick leaves juice an effective way to improve the haemoglobin level in reproductive age group women.

Discussion

The mean hemoglobin level of experimental group before administering 100ml drumstick leaves juice was

11.43 with a standard deviation ± 0.91 and in control group mean was 11.40 with a standard deviation ± 0.92. There is no significance difference between the hemoglobin level and the women in reproductive age group before administration of drum stick juice (p value is 0.899). In present study during the comparison of hemoglobin level before and after administering100ml drumstick leaves juice, it was found that there was a significant difference between mean hemoglobin level before and after administering the drumstick juice was present.

It was observed that the administration of the drumstick leaves juice on hemoglobin level among reproductive age group women had a significant increase in their post test estimation of hemoglobin. In present study during the comparison of hemoglobin level before and after administering 100ml of drumstick juice, it was found that there was a significant difference between mean hemoglobin level before and after administering100ml of drumstick juice in experimental group. The P value is significance at <0.001 level of significance.

This finding was supported by a Quasi experimental study which was conducted to evaluate the effectiveness of drumstick leaves juice to increase the hemoglobin level among adolescent girls with anemia in selected homes at Madurai, The sample size was 40 which was selected by using the non probability purposive sampling method. The pre intervention level of hemoglobin was done and the drumstick leaves juice was administered for 15 days and the post intervention level of hemoglobin was done. The results shown that, in the level of hemoglobin 23 (57.5 %) had mild level of anemia and 17 (42.5 %) had moderate level of anemia in the pre-test and 24 (60 %) had mild level of anemia and 16 (40 %) had no anemia in the post-test. It shows that there is a difference between the pre and post level of hemoglobin. That shows that there is a significant difference between the mean score after the intervention. The obtained "t" 9.44 value was found to be extremely significant at the level of $p < 0.01$. It was observed that the administration of the drumstick leaves juice for adolescent girls with anemia had a significant increase in post test estimation of hemoglobin.[8]

RECOMMENDATIONS

On the basis of the findings of the study the following recommendations have been made:

1. Similar study can be undertaken with a large sample to generalize the findings.

2. The study can be conducted in different settings with similar facilities.

Acknowledgement: I take immense pleasure to express my sincere gratitude and heart full thanks to my respected teacher and guide **Mr.Shridhar K.V Professor & H.O.D of Department of Medical Surgical Nursing** and **Principal** of College of Nursing, Adesh University,

Conflict of Interest: No

Source of Funding: Self

Ethical Clearnce: Ethical approval to conduct the study was obtained from the institutional Ethical Committee of Adesh University, Bathinda, Punjab.

References

1. Women's health. http://www.searo.who.int/topics/women/en/. Accessed on Jan 7th, 2019.
2. Dr. Ramesh Chellan ,Prevalence of Iron-Deficiency AnemiainIndia:Resultsfrom a Large Nationwide Survey. Journal of population and social studies August2007- July 2010 August2007, Volume 19. page no 58-71.
3. Ganapathi KC, Kumar KS. A cross-sectional study of anemia among women of reproductive age group (15-49 years) in a rural population of Tamil Nadu. International Journal of Medical Science and Public Health. 2017 Mar 1;6(3):524-30.
4. Mishra P, Ahluwalia SK, Garg P, Kar R, Panda G. The prevalence of anemiaamong reproductive age group (15-45 yrs) women in a PHC of rural field practice area of MM Medical College, Ambala, India. J Women's Heal Care. 2012;1(3):3-5.
5. Suzana D, Suyatna FD, Andrajati R, Santi PS, Mun'im A. Effect of Moringaoleifera Leaves Extract Against Hematology and Blood Biochemical Value of Patients with Iron Deficiency Anemia. Journal of Young Pharmacists. 2017;9(1):S79
6. Chellan R, Paul L. Prevalence of iron-deficiency anemiain India: Results from a large nationwide survey. Journal of population and social studies. 2010 Jan;19(1):59-80.
7. Kariyeva GK, Magtymova A, Sharman A. Anemia. Chapter. 2000;12:141-7.
8. Priyanka.m , Evaluate the effectiveness of drumstick

leaves juice to increase haemoglobin level among adolescent girls with anemia in a selected homes at madurai district. October – 2015.

Morbidity, Physical Disability and Health Security of the Greying Population in India: Distributional Profile and Implications

K Gangadharan[1], Sajith Kumar S[2]

[1]Project Director, [2]Research Associate, ICSSR IMPRESS Research Project, Department of Economics, Kannur University Dr.Janaki Ammal Campus, Palayad

Abstract

Ageing involves multidimensional changes including those in the biological, psychological and social spheres of a person's existence. Based on the IHDS 2011-12 the study tries to analyse the morbidity/ disability status and the income and expenditure coverage incurred for treatment of the 60 plus folks in the country. High Blood Pressure, diabetes and Asthma are the most prevalent morbidity types among the aged people and these are suffered through out of the rest of life. The inadequate care and support in the older age creates stress and makes the infirmity problem more severe. Accessibility and quick improvement in health condition become the major reason for preferring the allopathic treatments. Availing any sort of pension or health insurance schemes is the possible way that makes the elderly more independent and stable. However the data reveals that the percent of elderly availing these services are slight in number. Financial burden and dependence force them to skip their treatment or to ignore the affliction, this makes their health condition more severe and further leads to more illness.

Key Words: *Health, Health care, Health Security, Ageing*

Introduction

The world is greying rapidly with the rate of growth of ageing population exceeding the general population[1]. Ageing refers to the process of growing old or changes that occur with the passage of time. It involves multidimensional changes including those in the biological, psychological and social spheres of a person's existence. The elderly form a high risk group for multiple morbidity; physical, mental and social among others. Chronic and degenerative diseases, physical defects continue for a long period making health maintenance difficult for the aged. Ageing, as it is fraught with many unpleasant changes like disease, disability, dependence, frailty and the prospect of dying, may induce anxiety and apprehension. Thus ageing is a source of stress by means of physical, social and economic perspectives[2]. The higher degree of tolerance to disease conditions in old age as something normal is also a contributory factor to the prevalence of improperly treated disease conditions in old age. Therefore, there is an urgent need for propagation of proper attitudes and health behaviour in old age and change the negligent outlook both in the elder himself and the significant others around who care for him[3].

Quality of life at any age is influenced by the health status and health is considered a significant personal and social resource. A significant relationship between poor health and low satisfaction and psychological distress has been found in earlier studies on older persons. It implies that, chronic illnesses and disability increase with age. The proportion of persons with chronic illness rises from 38 percent in the 60 + group to 45 per cent in the 65+ age group to 54 per cent in the 70+ group. Nearly 60 per cent of the subjects above 60 year of age suffered from some long term illness that required frequent visits to doctors[4].

The difference between the number and proportion of old people must be borne in mind as the former has economic implications while the latter defines requirements for amenities and services. In the coming decades, the elderly population will constitute a large proportion of the population. This will create more burden on the existing health care service availability

and utilization. The general health care delivery system in India is itself very inadequate[5]. In this backdrop this paper seeks to review the current state of art in the area of health care, morbidity and health security among the elderly. It is primarily concerned with identifying the morbidity and disability status of the aged with respect to their financial status in terms of pensions and health insurance availability.

Objectives of the Study

The study points to evaluate the following objectives

(i) To examine the morbidity and disability status of the elderly population in India

(ii) To examine the pattern of health security and health expenditure for outpatient care for the elderly population across treatment.

Materials and Method

The study uses the extracted data from Indian Human Development Survey (IHDS 2011-12), conducted by National Council of Applied Economic Research and the University of Maryland. It involves a large scale national representative data that covered all Indian states and 4 union territories of India. The number of elderly respondents covered in the study is 21922.

Results and Discussion

The problems of the aged are truly multidimensional and call for a multi- sectoral approach involving health, social, economic and other disciplines almost simultaneously. The most common chronic health problems of the aged in the developed world include hearing impairment, cardio vascular diseases, diabetes, dementia and cognitive functions and cancer. But for countries like India, we need to add blindness, respiratory disorders, nutritional deficiencies etc. Over 75 percent the elderly in India are from the rural areas and over 80 percent come from the unorganized sector underlining the fact that meeting health care needs of the aged folks become a serious problem in terms of access, availability and health security. Table 1 presents the age and gender status of the 60 plus respondents surveyed in IHDS 2011-12.

Table 1. Gender wise Age status of the respondents

Age Category	Gender		Total
	Male	Female	
60-69	6262	6665	12927 (59.0)
70-79	3064	3351	6415 (29.3)
80-89	989	1717	2106 (9.6)
90-99	207	267	474 (2.2)
Total	10522 (48)	11400 (52)	21922

Source: IHDS 2011-12[6]

Figures in parenthesis are percentage to total respondents (N)

The survey conducted among 21922 respondents aged 60 years and above, out of this 52 percent are female and 10522 are male. Almost 59 percent of the total respondents belongs to the 60 to 69 age group; possibly the younger and most active group among the elderly. The representation of female respondents in all the four age group is evident from the table.

Table 2 reveals the major morbidity type among the 60 plus respondents considered for the study.

Table 2. Major Morbidity problems among aged respondents

Morbidity type	Status (Number of Respondents)		
	No	Relieved	Yes
TB	21705 (99.0)	53 (.2)	164 (.7)
BP	19157 (87.4)	31 (.1)	2734 (12.5)
Heart Diseases	21224 (96.8)	26 (.1)	672 (3.1)
Diabetes	20311 (92.7)	20 (.1)	1591 (7.3)
Cancer	21862 (99.7)	8 (.0)	52 (.2)
Asthma	20952 (95.6)	13 (.1)	957 (4.4)
Paralysis	21445 (97.8)	19 (.1)	458 (2.1)
Epilepsy	21830 (99.6)	3 (.0)	89 (.4)
Mental Illness	21807 (99.5)	3 (.0)	112 (.5)

Source: IHDS 2011-12

Table reveals that Blood Pressure, diabetes and Asthma are the most severe/prevalent morbidity types among the aged people. The low values corresponding to the morbidity relieved group indicates the long term vulnerability of diseases in the old age. Ailments in the old age are a type of morbidity trap and they can't revive from the ill health condition.

More than the long term morbidity the physical disabilities like infirmity in Hearing, walking, speaking and vision affects the normal life and routine of the aged person. Since all these problems are associated with the older age, the exposure such disabilities are prolonged. Many elderly in their later years suffer from disability either physical or mental or both. Physical disability refers to impairment of skills in performing personal, self-help activities and psychological disability manifests due to impairment in cognitive functions viz., memory, understanding ability, concentration etc. Assessment of disability is important to take decisions about the chronicity of disablement of a person or the need for financial assistance. These physical and mental disabilities increase the incapacity in performing self-help activities and dependency. As a consequence, the transition from illness to disabilities and imposed functional limitations, the burden on the caregiver increases. The disability status of aged respondents with respect to their social background is presented in the Table 3.

Table 3. Disability status of the 60 plus respondents

Variables	Category	Type of disability and the number and percent of Disabled					Total *
		Hearing	Speaking	Far sight	Short sight	Walking	
Age	60-69	677 (5.24)	364 (2.82	1742 (13.48	1456 (11.26)	1934 (14.96)	12927
	70-79	848 (13.22)	411 (6.41)	1379 (21.50)	1208 (18.83)	1761 (27.45)	6415
	80-89	498 (23.65)	255 (12.11)	689 (32.72)	601 (28.54)	893 (42.40)	2106
	90-99	145 (30.59)	84 (17.72)	173 (36.50)	155 (32.70)	238 (50.21)	474
Gender	Male	926 (8.80	460 (4.37)	1640 (15.59)	1392 (13.23)	1896 (18.02)	10522
	Female	1242 (10.89)	654 (5.74)	2343 (20.55)	2028 (17.79)	2930 (25.70)	11400
Location	Rural	761 (5.11)	761 (5.11)	2753 (18.50)	2315 (15.56)	3349 (22.51)	14880
	Urban	353 (5.01)	353 (5.01)	1230 (17.47)	1105 (15.69)	1477 (20.97)	7042
Detailed Location	Metro Urban	92 (7.11)	53 (4.10)	279 (21.56)	252 (19.47)	237 18.32)	1294
	Other Urban	495 (8.60)	300 (5.21)	951 (16.52)	853 (14.82)	1241 (21.56)	5756
	More Developed Village	826 (11.31)	417 (5.71)	1479 (20.25)	1279 (17.51)	1805 (24.71)	7304
	Less Developed Village	755 (9.98)	344 (4.55)	1274 (16.83)	1036 (13.69)	1543 (20.39)	7568
Marital Status#	Married, Spouse Absent	26 (10.28)	21 (8.30)	50 (19.76)	41 (16.21)	54 (21.34)	253
	Married	994 (7.46)	494 (3.71)	1975 (14.83)	1684 (12.65)	2314 (17.38)	13317
	Unmarried	24 (11.54)	13 (6.25)	32 (15.38)	28 (13.46)	44 (21.15)	208
	Widowed	1116 (13.82)	581 (7.20)	1914 (23.70)	1659 (20.54)	2393 (29.63)	8075
	Separated/ Divorced	7 (10.29)	4 (5.88)	11 (16.18)	7 (10.29)	20 (29.41)	68
Total**		2168 (9.89)	1114 (5.08)	3983 (18.17)	3420 (15.60)	4826 (22.02)	21922

Source: Authors calculation based on IHDS 2011-12 Figures in parenthesis are percentage to row total. *Total respondents in each category including persons with no disability. **Total respondents within each disability group and the figures in parenthesis are percentage with row total (N).

It is a general belief that disability increases with increase in age. The table make sense to this belief and a higher level of disability rate is found among respondents with more age; seniors of the senior citizens. Mobility and vision are the two factors that help elderly maintain their independence in old age[7]. However, the table reveals that disability in walking and far sight are the most severe problem found among the older respondents. It is highly evident from the study that, compared to the aged male, females are more subjected to all these disabilities. Also, there was a greater rise in disability among the females than the males. Some of the reasons for this include the neglect in healthcare, poor workforce conditions, and gender-based violence. Physical disability status of aged people in rural and urban area does not derive too much difference, though, a detailed analysis reveals that rural people age more prone to all these difficulties. While analysing the disability status of the aged respondents it is a noteworthy mention that higher level of disability is found among unmarried and widowed/separated respondents. The inadequate care and support in the older age creates stress and makes the infirmity problem more severe. Thus it is evident that lack of care, dependence and support is the major cause for wide spread disability among the older persons. Social and health morbidity is found to be associated with low socio-economic status and the female gender

The increasing level of morbidity and disability among the aged creates a more dependence on public and private health care delivery mechanisms. The coping capacity of these health system services is a matter of worry. Most of the elderly lacks enough financial support and are dependent on their family. The increased medical expenditure forces them to skip from treatment or ignore the vulnerability. Thus, the cost for treatment also play an important role in deciding the accessibility of health care utilization and the severity of morbidity condition. The table 4 analyse the cost of morbidity treatment for major treatment type and services and the availability of medical insurance to cope with the ever increasing health care expenditure.

Table 4. Cost for different treatment type and insurance coverage

Treatment Type	Doctor/hospital Fee		Medicine Cost		Travel Expenditure		Expenditures covered by Medical Insurance	
	A*	B**	A	B	A	B	A	B
Allopathic(Pain killer/ Cough syrup)	276	8407.63	276	2386.89	276	382.79	271	22.36
Allopathic (Antibiotic)	1264	6806.95	1264	3655.64	1263	623.42	1223	365.68
Other Allopathic	4581	8198.20	4581	3039.32	4581	517.37	4537	191.48
Ayurveda	179	6051.48	179	3487.22	179	715.67	178	6.74
Homeopathy	135	6131.59	135	3749.35	135	744.86	129	222.19
Home/Herbal remedy	24	3396.67	24	3434.17	24	320.00	24	.00
Surgery	320	23310.44	320	3940.52	320	1077.44	316	1879.40
Others	85	11719.55	85	5090.47	85	1303.29	83	174.55
Total#	6864	8585.15	6864	3221.02	6863	576.28	6761	289.94

Source: Authors Calculation from IHDS 2011-12 data

A* Number of respondents availed services, B** Mean Expenditure incurred,

#Number of respondents availed treatment/services

The table makes it clear that allopathic treatment is the most preferred method among the elderly population. Accessibility and quick improvement in health condition become the major reason for the dependency on pain killer and antibiotic in allopathic treatments. Sugary is the most expensive treatment however, allopathic treatments require more expenditure for medicine. The average cost for travel or the expenditure for travel incurred by the patients is higher for surgery and homeopathic treatments than in allopathic. The repeated visit for check-ups and treatment make them more expensive than the rest of the items.

Various health/medical insurance helps the patients to cover a part of their burden of medical expenditure. The table 4 makes it clear that the number of respondents availing the service of medical insurance is too meagre. Patients opting allopathic treatment and surgery avails the majority of the insurance coverage. It is a positive sign that the patients incurring higher treatment expenditure avails significant part of the medical insurance.

The financial status of the aged person is always become a trouble and majority depends on their children/family for meeting their financial needs. Govt Implements various social security measures like pensions to ensure minimum financial security to the aged and vulnerable sections of the society. Every elder persons is eligible for old age pension if he does not avail any other financial support from authorities. The table 5 presents the status of availing various pension by old age people.

Table 5. Number of Aged people availing any sort of pension

Pension Type	Response	Number of Respondents	Percent
Old Age pension	No	17864	81.5
	Yes	4058	18.5
Widows Pension	No	20768	94.7
	Yes	1154	5.3
Disability Pension	No	21847	99.7
	Yes	75	.3
Annapurna	No	21884	99.8
	Yes	38	.2
Other Government	No	21909	99.9
	Yes	13	.1
NGOs	No	21908	99.9
	Yes	14	.1
Any Other	No	21882	99.8
	Yes	40	.2
Total Respondents		21922	100

Source: Authors Calculation from IHDS data

From the table it is clear that the number of respondents availing any sort of pension is too small. Old age pension is the most received source of income followed by widow pension and the contribution from the rest of schemes is insignificant. The level of disability in the old age is higher in age compared to the other age groups, even though the number of people availing disability pension is also meagre.

Suggestions and Conclusion

The level of disability and morbidity among the aged person is very high compared to the counterparts. This makes a very high rate of dependents on health care institutions and the cost for treatment in the form of fees, medicines and transportation is also very high. The financial status of most of the aged respondents is too poor and majority of them are financially dependent on their family. Availing any sort of pension or meeting the health expense from various health insurance schemes is the possible way that makes the elderly more independent and stable. However the data reveals that the percent of elderly availing these services are minor in number. Financial burden and dependence force them to skip their treatment of to ignore the morbidity/disability affliction, this makes their health condition more severe and further leads to more illness.

Appropriate health education of all age groups with an emphasis on their contribution to good health in old age is the only way of forestalling disease, disability and dependence in old age. An appropriate health attitude and health practice programme becomes an integral part of coping with ageing ensuring better health in old age. The State supported health care programmes targeted for the elderly are quite inadequate due to economic constraints is well known. Geriatric health care yet does not figure top on the nation's health agenda even while there are more urgent issues like cataract, a serious social and economic liability crippling over 11 million elderly yet to be completely addressed.

Conflict-of-Interest Statement: The authors have no competing interests.

Source of Funding: The research paper is the outcome of IMPRESS Research Project Funded by ICSSR.

Ethical Clearance: The article does not need any ethical clearance.

References

1. Kumar V. Ageing in India- an overview. *Indian Journal of Medical Research*. 1997, 06: 257-64.
2. Kurup, AM. The challenge of ageing in India. In: Kumar V. editor. *Ageing: Indian Perspective and global scenario*. New Delhi: All India Institute of Medical Sciences 1996, 23-35.
3. Reddy LK. Health and attitude towards health among elderly. In: Kumar V. editor. *Ageing: Indian Perspective and global scenario*. New Delhi: All India Institute of Medical Sciences 1996, 231-241.
4. Lakshmanadu M. Rheumatic complaints and health care utilization patterns among the elderly in a Tamil Nadu town, India. In: Kumar V, editor. *Ageing: Indian perspective and global scenario*. New Delhi: All India Institute of Medical Sciences 1996, II. 5-6
5. Arun P, Bali. Socio-economic status and its relationship to morbidity among elderly. *Indian Journal of Medical Research*. 1997, I (06), 349-360.
6. Indian Human Development Survey (IHDS 2011-12), www.ihds.umd.edu
7. Agarwal G, Arokiasamy P. Morbidity prevalence and health care utilization among older adults in India. *Journal of Applied Gerontology*. 2010, 29(2):155–179.

(Original Research Article)

Significance of Chemical Composition Analysis in Urolithiasis

Karanpreet Bhutani[1], Upinder Singh[2], Punam Rani[3]

[1]Assistant Professor, Biochemistry, MMIMSR, MMDU, Mullana, [2]Consultant Orthopedician, Prime Hospital, Patiala, [3]M.sc Medical Biochemistry, MMIMSR, MMDU, Mullana

Abstract

Introduction: Urolithiasis is the formation of stones in the urinary tract. Between 1% and 15% of people globally are affected by kidney stones at some point in their lives. Knowledge of chemical composition of Renal stones may be helpful in clinical management of patients as well as in reducing risk of prevalence and recurrence of stones in this region.

Aims and Objectives: To analyse the chemical composition of Urinary tract stones.

Material and Method: The present study included 100 uroliths obtained by surgical intervention of Urolithiasis patients diagnosed at MM Institute of Medical Sciences, MMDU , Mullana from August 2018 to October 2019. The powdered form was qualitatively analyzed for their chemical composition adopting standard methods.

Results: In the present study, out of total 100 patients, the incidence of urolithiasis was more in males (72%) compared to females(28%).Distribution of stones based on their location, showed a high incidence of stones in the ureter (42%), followed by Bladder (26%) and Urethra (19%). Calcium oxalate was the most predominant chemical composition in the stones analyzed (63%), followed by Uric acid (18%). Calcium carbonate, Calcium phosphate and Magnesium Ammonium phosphate were predominant in 8%, 6% and 5% of stones respectively.

Conclusion: Analysis of the chemical composition of stones and knowledge of its etiology will help in improving the management of patients with Urolithiasis.

Key Words: *Urolithiasis ; Chemical ; Ureter; Calcium; Oxalate*

Introduction

Urolithiasis is the formation of stones in the urinary tract.A small stone may pass asymptomatic[1] If a stone grows to more than 5 millimeters, it can cause blockage of urinary tract, resulting in severe pain in the lower back or abdomen.[1][2] A stone may also result in hematuria, vomiting, or painful urination.[1] Risk factors for stone formation include high urine calcium levels, obesity, certain foods, medications like calcium supplements, conditions like hyperparathyroidism, gout and not drinking enough fluids.[1][3] Stones form in the kidney when minerals in urine are at high concentration such as Calcium, Magnesium, Oxalate, Carbonate, Phosphate, Urate etc. Between 1% and 15% of people globally are affected by kidney stones at some point in their lives. [3] High incidence of urolithiasis with varied chemical composition of calculi has been reported from different regions of India [4].Generally, more men are affected than women.[1]

There is limited data on the analysis of chemical composition of renal calculi in the population in and around Mullana. So the present study was undertaken to qualitatively analyse the renal stones. Knowledge of chemical composition of Renal stones may be helpful in clinical management of patients as well as in reducing risk of prevalence and recurrence of stones in this region.

Corresponding Author:
Dr. Karanpreet Bhutani
Assistant Professor, Department of Biochemistry
MMIMSR, Mullana,
Email id: karanpreet.biochem@gmail.com
Contact number: +919915565275

Aims and Objectives

To analyse the chemical composition of Urinary tract stones.

Material and Method

The present study included 100 uroliths obtained by surgical intervention of Urolithiasis patients diagnosed at MM Institute of Medical Sciences, MMDU , Mullana from August 2018 to October 2019. The stones obtained from the Surgery Department to Clinical Biochemistry Laboratory were washed with distilled water to remove the debris, dried completely and weighed. The stones were cut and crushed, the powdered form was qualitatively analyzed for their chemical composition adopting standard methods [5] using chemicals of Analytical reagent grade. The research project was approved by the ethical committee of institute.

Inclusion Criteria

Patients above 14 years were included in the study

Results

In the present study, out of total 100 patients, the incidence of urolithiasis was more in males (72%) compared to females(28%). The highest percentage of urolithiasis was found in the age group 31-45 years in both the sexes(51%). (Table 1)

Distribution of stones based on their location, showed a high incidence of stones in the ureter (42%), followed by Bladder (26%) and Urethra (19%). Males showed high incidence of Ureteric stones while females had high incidence of bladder stones.(Table 2) All the stones analysed were of heterogenous mixed type. Calcium oxalate was the most predominant chemical composition in the stones analyzed (63%), followed by Uric acid (18%). Calcium carbonate, Calcium phosphate and Magnesium Ammonium phosphate were predominant in 8%, 6% and 5% of stones respectively. (Table 3)

TABLE 1: Occurrence of Urolithiasis in relation to age and sex of the patient

Age group (in years)	No. of cases (Male) (n=72)	No. of cases (Female) (n=28)	% of Occurrence
15-30	12	03	15%
31-45	32	19	51%
46-60	18	05	23%
>60	10	01	11%

Table 2 : Distribution of stones according to their site of Occurence

Location	No. of Males	No. of Females	% of Occurrence
Renal	07	06	13%
Ureteric	39	03	42%
Vesicle/Bladder	08	18	26%
Urethral	18	01	19%

Table 3 : Chemical composition of the urinary stones

Composition of Stone	**No. of stones**	**%**
Calcium Oxalate	63	63%
Calcium Phosphate	06	6%
Calcium Carbonate	08	8%
Uric Acid	18	18%
Magnesium Ammonium Phosphate	05	5%

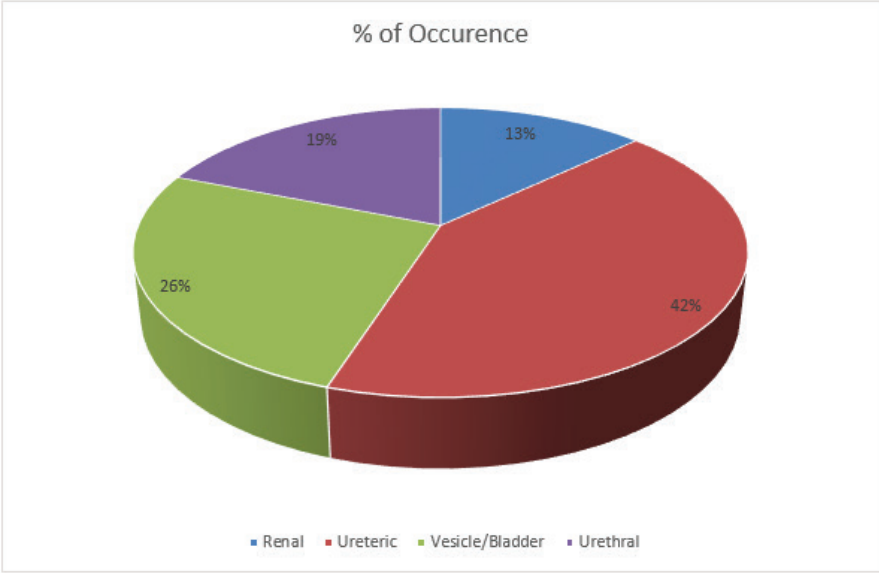


Figure 1 showing percentage occurrence of stones according to location

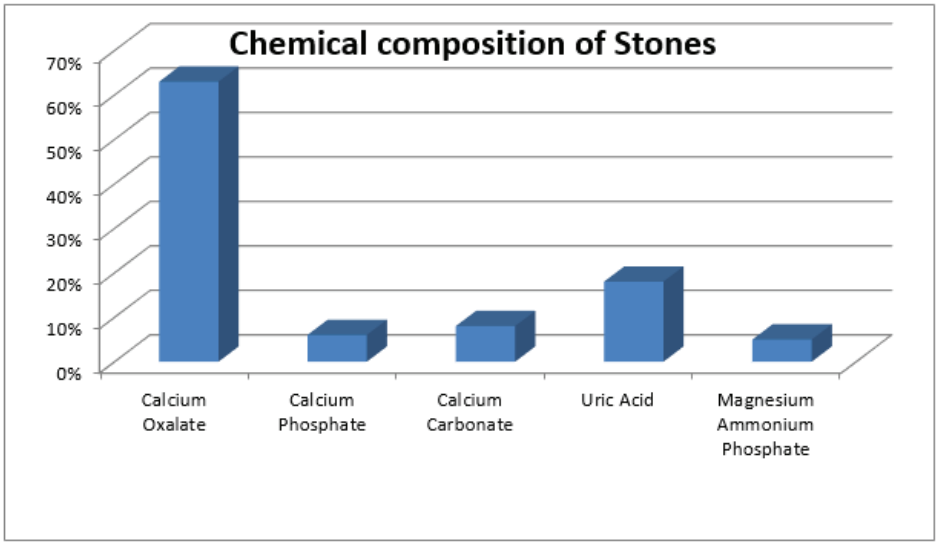


Figure2 showing chemical composition of stones

Discussion

Kidney stones affect all geographical, cultural and racial groups. [6] Stones result when urine becomes too concentrated and substances in the urine crystallize to form stones. [7] In the present study, the urolithiasis was predominant in males compared to females. Our findings were similar to study by Rafique et al [8] who found the incidence to be three times in males compared to females. Smaller diameter and increased length of urethra or large muscle mass in men may be the reason behind higher incidence in males compared to females. [9] Tissue breakdown on daily basis contributes to metabolic waste and a tendency towards formation of stones. [10] The type of diet consumed in the area is reflected by the composition of urine which in turn indicates the type of stones formed. Poor drinking leads to low urine volume which in turn contributes to stone formation . [11] In the present study, Calcium oxalate stones were predominant. Our findings were similar to the stone analysis study done in Manipur by P.P Singh et al who found calcium and oxalate in all the 196 stones analysed. [12] Ureteric stone analysis done in Jodhpur also reported a similar finding.[13] Hypercalciuria and hyperparathyroidism are the risk factors for calcium stone formation. Excessive consumption of Oxalate containing foods or excessive absorption of oxalate in enteric diseases or ileojejunal surgery or Vitamin C supplementation [14] contributes to oxalate stone formation. [9]

Excessive consumption of meat causes over acidification of urine leading to increased excretion of calcium, oxalate and uric acid and thus an increase in the kidney stone formation.

The composition of stones , urinary risk factors and analysis of diet suggest that urinary tract infections, nutritional habits and poor fluid intake contribute to urolithiasis. Therefore, sufficient intake of fluids can prevent stone formation and its recurrence. [15]

Conclusion

Analysis of the chemical composition of stones and knowledge of its etiology will help in improving the management of patients with Urolithiasis. The high incidence of renal stones in this area can be reduced by planning preventive measures and also the recurrence of stone formation can be prevented in the patients of urolithiasis by advising them on diet modification.

Source of Funding – Self

Conflict of interest - Nil

References

1) "Kidney Stones in Adults". *February 2013*. Archived *from the original on 11 May 2015*. Retrieved 22 May 2015

2) *MillerNL, LingemanJE (March 2007).* "Management of kidney stones" (PDF). *BMJ. 334 (7591): 468–72.* doi*:*10.1136/bmj.39113.480185.80. PMC 1808123. PMID 17332586. Archived (PDF) *from the original on 27 December 2010.*

3) *Morgan MS, Pearle MS (March 2016). "Medical management of renal stones". BMJ. 352: i52.* doi*:*10.1136/bmj.i52. PMID 26977089.

4) G*Wang RC, Smith-Bindman R, Whitaker E, Neilson J, Allen IE, Stoller ML, Fahimi J (March 2017). "Effect of Tamsulosin on Stone Passage for Ureteral Stones: A Systematic Review and Meta-analysis". Annals of Emergency Medicine. 69 (3): 353–361. e3.* doi*:*10.1016/j.annemergmed.2016.06.044. PMID 27616037

5) Hodgkinson A.A combined qualitative and quantitative procedure for the chemical analysis of urinary calculi. J Clinical Pathol 1975; 24:147-151.

6) Lieske JC, Segura JW (2004). "Ch. 7: Evaluation and Medical Management of Kidney Stones". In Potts JM (ed.). Essential Urology: A Guide to Clinical Practice (1st ed.). Totowa, New Jersey: Humana Press. pp. 117–52. ISBN 978-1-58829-109-7.

7) Curhan GC, Willet WC, Knight EL, Stampfer MJ. Dietary Factors and the Risk of Incident Kidney Stones in Younger Women, Nurses' Health Study II. Arch Intern Med. 2004; 164: 885- 91.

8) Rafique M, Bhutta RA, Rauf A, Chaudhry IA. Chemical composition of upper urinary tract calculi in Multan. J Pak Med Assoc 2000; 50: 145-8

9) Frank M, De Vries A. Prevention of Urolithiasis. Education to adequate fluid intake in a new town situated in Judean Dessert Mountains. Arch. Environmtl Health 1966; 13: 625.

10) Pandeya A,Prajapati R, Panta P and Regmi A. Assessment of kidney stone and prevalence of its chemical compositions. Nepal Med Coll J 2010; 12(3): 190-192

11) Robertson W.G. Renal stones in the tropics. Semin Nephrol 2003; 23: 77-87.

12) Singh P P, Singh L B, Prasad S N and Singh M G. Urolithiasis in Manipur (North Eastern region of India). Incidence and chemical composition of stones. Am J Clin Nutr 1978; 31: 1519-1525.

13) Singh P P, Pendse A K, Rathore V and Dashora PK. Urinary biochemical profile of patients with ureteric calculi in Jodhpur region(North West India). Urological Research 1988; 16:105-110.

14) Baxmann AC, Mendonca CD, Heilberg IP. Effect of vitamin C supplements on urinary oxalate and pH in calcium stoneforming patients. Kidney Int'l 2003; 63: 1066-71.

15) Siener R and Hesse A. Fluid intake and epidemiology of urolithiasis. Europ J Clin Nutr 2003; 57: 47-51.

Assessment of Awareness and Practices in Management of Childhood Diarrhoea among Caregivers of Under Five Children in Urban Field Practice Area of KIMS, Hubballi

Kashavva B Andanigoudar[1], Laxmikant Lokare[2], Dattatreya D Bant[3],

[1]Post Graduate, [2]Associate Professor, [3]Professor and HOD, Dept of Community Medicine, KIMS KIMS Campus, Vidyanagar, Hubli

Abstract

Background: Diarrhoea is one of the leading causes of childhood mortality and morbidity. Diarrhoea leads to dehydration and causes significant mortality and morbidity in under five children. Most of the childhood diarrhoea cases can be treated by Oral Rehydration Therapy and Zinc supplementation. Hospitalization for childhood diarrhoea can pose significant burden to health systems and households. Therefore, it is necessary to assess the community-based management followed for the same. The objective of this study was to assess the awareness and practices for management of childhood diarrhoea among the caregivers of under five children.

Method: A Community based Cross sectional study was conducted among 203 caregivers of under five children residing in urban field practice area of KIMS, Hubballi, during June-July 2018. Study participants were selected by convenient sampling. After obtaining informed oral consent, data was collected using self-administered, semi structured questionnaire by house to house visits. Information about the sociodemographic profile, episodes of diarrhoea and management for same was collected.

Results: The prevalence of diarrhoea in under five was 21.8% in preceding two weeks. 78.8% of the caregivers were aware of ORS.73% of caregivers used ORSand 6.41 % used Zinc in the treatment of diarrhoea in their children. Awareness about sanitation and hygiene was not satisfactory in the current study.

Conclusion: Appropriate use of ORS and Zinc therapy can reduce burden of diarrhoea. Awareness regarding safe drinking water, excrete disposal and personal hygiene needs to be improved to reduce diarrhoeal diseases.

***Key words**: Diarrhoea, ORS, Zinc, childhood, KIMS, Mortality, Morbidity*

Introduction

Diarrhoea is one of the most common childhood illness, in both developing and developed countries. It is the second leading cause of childhood mortality in India and is responsible for 9% of all deaths per year among children under 5 years of age [1]. It is estimated that approximately 1.6 million die each year from diarrhoea in the developing world[1].

The standard definition of diarrhoea could be passing of three or more liquid stools in a 24hour period[2] . They are generally characterized as acute watery diarrhoea, persistent diarrhoea and dysentery.

Global incidence of diarrhoea among under five children is 1.731 billion episodes per year[3] . Approximately 480,000 children of age under 5 years die every year due to diarrhoea all over the world[4] .In India incidence of diarrhoea among under 5 children was estimated to be 1.71 and 1.09 episodes per person

Corresponding Author:
Dr.Laxmikant Lokare,
Associate Professor, Dept of community Medicine, Campus, Vidyanagar, Hubli-580022. Email ID: drlaxmikant25@gmail.com, Mobile:9886104302

per year in rural and urban areas and total number of diarrhoeal deaths among under five children were estimated to be 158,209 per year as per 2015[5,6].

Interventions to prevent diarrhoea including safe drinking water, use of improved sanitation and hand washing with soap can reduce disease risk. An optimal strategy for the case management of diarrhoea in children includes correct fluid therapy, proper feeding habits, appropriate use of antibiotics, no use of anti-diarrhoeal and effective education of mother or care taker.

Oral rehydration therapy (ORT) is the management of diarrhoeal disease through the administration of plenty of fluids, in an effort to maintain or replenish proper levels of hydration in the body[7] .

In India, incidence and deaths due to diarrhoea has declined over the years due to several programmes inculcated from the grass root level. Some of the programmes include Intensified Diarrhoea Treatment Fortnight (IDCF), National Diarrhoeal Disease Control Programme (NDDCP), Rotavirus vaccination etc.

The main objective of this programme is to improve usage of ORS and Zinc for childhood diarrhoea by pre-positioning ORS at household level. The activities under this programme mainly include intensification of advocacy and awareness generation activities for diarrhoea management, strengthening service provision for diarrhoea case management, establishment of ORS-zinc corners, prepositioning of ORS by ASHA in households with under 5 children and awareness generation activities for hygiene and sanitation[8].

The studies on the diarrhoeal diseases among under five children have been scarce in this region despite high occurrence of diarrhoea among under five children. Therefore, this study on diarrhoea among under five children and initiatives to reduce the burden of diarrhoea is necessary to provide evidence-based platform for intervention.

Objective: Assessment of Awareness and Practices in Management of Childhood Diarrhoea among Caregivers of under five children.

Materials and Method

This was a community based Cross sectional study, conducted by Department of Community Medicine, Karnataka Institute of Medical Sciences (KIMS) Hubballi after taking Ethical clearance. Based on the previous study, the prevalence of diarrhoea in under 5 children was 14.8% and taking absolute precision as 0.05, sample size was calculated using the formula: $N = 4PQ/d^2$. The final sample size was taken as 203. 203 caregivers, selected by convenience sampling. The study was conducted for 1 month (8^{th} June to 5^{th} July 2018) in urban field practice area Karnataka Institute of Medical SciencesHospital (KIMS), Hubballi of Dharwad District, Karnataka, India. Caregivers of under five children residing in study area, who gave consent participated in the study. Caregivers of children with congenital anomalies and children with special needs were excluded from the study. Semi-structured, pretested questionnaire. Ethical clearance was obtained from institutional ethical committee of Karnataka Institute ofMedical Sciences(KIMS), Hubballi.

Method of data Collection

Caregivers of under 5 were identified by house to house visit in the area. The questionnaire was pretested in 10% of the sample size in one randomly selected urban area. The primary respondents were mothers of the under 5-year children and in cases where a mother was not a caregiver,another primary caregiver was interviewed. After taking the oral consent, the participants were interviewed using the questionnaire. Information about sociodemographic details, past episodes of diarrheal, awareness and practices about its prevention, control and management was collected.

Data Analysis

Data was entered and edited in Microsoft Excel and analysed usingStatistical Package for Social Sciences (SPSS) Version 21.Continuous data was expressed as the mean and standard deviation.Categorical data was expressed as proportions. Appropriate tests of significance were used.

Results

A total of 203 caregivers were interviewed. Majority of the study participants belonged to Muslim religion. Most of the participants were from lower middle class of socio-economic status according to modified B G Prasad's classification. 1.29% of the care givers reported at least one episode of diarrhoea in their child in the past one year and 7.9% of the caregivers reported at least one episode of diarrhoea in the preceding fortnight (figure 1).

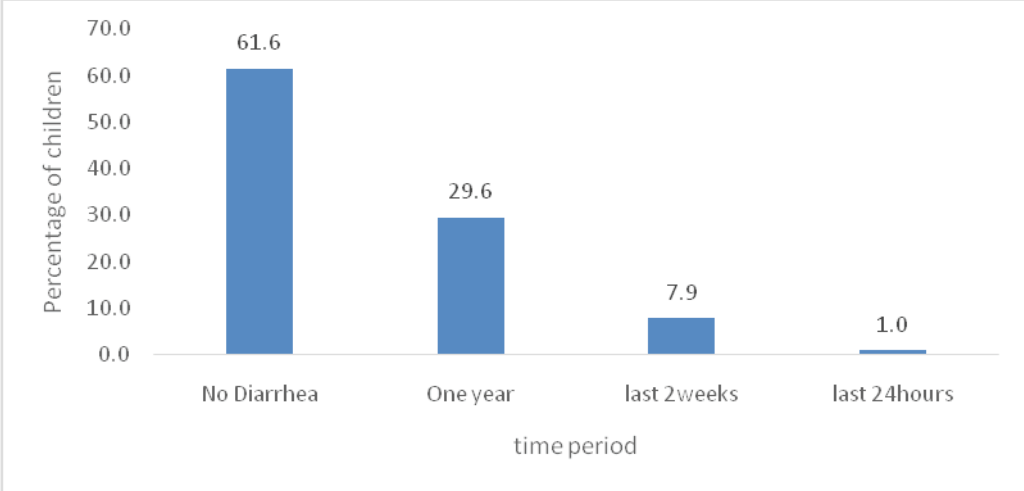


Figure 1: Distribution of number of children with episodes of diarrhoea in the past.

Table 1: Treatment approaches employed by the caregivers for management of diarrhoea in children.

Treatment approach	**N**	**%**
Managed with ORS at home	12	15.4
Managed with Home available fluids(other than ORS)	3	3.8
Went to hospital	63	80.8
Total	78	100

Table 2: Knowledge about the use of Oral Rehydration Therapy and Zinc in treatment of diarrhoea in children among the caregivers.

Variables	**Categories**	**N**	**%**
Knowledge about use of ORS	Yes	160	78.8
	No	43	21.2
Knowledge about use of Zinc	Yes	14	6.9
	No	189	93.1

The most common treatment approach for treatment of childhood diarrhea among caregivers was visiting hospital. The most common health facility approached and preferred by the caregivers was private clinic. Only 15% of the caregivers used ORS at home for diarrhoea in the children (Figure 1).

All the caregivers were aware of ORS and 78.8% were having knowledge about the correct method of use of ORS for diarrhea in their children. Only 6.9% of the caregivers were aware about zinc and its usage in episode of childhood diarrhoea. (Table 2).

All the caregivers practiced handwashing with soap and water before cooking food, before feeding the child

and after using toilet, but most of them were not aware about the proper handwashing technique and steps in hand washing. The awareness about sanitation and hygiene practices were found to be poor in most of the caregivers.

Table 3: Factors affecting the use of ORS and Zinc in the treatment of diarrhoea in children.

Variables	**Categories**	**Use of ORS n(%)**		**Chi square**	**p value**
		Used ORS	**Did not Use ORS**		
Socioeconomic status	>/=class 3	23(13.1)	152(86.9)	6.562	<0.05
	<class 3	9(32.1)	19(67.9))		
Education of the mother	>/=High school	32(27.8)	83(72.2)	29.069	<0.001
	<High school	1(1.13)	87(98.87)		
Awareness about the use of ORS	yes	31(19.4)	129(80.6)	7.419	<0.05
	No	1(2.3)	42(97.7)		
Hospital care seeking for diarrhoea	Present	27(84.3)	5(15.7)	50.5	<0.001
	Absent	135(78.9)	36(21.1)		
Variables	Categories	Use of Zinc n(%)		Chi square	p value
		Used Zinc	Did not Use Zinc		
Socioeconomic status	>/=class 3	13(7.4)	162(92.6)	0.559	>0.05
	<class 3	1(3.5)	27(96.5)		
Education of the mother	>/=High school	12(10.4)	103(89.6)	5.172	<0.05
	<High school	2(2.3)	86(97.7)		
Awareness about the use of Zinc	yes	12(7.8)	141(92.2)	0.528	>0.05
	No	2(4)	48(96)		
Hospital care seeking for diarrhoea	Present	5((3.6)	135(96.4)	7.768	<0.01
	Absent	9(14.3)	54(85.7)		

The factors found to be significantly associated with the use of ORS for childhood diarrhoea were lower socioeconomic status, education of the mother, awareness about the use of ORS in childhood diarrhoea and hospital care seeking for treatment of diarrhoea. The factors found to be significantly associated with the use of zinc were higher socioeconomic status, education of the mother, awareness about use of zinc and hospital care seeking for treatment of diarrhoea (Table 3).

Discussion

Diarrhoea is one of the major problems faced by children under five of developing countries like India. Recurrent infections in childhood significantly hamper the growth and development of preschool children[9].

The proportion of children with at least one episode of diarrhoea in our study was 38.4%, with almost equal distribution of cases among the age groups 1- 3 years and 3- 5 years. In another study done by Negi in rural

community of Varanasi, diarrhoea prevalence was 60.24% amongthe children of age group 10-25 months[10] . This difference in the most affected age group could be explained on the basis of a difference in study areas, feeding practices and sanitary conditions.

Of the total diarrhoeal episodes, 60.2 % of the cases occurred in the families of lower socio-economic status (class 4 and class 5) and this finding was significant. A similar study conducted by Walia et al in-pre-school children reported that poor socioeconomic statusand poorsanitation were important factors responsiblefor high diarrhoeamorbidity due to ease of transmission of infection[11] .

Only 6.9% of the caregivers were aware about the use of zinc in the treatment of diarrhoea and its additional benefits, while about 78% of the caregivers had knowledge about the use of ORS. A similar study conducted in urban slums of Delhi reported 71% awareness about ORS among care givers[12] .

The main finding is that about 81.8% of under 5 children with acute non bloody diarrhoea sought care from health facilities. This might be due to more severity of the episode or reduced awareness about the management of diarrhoea by home available fluids (HAFs). Out of those who sought care, utilisation of private facilities was preferred by the majority of care givers.

In a UNICEF 10 district survey in New Delhi, 79 % of mothers sought treatment from private medical sector for management of diarrhoea in their children[13]. From this it is quite evident that there is an over dependence on private sector. As medical expenses are more and more expensive in this sector the financial burden on families will be tremendous during course of treatment. In spite of the same facilities being offered free of cost in the government sector and offered at the door steps by health workers, they are not being utilized well by people.

Conclusion:

There was high prevalence of diarrhoea and most of them sought care from private health facilities. Cost of treatment can be significantly reduced by continuous health education in the community about the usage of zinc and ORS for treatment of diarrhoea. Health providers should spend more time to emphasize on use of ORS, Zinc and HAFs in prevention and treatment of dehydration. Awareness regarding safe drinking water, excrete disposal and personal hygiene whichcan reduce burden of diarrhoeal diseases is recommended.

Conflict of Interest –None Declared

Source of Funding- self

Acknowledgement: Authors thank the undergraduate students for their involvement in the study. We also thank all the teaching and non-teaching staff in the department of community medicine, KIMS, Hubballi.

References

1. WHO. The World Health Report 2004. Geneva, World Health Organization,2004.
2. Guidelines for estimating the economic burden of diarrhoeal disease , with focus on assessing the costs of rotavirus diarrhoea.
3. Fischer Walker CL, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA, et al. Global burden of childhood pneumonia and diarrhoea. Lancet. 2013;381(9875):1405–16.
4. UNICEF, One is too many: Ending child deaths from pneumonia and diarrhoea, UNICEF, New York, 2016.
5. New Delhi, India: National Commission on Macroeconomics and Health, Ministry of Health and Family Welfare, Govt. of India; 2005. Report of the National Commission on Macroeconomics and Health. Estimation of burden of diarrhoeal diseases in India. In: NCMH Background Papers: Burden of Diseases in India; pp. 182–7.
6. Lakshminarayanan, Subitha&Jayalakshmy, Ramakrishnan. (2015). Diarrhoeal diseases among children in India: Current scenario and future perspectives. Journal of Natural Science, Biology and Medicine. 6. 24. 10.4103/0976-9668.149073
7. WHO. Management of the child with a serious infection or severe malnutrition. 2000. Geneva, Department of Child and Adolescent Health and Development, World Health Organization, 2000 (WHO/FCH/CAH/00.1).
8. IDCF operational guidelines 2018, available from www.nhm.gov.in accessed on 28-06-2018.
9. Avachat SS, Phalke VD, Phalke DB, Aarif SM, Kalakoti P. A cross-sectional study of socio-demographic determinants of recurrent diarrhoea

among children under five of rural area of Western Maharashtra, India. The Australasian medical journal. 2011;4(2):72.

10. Negi K. Demographic profile of children affected with diarrhoea in a rural community of VaransiIn 34 th Annual Conference of IPHA 1995.
11. Walia BN, Singhi S, Gambhir SK, Sroa SR. Impact of acute diarrhoea & oral rehydration solution on nutritional status of preschool children. The Indian Journal of Medical Research. 19 Dec;90:415-25.
12. Pahwa S, Kumar GT, Toteja GS. Performance of a community-based health and nutrition-education intervention in the management of diarrhoea in a slum of Delhi, India. Journal of health, population, and nutrition. 2010 Dec;28(6):553.
13. UNICEF. Management Practices for Childhood Diarrhoea in India: Survey of 10 Districts. New Delhi: UNICEF. 2009.

Correlation of Liver Function Test with Different Age and Sex Group and with Ferritin Level in Thalassemia

Kumkum Sarkar[1], Netai Pramanik[2], R. P. Goswami[2], Prakas Kumar Mandal[3], Paban Chowdhury[3], Kingsuk Jana[4], Sonali Das[5]

[1]Assistant Professor, Department of Tropical Medicine, [2]Professor, Department of Tropical Medicine, [3]Professor, Department of Hematology, [3]Statistical Analyst, Department of Microbiology, [5]Research Associate, Department of Laboratory Medicine, Calcutta School of Tropical Medicine, 108, C. R. Avenue, Kolkata, India

Abstract

Thalassemia is the most common genetic blood disease in the world and varies in different population group in the world. In thalassemic patients liver damage is augmented when age of the patients are increase. These are due to increasing age with advancement of disease progression, repeated blood transfusion, less use/ intolerance of iron chelating agent, decreased activity of hepatocyte to rescue them in such excess billirubin and iron flood. Secondary to hypersplenism.

Iron overload due to frequent transfusions in β-thalassemia results in abnormal organ function tests. Proper and timely screening of these parameters can help in early diagnosis & prevention of iron overload. Iron overload is a main leading cause of elevated liver enzymes, and presence of HCV infection is significantly related to the increased iron overload[14]. Liver injury whether acute or chronic, eventually results in an increase in serum concentrations of Alanine transaminase (ALT) and Aspartate transaminase (AST). In transfusion dependent thalassemia patients iron overload is often inevitable and exposed to transfusion-associated infections. Apart from these when the age is more, the disease progresses with their complication like hepatic injury. The thalassemia patient develops liver fibrosis as a result of iron overload due to excessive blood transfusion and also from excess intestinal absorption. N Sultana et al.[6] showed that serum ferritin and serum bilirubin parameter of iron over load and jaundice are correlated.

Key Words: *Thalassemia, liver function test, ferritin.*

Introduction

Thalassemia, the most common hereditary disorder worldwide[1].Approximately 7% of the global population is carrier for hemoglobin disorder[2].Beta-thalassemia syndromes are a group of hereditary blood disorders characterized by reduced or absent beta globin chain synthesis, resulting in reduced Hb in red blood cells (RBC), decreased RBC production and anemia. It is mostlyinherited as recessive traits [3]. Hemoglobinopathies are characterized by the production of structurally defective hemoglobin due to abnormalities in the formation of globin moiety of the molecule [4].Beta-thalassaemias are heterogeneousgroup of disorders and has three types, beta-thalassemia minor or beta-thalassemiatrait, beta-thalassemia intermedia and beta-thalassemia major. Beta thalassemia occurwidely in a broad belt, ranging from theMediterranean and parts of north and West Africa through the Middle East and Indian subcontinent to South East Asia[4].Hb-E beta-thalassemiais the commonest severe form of thalassemia in South East Asia and part ofIndian subcontinent.Hb-E isineffectively synthesized and hence, when itinherited together with beta-thalassemia there ismarked deficiency of beta-chain production [5].It is also divided into mild, moderateand severe form clinically. Clinical presentation of severe form is similar with beta-thalassemia major. These patients can survive long with the bettertreatment [6]. They need alifelong repeated blood transfusion to

Corresponding Author:
Sonali Das,
Research Associate, sonalidasstm@gmail.com,
Tel. No.-+91-8981856735. West Bengal, India

maintaintheir hemoglobin level around 12g/dl, but multiple transfusion will cause an accumulationof iron in various tissue accompanied by anincrease serum iron level[7].In thalassemia, iron over load occurswhen iron intake is increased over a sustainedperiod of time, either from the transfusion of redcells or because there is increased absorption ofiron from digestive tract. As there is nomechanism in human to excrete the excess iron, it has to be removed by chelating agent[8]. Iron can deposit in different visceral organs mainly in heart, liver and endocrine glands causing tissuedamage and most of the mortality and morbidity associate with thalassemia. Iron is stored in the body as ferritin mainly within the reticuloendothelial system and its overload may promote hepatic injury and fibrogenesis [9]. Furthermore blood transfusion dependent thalassemia are also liable to infected with Hepatitis B and Hepatitis C if proper screening is not done which can cause hepatic fibrosis and cirrhosis[10]. So thalassemia patients must be routinely checked for liver function, cardiac function, endocrine function and also serum ferritin and they should be treated accordingly for the maintenance of healthy life.

Materials and Method

The study was conducted in the Hematology Department, Calcutta school of Tropical medicine,from September 2018 to May 2019. This study was designed on the basis of retrospective observational type of study.This study was conducted on consecutive 64 transfusion dependent thalassemia patient. Thalassemia diagnosis was confirmed by examining hemoglobin electrophoresis. A pre-designed Proforma was used to collect information from the hospital records. By using the proforma which included sex, age at presentation, age at diagnosis, ferritin level, body weight, pre-hemoglobin and clinical symptom at presentation.

Inclusion criteria

Patient over 2 years to 30 years of age with confirmed thalassemia by examining hemoglobin electrophoresis. Those having symptom of clinical jaundice with or without history of chronic blood transfusion.

Exclusion criteria

Age more than 30 years

Statistical Analysis

Data were analyzed using the statistical software SPSS (version 21). All the variables were tested for normality, so that suitable parametric statistical tools could be used. Analysis of variance (ANOVA) of the data was used to detect overall difference in group means.

Observation and Results

Clinico-hematological study of Thalassemia was done on 64 patients during the period of 2018-2019.

AGE and SEX:-

Mean (±SD) age in total 64 patients between the age group 1 to 10 years was 5.70 ± 2.084, between 11 and 20 years mean was 15.76 ±3.562 and between age 21 to 30 years was 25 ± 2.8982 were include in the study. Our study based on 64 Thalassemia patients. Sex distribution in different patients shown in Age and sex distribution in different patients shown in **Table 1:**

Table1: Group statistics of LFT with AGE and SEX distribution

subject		Frequency	Percent (%)	Valid Percent	Cumulative Percent
Age group	1-10	17	26.6	26.6	26.6
	11-20	25	39.1	39.1	65.6
	21-30	22	34.4	34.4	100.0
	Total	64	100.0	100.0	
Valid	F M Total	35 29 64	54.7 45.3 100.0	54.7 45.3 100.0	54.7 100.0

Corelation Between Lft and Age:-

A Pearson product- moment correlation is run to determine the relationship between Total Billirubin and AGE. There is low correlation is found between TBill and AGE, which is statistically insignificant (r=.111, n=64, p=0.384).

SGPT-

The descriptive table show below some useful descriptive statistics like Mean, std. Deviation, and 95% confidence Interval for dependent variable (SGPT) for different age group (1-10,11-20,21-30) .**Table 2:**

Table 2:The descriptive table show below the SGPT Level of different age group

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1-10	17	50.335	46.4452	11.2646	26.455	74.215	10.0	159.0
11-20	25	54.160	41.2530	8.2506	37.132	71.188	9.0	169.0
21-30	22	45.182	29.8530	6.3647	31.946	58.418	5.0	121.0
Total	64	50.058	38.8359	4.8545	40.357	59.759	5.0	169.0

The table shows the output of the ANOVA analysis and whether there is a statistically significant difference between our group means. We can see that the P-value (Sig value) is .737, which is above 0.05. So there is no Significant difference found in SGPT with three age groups (1-10,11-20,21-30). Similar analysis was done for SGOT of different age group, and shows that the p-value(.479), that was also insignificant.

Independent samples t-test of SGPT on different sex

The table below shows independent samples t-test. Our level of significance is 0.05.and equal variance assumed. Our null hypothesis is mean SGPT for male and female are equal, and alternative hypothesis is mean SGPT of male and female is not equal.

		(1) Levene's Test for Equality of Variances		(2) t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
SGPT	Equal variances assumed	.082	.776	.043	62	.966	.4210	9.8301	-19.2291	20.0711
	Equal variances not assumed			.043	60.372	.966	.4210	9.8301	-19.1887	20.0306

Table 4: FERITINCAT * AGECAT Cross tabulation

			AGECATEGORY			Total
			0-10	11-20	21-30	
FERRITIN CATEGORY	0-1000	Count	12	19	14	45
		Expected Count	12.0	17.6	15.5	45.0
	1000-2000	Count	3	4	5	12
		Expected Count	3.2	4.7	4.1	12.0
	2000-3000	Count	2	2	3	7
		Expected Count	1.9	2.7	2.4	7.0
Total		Count	17	25	22	64
		Expected Count	17.0	25.0	22.0	64.0

Table 5: **Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.907a	4	.924
Likelihood Ratio	.911	4	.923
Linear-by-Linear Association	.215	1	.643
N of Valid Cases	64		

When reading this table we are interested in the results of the "**Pearson Chi-Square**" row. We can see here that $\chi(4) = .907$, $p = .924$.This tells us that there is no statistically significant association between FERRITIN CATEGORY and AGE CATEGORY. Here we can see that ,The strength of association between two variables is very weak.

Table 6 : ANOVA table showing SGPT of different ferritin group					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	2432.310	2	1216.155	.801	.453
Within Groups	92585.967	61	1517.803		
Total	95018.276	63			

From the above table we can see that the significance value is 0.453(p-value), which is above 0.05, and therefore we can conclude that there is no significant difference found in SGPT with three ferritin group.

Discussion

Regular blood transfusion and iron chelation therapy have improved the life expectancy in patients with transfusion dependent thalassemia and now they survive beyond the third decade of life. Liver derangement is becoming an important cause of morbidity and mortality in these patients. Viral infections (mainly hepatitis B and C) causing chronic hepatitis and/or severe iron overload are both important causes of liver pathology. Iron chelation with Deferasirox (DFX), an oral single dose therapy, has improved the compliance to chelation which reduces excessive body iron [11].

Liver enzymes are raised and indicative of liver injury in transfusion dependant β-thalassemia major patients [12]. In thalassemia, abnormal liver function

appears to be related to the high ferritin levels and the age when transfusions was initiated.[13-17]In thalassemia, liver is the earliest organ affected by iron and serum SGOT and SGPT are raised due to peroxidative injury and direct toxic effect of iron on liver cells[12]. So this study was conducted to know the derangement of liver enzymes and their correlation with the age and serum ferritin levels.

In our study on 64 thalassemic patient, we found raised SGOT and SGPT only in 33 and 31 patients respectively. They had no correlations with age with p value0.479 and0.737 respectively.

Reduction of serum ferritin concentration was associated with a significant decrease in serum ALT, AST and ALP concentration[11]. In a study by Soliman A et al, they found a significant correlations between serum ferritin concentrations and ALT and AST levels ($p < 0.01$)[11].

Another study by Suman RL et al showed as Iron deposition in liver takes place, its functions are affected which are predicted by raised SGOT and SGPT. SGOT and SGPT were raised significantly (p Value <0.05) and continue to rise as ferritin crosses 1000 ng/ml. There was a positive correlation between serum ferritin and liver enzymes (Pearson's bivariate correlation coefficient r=+0.87±84)[12].

But in our study we found raised ferritin level(1000- 2000 ng/ml) in 12 patients and 7 patients in 2000 -3000 ng/ml. Still we could not found any correlation of it with LFT (Mainly transaminases). The p value was 0.453 for SGPT.

In those two studies, they found raised SGOT and SGPT as their ferritin level were very high in all patient, whereas we found raised ferritin level in very few patient. It may be due to our all patients are routinely checked for serum ferritin and they received chelation therapy when ferritin level goes above 500 ng/ml.

Conclusion:

Iron overload can cause liver injury which causes raised liver enzymes. We failed to show this. Like us, some investigator also found such weak correlation [18] as exact mechanisms are still unclear. So, further detailed studies needed to find out the promising correlations in transfusion dependent thalassemic patients.

Acknowledgement:

We are thankful to Prof. P. K. Kundu, Director, School of Tropical Medicine, Kolkata and Prof. S. K. Guha, M.S.V.P., School of Tropical Medicine, Kolkata for allowing us to work in this institution and extending valuable help when needed. We must express our deepest gratitude to Dr. B. Saha, Professor and Head of the Department, Department of Tropical Medicine, School of Tropical Medicine, Kolkata.

Ethical Approval: The Ethics committee of the Calcutta School of Tropical Medicine, Kolkata, West Bengal, India, approved the study protocol.

Source of Funding:- Self

Conflict of Interest:- Nil

References

1. Weatherall DJ, Clegg JB, Thalassaemia - a global public health problem. Nat Med, 1996:2,847-9.
2. Panda PK,SharmaY.Ferritinlevel:Predictor of thalassemia cardiomyopathy.Heart India 2018;6: 18-21.
3. Galanello R, Origa R. Beta-thalassemia. Orphanet J Rare Dis. 2010 May 21;5:11.
4. Firkin F, Chesterman C, Penington D, Rush B.(eds) 1996, de Gruchy,s Clinical Hematology in Medical Practice.5th ed, Blackwell, Australia,137.
5. Hoffbrand AV, Cohen A , Hershko C. Role of deferiprone in chelation therapy for transfusion iron overload. Blood 2003; 102: 17- 24
6. N Sultana1, S Sadiya2, MH Rahman1. Correlation between serum bilirubin and serum ferritin Level in thalassaemia patients. Bangladesh J Med Biochem 2011; 4(2): 6-12
7. Khan WA, Banu B, Amin SK et al. prevalence of beta thalassaemia trait and HB-E trait in Bangladeshi school children and health burden of thalassaemia in our population.2005; 21(1): 1-7.
8. Voskaridou E, Douskou M, Terpose E, et al. magnetic resonance imaging in the evaluation of iron overload inpatients with ? - thalassaemia and sickle cell disease. BrJ Haematol 2004; 126: 736 - 742.
9. Hershko C, Konijn AM, Link G. Iron chelators for thalassaemia. Br J Haematol 1998; 101: 399 - 406.
10. Olivieri NF, Brittenham Gm: Iron- chelating therapy and the treatment of thalassaemia. Blood 1997; 89: 739.

11. 1.Soliman A, Yassin M, Al Yafei F, Al-Naimi L, Almarri N, Sabt A, De Sanctis V. Longitudinal Study on Liver Functions in Patients with Thalassemia Major before and after Deferasirox (DFX) Therapy.Mediterr J Hematol Infect Dis. 2014 Apr 7;6(1):e2014025. doi: 10.4084/MJHID.2014.025. eCollection 2014.
12. Suman RL, Sanadhya A, Meena P, Goyal S. Correlation of liver enzymes with serum ferritin levels in β-thalassemia major. Int J Res Med Sci 2016;4:3271-4.
13. [Ref. of. 13-17] Larson AM, Taylor SL, Bauermeister D, Rosoff L, Jr, Kowdley KV. Pilot Study of the Relationship Between Histologic Progression and Hepatic Iron Concentration in Chronic Hepatitis C. J ClinGastroenterol. 2003;37:406–11. doi: 10.1097/00004836-200311000-00012.
14. Kaddah A, El-Shabrawi M, Saleh A, Al Gaithy A, Basalama A. Liver iron content and histological findings versus serum ferritin in detection of different grades of hemosiderosis in hepatic diseases in thalassemia major. J A C. 2005;6:475–84.
15. de Virgiliis S, Sanna G, Cornacchia G, Argiolu F, Murgia V, Porcu M, Cao A. Serum ferritin, liver iron stores, and liver histology in children with thalassaemia. Arch Dis Child. 1980;55:43–5. doi: 10.1136/adc.55.1.43.
16. Li CK, Chik KW, Lam CW, To KF, Yu SC, Lee V, Shing MM, Cheung AY, Yuen PM. Liver disease in transfusion dependent thalassaemia major. Arch Dis Child. 2002;86:344–7. doi: 10.1136/adc.86.5.344.
17. Vogel E, Lebensburger JD, Bai S, Fineberg N, Hilliard L, Vadlamud N, Dimmit R, Kelly D, Thomas H, Howard TH. Liver histology, liver iron concentration (LIC), and serum ferritin in a large cohort of chronically transfused children with sickle cell anemia: Limitations of LIC as a marker for hepatic injury and ferritin as an indicator for chelation initiation. 53rd ASH annual meeting; 2011. (abstract)https://ash.confex.com/ash/2011/webprogram/Paper42892.html.
18. Asif M, Manzoor Z, Farooq MS, Kanwal A, Shaheen U, Munawar SH, Khan IA, Aziz A. Correlation between serum ferritin level and liver function tests in thalassemic patients receiving multiple blood transfusions. Int J Res Med Sci 2014;2:988-94.

Construction of Human Development Index (HDI) for districts of Karnataka based on NFHS-IV data

Keerthan Rao Y[1], Ravishankar. N[2]

[1]MSc Bio-statistics, [2]Assistant Professor, Department of Data Science, Prasanna School of Public Health (PSPH), Manipal Academy of Higher Education (MAHE), Manipal

Abstract

Background: The Human Development Index (HDI) is a composite measure of life expectancy, education and per capita income indicators, which are used to rank countries. A country scores higher HDI when lifespan is higher, literacy rate is higher and GDP per capita is higher.

Objective: To construct HDI for districts of Karnataka based on NFHS-IV data.

Methodology: Based on the district level NFHS-IV household data, HDI scores were calculated. The methodology put forward by United Nations Development Programme (UNDP) was adopted. Health index is measured in terms of life expectancy at birth. Education index is calculated based on adult literacy rate. Living standard index is measured in terms of availability of resources like water, toilet, cooking fuel, electricity, type of house and income level .The HDI is computed as the geometric mean of these three indices.

Results: Based on the HDI scores, districts are ranked. The number of districts belonging to very high, high, moderate and low human development are 3 (10%), 13(43.3%), 13(43.3%) and 1(3.3%) respectively. Udupi district ranked first in terms of overall human development where as Yadgir ranked least.

Keywords. *Human development index; Life expectancy*

Introduction

Human Development Index (HDI) is a composite measure of indicators of basic human needs namely health, education and per capita income.[1] The index was first developed by Pakistani economist Mahbub Ul Haq in 1990 and later by Indian economist Amartya Sen. This index helps to assess the performance of a country with respect to other countries in terms of development. United Nations Development Program (UNDP) publishes global HDI report where countries are ranked according to their development. A country with a higher development will have a better rank in HDI. India ranks 130 out of 189 countries according to UNDP's HDI report 2019. In India HDI for states is published by NITI aayog.

Karnataka is one of the 29 states of India. It is located in south western part of India. It was formed in November 1, 1956, originally known as the State of Mysore. The capital of Karnataka is Bengaluru. Karnataka comprises of 30 districts with 227 talukas. As per the information from Census 2011, Karnataka has population 6.11 crores. The area of the state is about 190000 sq.km as it is 8th largest state of India in terms of area.[2]

The National Family Health Survey (NFHS) is one of the largest surveys conducted in India by International Institute of Population Sciences (IIIPS), Mumbai. NFHS provides information about population, health and nutrition status for all the states and union territories of India. Its recent round is NFHS-IV, which was conducted in 2015-16. Fieldwork of NFHS-IV was conducted from 20 January 2015 to 4 December 2016 covering 601509 households, 699686 women and 112122 men. It collected data on 114 key indicators. NFHS-IV provided

the district level data for important indicators.[3]

Human Development Index measures the average achievement in human development and assigns ranking to countries.[4] Similarly, human development index can be calculated for states, districts and talukas. In this paper, human development index for districts of Karnataka is constructed based on district level data from NFHS-IV.

Objective:

To construct human development index for districts of Karnataka based on NFHS-IV data.

Data and Methodology:

The National Family Health Survey-IV (NFHS-IV) district level household data was used to construct Human development index for 30 districts of Karnataka state. For the statistical analysis, Microsoft Excel-2007 and EZR version 1.37 were used.

The methodology put forward by United Nations Development Programme (UNDP) was adopted for the construction of HDI. The human development index is computed based on three indices namely Living standard index (LSI), Education index (EI) and Health index (HI). The geometric mean of these three indices gives the Human Development Index (HDI).[4]

$$HDI = (LSI \times EI \times HI)^{1/3}$$

Living standard index (LSI) is computed as geometric mean of 6 dimensions. The 6 dimensions are proportion of households having source of water facility (l_1), proportion of households having toilet (l_2), proportion of households having access to electricity (l_3), proportion of households having access to cooking fuel (l_4), proportion of households having pucca house (l_5) and proportion of households having at least middle class status (l_6).

$$LSI = (l_1\, l_2\, l_3\, l_4\, l_5\, l_6)^{1/6}$$

Education index (EI) is computed in terms of proportion of literates among population aged 7 and above (proportion ranging from 0 to 1).

Health index (HI) is measured in terms of life expectancy at birth (LEB). It is calculated as follows:

Where, max (LEB) is maximum life expectancy at birth that is 85 years and min (LEB) is minimum life expectancy at birth that is 25 years. Life expectancy at birth was computed by constructing complete life tables using age at death of each district.

Interpretation of HDI

Human Development Index ranges from 0 (minimum human development) to 1 (maximum human development). Further, HDI value of 0 – 0.540 signifies low human development, 0.541 – 0.699 signifies moderate human development, 0.7 – 0.79 signifies high human development and 0.791 – 1 signifies very high human development.

Results

The HDI for 30 districts for Karnataka is provided in table 1. Among the 30 districts, 3 (10%) belonged to very high human development, 13 (43.33%) belonged to high human development, 13 (43.3%) belonged to moderate human development and 1 (3.3%) district belonged to the category of low human development. From the table 1, it can be seen that, HDI score is maximum for Udupi and minimum for Yadgiri, which is the only district belonging to low human development category. Living standard index score is maximum for Bengaluru and minimum for Yadgiri. Health index score is maximum for Ramanagara and minimum for Bengaluru Rural. Education index score is maximum for Bengaluru and minimum for Yadgiri.

Table 1: HDI for districts of Karnataka

DISTRICT	LSI	HI	EI	HDI	RANK
UDUPI	0.891	0.863	0.761	0.837	1
BENGALURU URBAN	0.962	0.689	0.866	0.831	2
DAKSHINA KANNADA	0.884	0.804	0.793	0.826	3
UTTARA KANNADA	0.789	0.781	0.745	0.771	4
DHARWAD	0.722	0.833	0.740	0.764	5
SHIMOGA	0.816	0.711	0.758	0.760	6
KODAGU	0.833	0.705	0.725	0.752	7
CHIKMAGALORE	0.736	0.790	0.714	0.746	8
HASSAN	0.735	0.824	0.683	0.745	9
MYSORE	0.812	0.761	0.662	0.742	10
DAVANGERE	0.787	0.758	0.681	0.741	11
CHAMRAJANAGAR	0.662	0.752	0.812	0.740	12
MANDYA	0.741	0.897	0.606	0.739	13
HAVERI	0.695	0.795	0.702	0.729	14
RAMANAGARA	0.760	0.915	0.532	0.718	15
KOLAR	0.766	0.712	0.653	0.709	16
TUMKUR	0.674	0.715	0.701	0.696	17
BELGAUM	0.716	0.712	0.608	0.684	18
BENGALURU RURAL	0.764	0.603	0.687	0.682	19
GADAG	0.645	0.738	0.657	0.679	20
KOPPAL	0.654	0.792	0.586	0.672	21
CHIKBALLAPUR	0.700	0.754	0.575	0.671	22
GULBARGA	0.684	0.780	0.587	0.663	23
BIDAR	0.645	0.795	0.564	0.661	24
BIJAPUR	0.591	0.898	0.588	0.660	25
CHITRADURGA	0.639	0.687	0.649	0.658	26
BAGALKOT	0.646	0.687	0.598	0.643	27
BELLARI	0.723	0.650	0.546	0.635	28
RAICHUR	0.599	0.697	0.476	0.584	29
YADGIRI	0.496	0.788	0.377	0.528	30

In above table, red font colour signifies very high human development, green font colour signifies high human development, blue font represents moderate human development and black font represents low human development

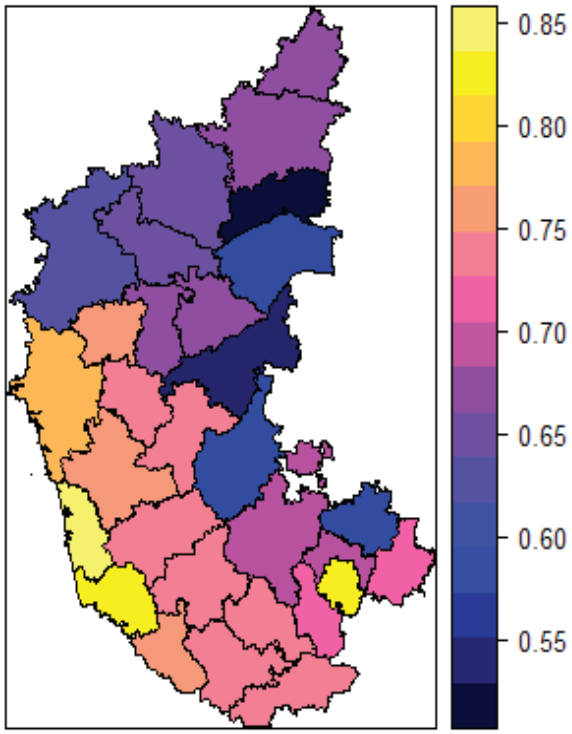


Figure1: Figure of Karnataka showing the human development index score

Discussion

Human Development Index (HDI) reflects the status of well-being and economic development of a geographic entity – country, state, district etc relative to others. Many policy decisions are made looking into the HDI. In this study HDI was constructed for 30 districts of Karnataka state using NFHS-IV as the data source. This index can be used to identify where the districts are lagging behind in developmental process.

As per the HDI, Udupi district was ranked first among all the 30 districts of Karnataka state. This can be attributed to presence of good quality health care facilities, educational institutions and better transport facilities. Further, Udupi is one of the best tourist hotspots and religious destinations of India. Yadgiri was ranked last as it has least HDI value. This may be due to the fact that Yadgiri is recently formed district, developmental programs are still at infancy.

As per the Human Development Index across districts of Karnataka, 2011 reported in Economic Survey of Karnataka 2015-16,[5] Bengaluru Urban has been ranked first among 30 districts with HDI score of0.928, whereas Udupi is positioned at 3rd place with HDI score 0.675. Raichur is in the last place with HDI score 0.165. In Economic survey of Karnataka 2015-16, living standard indicators used were access to cooking fuel, toilet, pucca house, water, electricity, percentage of non-agricultural workers to total workers and taluk level per capita income. Education indicators used were literacy rates and gross enrollment rates. Health indicators used were child mortality rate and maternal mortality rate. The methodology used in this paper is almost same as that of Economic Survey of Karnataka 2015-16, except in health index, instead of maternal mortality rate and child mortality rate, life expectancy at birth is used and in education index, only literacy rates are used.

Ethical Clearance: not applicable as the study is based on a secondary publicly available/open source data

Funding Source: None

Conflict of Interest: None

References

1. Anand, S, Sen A. Human Development Index: Methodology and Measurement. Human Development Report Office (HDRO), United Nations Development Programme (UNDP). 1994.
2. Chittaranjan, H. A handbook of Karnataka. Government of Karnataka, Bengaluru, A Government of Karnataka Publication. 2005.
3. Sheet I F. NFHS-4 (National Family Health Survey-4). International Institute for Population Studies. 2017.
4. Karnataka Human Development Report 2005. UNDP. 2005.
5. Economic Survey of Karnataka 2015-16 [internet]. Available from https://des.kar.nic.in/docs/ Economic%20 Survey% 202015-16_ English%20 Final.pdf

Association of Anthropometric Measurements and Lumbar Lordosis with Flexor and Extensor Trunk Muscle Endurance Along with Gender Based Differences in Young Adults

Manoj Purohit [1], Shabnam Joshi[2], Rekha Chaturvedi* [2], Sivachidambaram Kulandaivelan[2]

[1]Student, MPT, [2]Assistant Professor, Guru Jambheshwar University of Science and Technology Hisar, Haryana.

Abstract

The goal of the study is to see the association of anthropometric measurements and lumbar lordosis with flexor and extensor trunk muscle endurance along with gender based differences in young adults. **Study design**: Cross sectional observational study. **Sampling**: Systematic random sampling **Sampl**e: 354 participants of age group 18-28 years based on inclusion and exclusion criteria. **Procedur**e: Age, BMI, Trunk flexor and extensor endurance, lumbar lordotic angle were measured and the association between these variables were calculated using chi square test and independent T- test. **Result**: Significant gender based differences were found in variables age, BMI, LLA and WC. Significant positive association of BMI and LLA, WC and LLA, FET and EET, age and FET, Negative association of EET and LLA, WC and FET was found. **Conclusion**: LLA and endurance of the trunk musculature are vital elements for good spinal health.

Trial Registration: CTRI/2019/04/018628.

Keywords: *BMI, Trunk flexor endurance, Trunk extensor endurance, Lumbar lordotic angle.*

Introduction

Low back pain has been a common problem contributing enormously to musculoskeletal problem that causes activity limitation and work absenteeism[1,2] and thereby causing enormous burden to the society [3]. Alteration in posture is one of the contributing factor of pain in the low back region. The variance of lumbar spine curvature because of irregularities in posture contributes significantly to low back pain. Studies have reported that excessive lumbar lordosis as a prime cause for pain and radiculopathy [4, 5] and the deficiency in endurance of trunk muscles has been recognized as a predictor for various conditions of the low back in people [6]. Studies have confirmed that the patients of low back pain have lesser abdominal endurance as compared to the healthy population[7-9] and the major element of low back pain is estimated to be the loss of muscle control leading fatigue in trunk muscles[10]. Thus the examination of the endurance of trunk muscles holds greater importance in prevention and rehabilitation of low back pain. The relationship of low back pain with the BMI is described in various studies suggesting increase in the bulk of the trunk area results in frequent ability to fatigue of the musculature[11]. Increase in BMI, because of diminished mobility act on pelvic, abdominal and thoracic area results in decrease range of motion. A decrease in flexibility of the trunk region and early fatigue is the complication of low muscle strength in some subjects. Decrease muscle flexibility and trunk strength have been found as risk factor for low back pain[12].The endurance of the musculature of the trunk also a vital element for mechanical support to spine[13]. The endurance of the musculature of the trunk muscles influences the pelvis and lumbar stability. A study suggests chief causes of postural deformation is the asymmetry between endurance of trunk flexors and extensors [14]. A study suggests that the endurance of back muscle is seen to be more in males as compared to females and has a negative co-relation between the core muscle endurance and lumbo-sacral angle in patients with chronic low back pain[15]. Factors like obesity, lumbar lordotic angle, poor

Corresponding author:
Rekha Chaturvedi,
Guru Jambheshwar University of Science and Technology, Hisar, Haryana, India.
E mail: rekhachaturvedi85@gmail.com,7206322394**.**

trunk and abdominal muscle strength, tight hamstrings and inequality of lumbar lordosis are interconnected factors contributing to decreased range of motion of lumbar spine[16]. So this study aims to see the association between anthropometric variables and lumbar lordosis with the trunk muscle endurance and to see the gender based differences in these variables in young adults.

Methodology

Study design: The present study is a cross sectional (Observational) design. The subjects were selected by systematic random sampling method. A total of 354 participants were selected out of 4992 participants residing in hostel of the University based on the inclusion and exclusion criteria. Sample size estimation was done with 95% confidence level and 5% margin of error. Inclusion criteria were: healthy young adults of age group between 18-26 years. Exclusion criteria: symptomatic back pain, pain in neck and thoracic region, history of any disease related to orthopedic, neurological and cardiopulmonary, any congenital or acquired chest wall deformity. Ethical approval was taken by Institute Ethical Committee (IEC) of Department of Physiotherapy of Guru Jambheshwar University of Science and Technology Vide letter no. PTY/2019/351. The protocol for the study was registered in CTRI (Clinical Trial Registration of India) Registration number CTRI/2019/04/018628 in accordance with the guidelines of ICMR (Indian Council of Medical Research)

Procedure:

The height and weight of all the participants of the study were taken using the weighing scale and stadiometer and the BMI was calculated. For measuring the Trunk flexor endurance Kraus-Weber Test was used[17]. For measuring the trunk extensor endurance modified Sorensen extension test was used. Palpations and marking of spinous processes was done by dry erase marker at the T12 and S1 spinous processes. Before measuring the lumbar lordosis angle of each subject the iPhone® has an inbuilt zeroing option for the application based inclinometer.[18]

Fig. 1 Kraus Weber test for Trunk flexor endurance

Fig. 2 Sorenson test for trunk extensor endurance

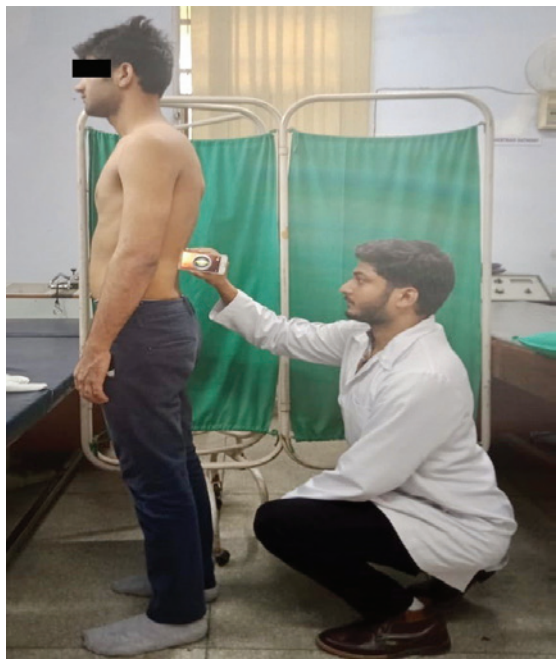
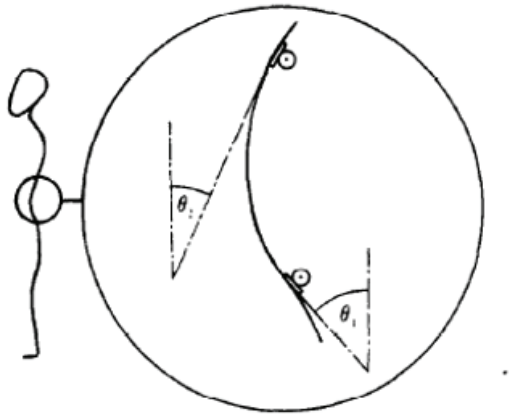


Fig. 3 Measuring lumbar lordosis using I Phone inclinometer

To measure the lumbar lordosis angle of subjects the instrument (iPhone®) was put with contact through the power on-off button on the body landmarks T12-L1 and

S1-S2 marked by a dry erase marker.[18]

Calculation of lumbar lordosis angle was done by the output from the instrument indicating the angles θ_1 (S1), and θ_2 (T12). The angles were recorded and added together. Lumbar curvature C is given by $C = \theta_1 + \theta_2$. [18,19]



Data analysis: Data was analyzed by the SPSS software (21.0 version). Mean and standard deviation (SD) of all the seven variables i.e. age, height, body mass index, waist circumference, flexor trunk muscle endurance (FET), trunk extensor muscle endurance (EET) and lumbar lordotic angle (LLA) in all male and female participants were calculated. The quartiles were formed from the values obtained from all variables to simplify the calculations. Independent T- test was used to find out the gender difference between the subjects and Chi-square test was used to find significance of association between the variables in both groups. The significance level was set at $p < 0.05$.

Result

The result of the study shows that there is significant gender difference in variables like age, BMI, LLA and WC. The male participants were taller, older and have more BMI and WC than their female counterparts. The females had more LLA as compared to the males. The characteristic of significant variables is mentioned in Table 1

Variables	**Mean ± SD**		**MD (95% CI)**	**t**	p
	Male	**Female**			
Height (m)	1.72 ± 0.05	1.59 ± 0.05	0.12 (0.11-0.13)	21.23	0.000
Age (years)	21.20 ± 1.89	20.81 ± 1.82	0.40 (0.01-0.78)	2.002	0.046
BMI (kg/m2)	22.33 ± 2.83	20.97 ± 2.93	1.36 (0.76-1.97)	4.436	0.000
FET (sec)	52.99 ± 19.92	51.27 ± 18.11	1.72	0.851	0.395
EET (sec)	75.75 ± 18.22	74.96 ± 17.57	0.79	0.414	0.679
LLA (o)	23.74 ± 2.72	26.13 ± 2.37	-2.39 (-2.93 to -1.86)	-8.824	0.000
WC (cm)	81.17 ± 7.50	76.44 ± 6.37	4.73 (3.28-6.19)	6.394	0.000

Table 2 Association between anthropometric variables and lumbar lordotic angle (LLA), trunk extensor muscle endurance test (EET), trunk flexor muscle endurance test (FET) using cross-tabulation

Variables	Df	Chi-square value	Significance
BMI_Quartiles*LLA_Quartiles	9	57.844	<0.001*
Age_Quartiles*LLA_Quartiles	9	15.764	0.072
FET_Quartiles*LLA_Quartiles	9	8.014	0.533
EET_Quartiles*LLA_Quartiles	9	22.689	0.007*
WC_Quartiles*LLA_Quartiles	9	23.904	0.004*
BMI_Quartiles*EET_Quartiles	9	11.441	0.247
Age_Quartiles*EET_Quartiles	9	5.380	0.800
FET_Quartiles*EET_Quartiles	9	137.188	<0.001*
WC_Quartiles*EET_Quartiles	9	16.172	0.063
BMI_Quartiles*FET_Quartiles	9	14.436	0.108
Age_Quartiles*FET_Quartiles	9	16.418	0.059*
WC_Quartiles*FET_Quartiles	9	20.607	0.015*

There was a positive correlation of BMI with the LLA. With the increase in BMI, LLA was also increasing. The extensor endurance showed a negative association with the LLA. When the LLA is decreased EET is also decreased. The result of the study showed significant positive correlation of LLA with the waist circumference. With the increase in WC, LLA is also increased. FET is also directly associated with EET. With the increase in flexor endurance , extensor endurance of the trunk muscle is also increased. The flexor endurance of the trunk muscle is also directly associated with the age. The flexor endurance is more in the participants of higher age. The result of the study also showed with the increase in waist circumference flexor endurance of the participants were decreasing. Decrease in extensor endurance is significantly associated with the history of back pain. The result of the study shows decrease in trunk endurance is most associated with low back pain as compared to flexor endurance (OR for FET is 2.42 and EET for 4.74). Point prevalence of low back pain in young adults aged 18-26 years is 4.5 % (95% 2.80-7.22) with females more prone to be affected. The use of high heels increases the lumbar lordosis and may contribute to low back pain. However, the result of the study shows no association between high heels use and lumbar lordotic angle, trunk flexors muscle endurance and trunk extensors muscle endurance.

Table 3 Association between trunk extensor endurance test (EET) and LBP in total population (n=354). The result shows there is a significant association of extensor endurance with history of back pain. The decrease in extensor endurance is directly associated with history of back pain.

EET	No Back Pain (n=338)	Back Pain (n=16)	Total
1st Quartile (n=72)	67 (93.1 %) 19.8	5 (6.9 %) 31.3	20.3
2nd Quartile (n=71)	64 (90.1 %) 18.9	7 (9.9 %) 43.8	20.1
3rd Quartile (n=81)	79 (97.5 %) 23.4	2 (2.5 %) 12.5	22.9
4th Quartile (130)	128 (98.5 %) 37.9	2 (1.5 %) 12.5	36.7

Discussion

The result of the study showed significant gender difference in the variables like age, body mass index, lumbar lordotic angle and waist circumference. The male participants were taller, older and have more BMI and waist circumference than their female counterparts. The lordotic angle was found to be greater in females as compared to the males (MD=7.7), this variation in the lordotic angle certainly reflects the gender differences in the shape of pelvis. There was a significant positive association of BMI with lumbar lordotic angle with the increase in BMI lumbar lordotic angle also increases. A study showed that people with normal BMI suffered from mild low back pain, whereas overweight and obese people complaint of severe low back pain, thereby showing positive correlation of BMI with low back pain significantly [20].The result of the study also showed that with the decrease in LLA, there is decrease in trunk extensor endurance. This relationship has been explained in various studies of low back pain. The patients of low back pain shows straightening of curvature of lumbar spine and thereby decrease in lumbar lordotic angle. A study has reported that acute LBP patients exhibits decrease in lumbar lordosis and lumbosacral angle, and increased thoracic kyphosis and backward displacement of COG and concludes that increased lumbar lordosis may result in pain in thoracic and lumbar region [21]. Another study has investigated the relationship between trunk muscle strength, lumbar lordosis and sacral angle in low back pain patients revealed that an imbalance in the trunk muscle strength may have a significant impact on the lumbar lordosis and could be a risk factor for possible low back pain[22]. Wallwork TL et al 2009 also reports decrease in the cross sectional area of the core muscles especially the multifidus and thereby compromising the extensor endurance of the back muscles in LBP patients [23]. The waist circumference shows significant positive co-relation with LLA, with the increase in waist circumference LLA also increases. Mainly the overweight females with a predominant abdominal fat mass having large waist circumference have been seen to have largely increased risk of low back pain. A study has shown that patients with BMI more than 24 kg/m2 or waist-hip ratio more than 0.85 can exaggerate the measurements of cobb's angle and sacrum slant angle. Increased lumbar lordosis and sacrum slant angle can be one of the causes for low back pain in a person with increased waist circumference [24]. Another study reported that females with a waist circumference greater than ninety centimeters have decreased muscular endurance as compared to the females with lower waist circumference [25]. The correlation of flexor endurance with extensor endurance shows direct correlation, with the increase in flexor endurance extensor endurance also increases. As the participants of the study are of age group between 18-26 years which is a high physical active group and the participants in the study complaining of low back pain were only 8.5% so, this

association is justified. Age is significantly associated with trunk flexor muscle endurance. This relationship can be further explored to know the exact mechanism for increase in the trunk flexor endurance. The point prevalence of LBP in the study was 4.5%, 95% CI (2.80, 7.22) with a female predominance and 84% of participants having weak extensor endurance and had history of back pain. The result of the study shows decrease in trunk extensor endurance is most associated with low back pain as compared to flexor endurance (odd ratio for flexor muscle endurance is 2.42 and for extensor endurance is 4.74).

Conclusion

The lumbar lordotic angle and the endurance of the trunk musculature as an essential element for maintaining good spinal health.

Compliance with Ethical Standards: This article does not contain any studies with human participants performed by any of the authors.

Funding: There is no external funding to write this paper.

Conflict of Interest: The author of the study declares no conflict of interest.

References

1. Palazzo C, Ravaud J-F, Paperlard A, Ravaud P, Poiraudeau S. The burden of musculoskeletal conditions. PLoS One. 2014; 9(3): e90633.
2. Schofield DJ, Shrestha RN, Percival R, Callander EJ, Kelly SJ, Passey ME. Early retirement and the financial assets of individual with back problems. Eur Spine J.2011; 20(5): 731–736.
3. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. Bull World Health Organ .2003;81(9): 646–656.
4. Rene Cailliet. Low back pain syndrome, 5th edition. F. A. Davis Company, Philadelphia.1995; 23, 100–102.
5. Na YM, Kang SW, Bae HS, Kang MJ, Park JS, Moon JH. The analysis of spinal curvature in low back pain patients. Journal of Korean Academy Rehab Med.1996; 20(3):669–674.
6. Gandevai, S. C .Spinal and supraspinal factors in human muscular fatigue. Physiology Review. 2001; 81: 1725-1789.
7. Ito T, Shirado O, Suzuki H, Takahashi M. Lumbar trunk muscle endurance testing: an inexpensive alternative to a machine for evaluation. Arch Physical Medicine Rehabilitation.1996; 77: 75–79.
8. Moffroid MT. Endurance of trunk muscles in persons with chronic low back pain: assessment, performance, and training. Journal Rehabilitation Reserve Dev.1997; 34:440–47.
9. Malliou P, Gioftsidou A, Beneka A, Godolias G. Measurements and evaluations in low back pain patients. Science and Journal Medicine Science Sports. 2006; 16:219– 30.
10. Parnianpour M, Nordin M, Kahanovitz N, Frankel V. The triaxial coupling of torque generation of trunk muscles during isometric exertion and the effect of fatiguing isoinertial movements on the motor output and movement patterns. Spine.1988; 13: 982–92.
11. World Health Organization, Obesity and Overweight. 2011. In ―Comparison of anthropometric and Body composition measures as predictors of components of the metabolic syndrome in a clinical setting‖. Obesity Research and Clinical Practice.2013; 7:55-66.
12. Wilmore JH, Buskirk ER, DiGirolamo M, Lohman TG. Body composition: A round table. The Physician and Sports medicine. 1986; 14(3):144-162.
13. Mclntosh G, Wilson L, Affleck M, Hmilton H. Trunk and lower extremity muscle endurance: normative data for adults. Journal of rehabilitation outcome measures.1998; 20-39.
14. Selvaganapathy K, Rajappan R, C.M. Balachanthran, The relationship between trunk muscles endurance and normal BMI among university students with sedentary lifestyle. International Journal of Physiotherapy.2017; 4(6): 358-362.
15. Mahadik S., Anap D., Diwate A. Correlation of lumbosacral angle with core muscle endurance in patient with chronic low back pain. Indian Journal of basic applied medical research. 2015;4: 423-428.
16. Bayramoglu M, Akman MN, Kilinc S, Cetin N, Yavuz N, Ozker R. Isokinetic measurement of trunk muscle strength in women with chronic low back pain. American Journal Physical Medicine Rehabilitaion. 2001; 80(9):650–655.
17. Selvaganapathy K, Rajappan R, C.M. Balachanthran, The relationship between trunk muscles endurance

and normal BMI among university students with sedentary lifestyle. International Journal of Physiotherapy.2017; 4(6): 358-362.

18. Salamh P.A, Kolber M, The reliability, minimal detectable change and concurrent validity of a gravity based bubble inclinometer and iphone application for measuring standing lumbar lordosis. Physiotherapy Theory Practice. 2013; 1-6.
19. M A Adams,P Dolan Phil, C Marx, W C Hutton. An electronic inclinometer technique for measuring lumbar curvature. Clinical Biomechanics.1986; 1: 130-134**.**
20. Chowdhury D, Sarkar. S, Rashid MH, Rahaman A, Sarkar SK, Roy R. Influence of body mass index on low back pain. Mymensingh Medical Journal. 2014; 23(1):125-9.
21. Na YM, Kang SW, Bae HS, Kang MJ, Park JS, Moon JH. The analysis of spinal curvature in low back pain patients. Journal of Korean Academy Rehabilitation Med. 1996; 20(3):669–674.
22. Kim HJ, Chung S, Kim S, Shin H, Lee J, Kim S, et al. Influences of trunk muscles on lumbar lordosis and sacral angle. Eurpean Spine Journal. 2006;15:409-14.
23. Wallwork TL, Stanton WR, Freke M, Hides JA. The effect of chronic low back pain on size and contraction of the lumbar multifidus muscle. Manual Therapy.2009; 14(5), 496-500.
24. Guo JM, Zhang GQ, Alimujiang. Effect of BMI and WHR on lumbar lordosis and sacrum slant angle in middle and elderly women. Zhongguo Gu Shang. 2008; 21:1-30.
25. Booth ML, Hunter C, Gore CJ, Bauman A, Owen N. The relationship between body mass index and waist circumference: implications for estimates of the population prevalence of overweight. International Journal of Obese related Metabolic Disorders. 2000; 24(8):1058-61.

The Effectiveness of Autogenic Relaxation on Reducing the Level of Depression among Elderly People Residing in Old Age Homes

Mansi N. Patel[1], Deepak Krishnamurthy[2]

[1]2nd year M.Sc. Nursing student, [2]HOD of Mental Health Nursing, Manikaka Topawala Institute of Nursing, College address: Manikaka Topawala Institute of Nursing – A constituent of Charotar University of science & Technology, Changa, Taluka : Petlad, District : Anand, Gujarat 388421 India.

Abstract

Introduction:- Aging is a worldwide issue in our society, elderly people living in old age homes may suffer from sadness, pain, and isolation. Depression is a common condition in the elderly that negatively affects numerous parts of their lives. Autogenic therapy uses visual imagery and body awareness to promote a state of deep relaxation. A detached but alert state of mind called "passive concentration" must be achieved for autogenic therapy exercises to be carried out. DESIGN:- A quantitative approach using pre experimental one group pre test post test design. PARTICIPANTS:- 60 old age people were selected by using a purposive non-probability sampling technique. INTERVENTION:- Autogenic relaxation TOOL:- geriatric depression scale was used to assess the level of depression in old age people RESULT:- The Mean depression level before intervention is 14.23 while after intervention it is reduced to 11.83. It shows statistically significant change in the mean depression level before & after the autogenic relaxation session. CONCLUSION:- The findings of the study indicate that autogenic relaxation is effective in lowering the level of depression among old age people living in old age homes.

Key Words:- Autogenic relaxation, Level of depression, Old age people

Introduction & Background

Most commonly the depressive syndrome is observed among the elderly. Depression is a mental illness, which currently accounts for nearly 30% of people between the age of 45 and 75years in India.[1]

Approximately 15% of adults aged 60 and over suffer from a mental disorder. The most common neuropsychiatric disorders in this age group are dementia and depression.[2]

Depression is the frequent affective condition in elderly. In depression, the person is having symptoms like sad mood, despair, lower confidence, poor interest in routine activities and negativity. Depression in the old age people has an impact on the variables of physical problems, functional issues, and cognitive disturbances.[3]

The elderly people don't have other alternative but to live in old age homes, multiple times they feel loneliness, detachment, and depression. In addition to losing their privacy, most of their worldly possessions, they also lose their sense of self-worth and social support. They are dependent on others to meet their emotional and recreational needs. This inspires the researcher to perform a study to identify depression in the older adults living in old age care centers.[4]

Autogenic Relaxation provides an excellent strategy for managing depression, Autogenic relaxation is a psychophysiological type of psychotherapy based on autosuggestion, first developed by the German physician and psychiatrist J.H. Schultz in the early 20th century. It consists of the phased practice of six simple relaxation

Corresponding author-
Ms. Mansi N. Patel,
2nd year M.Sc. Nursing student, Manikaka Topawala Institute of Nursing – A constituent of Charotar University of science & Technology, Changa, Taluka : Petlad, District : Anand, Gujarat 388421, India

responses. The first exercise that addresses muscular relaxation is performed by reiterating a formula to promote a sensation of heaviness in limbs, and subsequently, attention is focused inactively on sensing warmth, then on slow breathing, abdominal warmth, a calm heart beat, and a cool forehead. While progressing through these exercises, most people experience passive concentration, which allows the individual to break depression.[5]

Material and Method

Purpose of the Study

The purpose of the study is to evaluate the effect of autogenic relaxation on reducing the level of depression among old age people in old age homes.

Objectives of the Study

I. To assess the pre-test and post-test level of depression among elderly people.

II. To evaluate the effectiveness of autogenic relaxation reducing the level of depression among old age people.

III. To find the association between the level of depression with selected demographic variables.

Hypothesis

$1H_0$: There is no significant difference between the mean pre-test depression score and the mean post-test depression score. (at $p< 0.05$ level of significance)

$2H_0$: There is no significant association between pre-test depression level of elderly people and their selected demographic variables. (at $p<0.05$ % level of significance)

Delimitations

1) The study is limited to old age people who are between 60 to 72 years.

2) The study is limited to old age people residing at selected old age homes.

3) Limited uniformity in following the command of the therapist by all the participants.

4) This study is limited to a significant level of depression.

Operational Definition

1. Elderly people: The old age people aged 60 to 72 year who are residing in old age homes.

2. Level of depression: Depression is a loss of interest in pleasurable activities, feelings of worthlessness, helplessness, isolation, lack of interest in daily activities for at least two weeks in elderly people which is measured by the elderly depression scale. Grouping the depression scores obtained through observation rating scale on depression. It is divided in to normal, mild, and severe.

3. Effectiveness: It is the outcome of autogenic relaxation which will be appraised, validated by a decrease in depression level among elderly people. It is the difference between the pre-test and post-test level of depression and it is measured by the geriatric depression scale.

4. Autogenic relaxation: It is the kind of relaxation technique that involves six progressive steps Practicing for once in a day for 30 minutes during which elderly people focus on breathing, circulation and muscle relaxation. It is a non-pharmacological, non-invasive therapy used to decrease the level of depression among old age people.

5. Old age home: Old age home is a residence or institution where old people live and providing care to the elderly.

Research Approach

A quantitative approach was used to test the effectiveness of the intervention.

Study Design

The researcher used a pre-experimental research design for the present study.

Research Variables

Independent variable:-

In the present study independent variable was selected autogenic relaxation sessions.

Dependent variable:-

In present study dependent variable was level of depression among elderly.

Demographic variables:-

Demographic variables are characteristics or attributes of subjects that are collected to describe the sample. age, gender, religion, education, marital status, no of children, frequency of visit of children, Previous occupational status, Type of family, spouse alive or dead, any problem with a spouse were the demographic variables of the present study.

Setting of the Study

The research was done in selected 4 old age homes which include.

· Krishnahsray Ashram, Janhitarth charitable Trust, old Age Home, Mahelav

· Asahara Mahila Utkarsh Trust, old Age Home, Petlad

· Jalarambapa old age home, Pij

· Jivansandhya old Age Home, Ahmedabad

Population

Target population**:** Target population of the study was old age people residing at old

age home.

Accessible population**:** An accessible population is the aggregate of old age people that conform to designated inclusion or exclusion criteria and that are accessible as the subjects of study.

Sample

The participants were old age people with mild depression according to the Geriatric depression scale residing in a selected old age homes, those who fulfilled the inclusion criteria.

Sample Size

The sample size for the present study was 60 old age people who were residing in old age homes.

Sampling Technique

60 old age people were selected by using a purposive non-probability sampling technique.

TOOL

The tool used for the study was the Geriatric Depression Scale (30 points)**.** The investigator collected the data by used the geriatric depression scale. It was YES or NO question type. The items were assessed by the tool scores, which was given based on the nature of questions that is in a positive manner for positive type questions and in a reverse manner for the negative aspect questions. A total Score was provided which consists of one point from each depressive answer. Non-depressive answers were scored as zero and do not add to the total score. In scoring the Geriatric Depression Scale, each item is scored 0 or 1 depending upon whether the item is worded positively or negatively. The total score on the scale ranges from 0 to 30. For items 2-4, 6, 8, 10-14, 16-18, 20, 22-26, 28 the scoring is: Yes = 1 , No = 0 Items 1, 5, 7, 9, 15, 19, 21, 27, 29, 30 are reverse scored as follows: No = 1 , Yes = 0

SCORING INTERPRETATION	
0 - 9	No depression
10 - 19	Suggestive of mild depression
20 -30	Suggestive of severe depression

Criteria For Selection of Samples

Inclusion criteria

1. Elderly people who stayed in the selected old age homes in Gujarat.

2. Elderly people in the age group of 60 to 72 years.

3. Elderly people who can speak read and understand Gujarati.

4. Elderly people who are willing to participate in this study.

5. Elderly people who have mild depression according to the Geriatric depression scale.

Exclusion criteria

1. Elderly people who are not available at the time of data collection.

2. Elderly people with psychotic symptoms and other mental illness

3. Elderly people who are taking drugs for mental illness.

4. Elderly people with hearing problems and without

hearing aids.

SOURCE OF DATA

The data will be collected from the Geriatric people who were residing at selected old age homes.

The researcher chooses old age care centers with the use of simple random sampling technique (chit method) after getting approval from concerned authority and written consent from participants, GDS is utilized to check the depression. The participants comes in inclusion criteria are recruited. An autogenic relaxation session was provided for 7 days once in a day for 30 minutes preferably in morning 10 to 11 am. On 7th day geriatric depression, the scale is reapplied to assess depression level after autogenic relaxation sessions.

Findings

The investigator collected the data for analysis and interpretation, using post-test structured Performa. The majority of the old age people 25 [41.7%] were in the age group of above 68-72 years. While comparing the sex, the majority of the old age people 37 [61.7 %] were female and 23 [38.3%] were males.

Regarding religion, all the old age people 60 [100 %] were Hindus. Regarding the marital status majority of the old age people, 24[40%] were married, 9 [15%] were unmarried, 23[38.3%] widow/widower 4 [6.7 %] divorced.

While comparing family type 22[36.7%] belongs to the nuclear family, 25[41.7%] belongs to the joint family. While comparing the number of children 2[3.0%] had no children, 6[10%] had 1child, 19[31.7%] had 2 children, 17[28.3%] had 3 children, 7[11.7%] had more than 3 children.

Regarding the children visit time to old age home, 12[20%] not even visited once in a month, 22[36.7%] visited to old age home in monthly once, 10 [16.7 %] 2 times visited old age home in month , 5 [8.3%] visited old age home more than 2 times in month.

Regarding spouse 28[46.7%] had a spouse and 23[38.3%] had no spouse. While discussing any problem with spouse 6[10%] had a problem with their spouse and 22[36.7%] had no problem with the spouse.

Table 1: Frequency and percentage distribution of old age people according to the level of depression

N=60

Level of Depression	Pre Test		Post Test	
	Frequency	Percentage (%)	Frequency	Percentage (%)
No Depression	00	00	07	11.67%
Mild	60	100%	53	88.33%
Severe	00	00	00	00

The above table states that in the pre-test all the old age people 60 [100%] had a mild level of depression, in post-test 7 [11.67 %] had no depression and 53[88.33%] had a mild level of depression.

Table 2: Effectiveness of autogenic relaxation on depression among old age people N = 60

	N	Mean	Standard Deviation	SE Mean
Depression Level- Pre	60	14.23	2.174	0.281
Depression Level- Post	60	11.83	2.195	0.283
Difference	00	02.40	-0.021	-0.002

The Mean depression level before intervention is 14.23 while after intervention it is reduced to 11.83. It shows statistically significant change in the mean depression level before & after the autogenic relaxation session.

Table no. 3 Level of depression before and after an intervention N=60

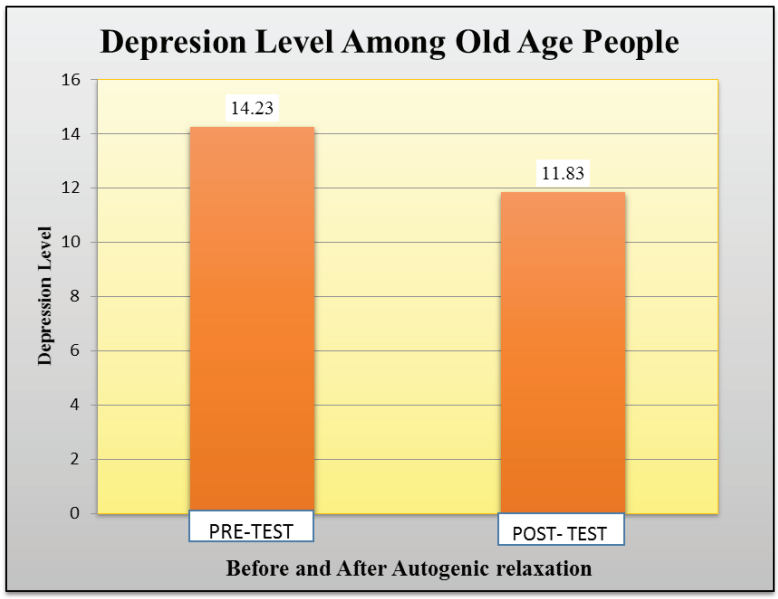
		Mean	Std. Deviation	Std. Error Mean
Pair 1	Pretest	14.23	2.17	0.28
	Posttest	11.83	2.19	0.28

Data presented in table no 4 depicts mean pre-test depression score is 14.23 & SD is 2.17 and the mean post-test depression score is 11.83 & SD is 2.19. It indicates that there is statistical significant difference found on depression level before and after intervention.

Table no. 4 Effectiveness of Autogenic Relaxation on Depression level

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair- 1 Pretest Posttest	2.40	0.88	0.11	2.17	2.62	20.96	59	.0001

Data presented in table no 5 indicate that the mean difference between pre-test and post-test is 2.40 & SD is 0.88 and the calculated T- value is 20.96 which is more than t table value hence we reject null hypothesis so it concludes that autogenic relaxation is effective intervention on reducing the level of depression.



The above graph shows that in the experimental group the Mean depression level in the pre-test is 14.23 while in post-test it reduced to 11.83. It indicates Autogenic relaxation therapy has a significant effect on depression levels among old age people.

The p-value association shows there was an association between the pre-test level of depression and age and there was no association found between the level of depression and other socio-demographic variables.

Discussion

Autogenic relaxation promotes deep relaxation. They used words like: "relaxed, rested, calmness, warmness, heaviness". Moreover, the physical sensations felt by some participants throughout the Autogenic relaxation sessions such as: tingling at fingertips, deep sleep, slow respiration, warm sensation.

However, considering the actual fact that Autogenic relaxation supports the present self-healing and sel-regulating physiological functions of varied body systems. Some of the participants even fell asleep often throughout the follow of Autogenic relaxation.

At the end of every Autogenic relaxation session, participants got an opportunity to speak regarding their experiences. They were assured that these sensations are normal and uncontrollable responses and that they can decrease in intensity and frequency with follow. For example, within the starting, many participants found it troublesome to prevent their mind from wandering off. They were reminded that passive concentration is new their brain which intrusive thought is sort of normal. At the end of the session, participants sometimes 'forget' to say their bodily complaints.

In this study, Autogenic relaxation did have a positive impact on Total psychological well-being among the experimental group over time. For the aim of this study, no comparisons were created across the genders due to the unequal distribution of woman to men. Additionally, age variations were conjointly not considered due to the small sample size.

Conclusion

From the results of this study, it is conclude that Autogenic relaxation considerably reduced the level of depression and Total psychological well-being among the experimental group. The present study aims to evaluate the effectiveness of autogenic relaxation on depression among old age people residing in old age homes. The study was conducted by using pre experimental one group pre test post test research design. Kheda district was selected for conducting the study. The sample size was 60 old age people by using purposive sampling technique.

Conflict of Interest :- No any conflict of interest in this study

Source of Funding:- Self

Ethical Clearance :- This study is approved by ethical committee

References

1. Jayapriya. R, Santhi. S, Sujatha. V; Effectiveness of Progressive Muscle Relaxation and Activity Schedule on Depression and Activities of Daily Living Among Elderly Patients; the journal of medical science and clinical research; Feb 2016;4(2) available from URL http://jmscr.igmpublication.org/home/index.php/archive/99-volume-4-issue-02;feb-2016/539
2. Buvneshkumar M, John K R, Logaraj M. A study on prevalence of depression and associated risk factors among elderly in a rural block of Tamil Nadu. Indian J Public Health [serial online] 2018 [cited 2019 Dec 9];62:89-94. Available from: http://www.ijph.in/text.asp?2018/62/2/89/234503
3. Christensen cockcrow.Foundations and adult health nursing .1st edition. Philadelphia: Mosby company;2006.p1082,1088.
4. Illango Ponnuswami, "Ageing worldwide trends & challenges for caregiving"; social welfare 2005; vol.51 no.7, P 26-39.
5. Seung-JooLimPhD, RN[1]ChunmiKimPhD, RN[2]Effects of Autogenic Training on Stress Response and Heart Rate Variability in Nursing StudentsVolume 8, Issue 4, December 2014, Pages 286-292https://doi.org/10.1016/j.anr.2014.06.003

Drug Utilization of Antibiotics in Medicine ward of Tertiary Care Teaching Hospital

Mayank, Saini[1], Sourav[1], Abhimanyu Prashar[1], Manish Kumar[1], A. Pandurangan[1], Vipin Saini[3], Amit Mitttal[4]

[1]Student, [2]Professor, M. M. College of Pharmacy, Maharishi Markandeshwar (Deemed to be University) Mullana-Ambala, [3]Vice-Chancellor, M. M. University, Solan, Himachal Pradesh, [4]Professor, M. M. Institute of Medical Sciences and Research, Maharishi Markandeshwar (Deemed to be University) Mullana-Ambala

Abstract

Background: Drug utilization study are used to foster more efficient use of scarce resources to improving the standards of medical treatment at all levels in health system. It also helps in the identification of problems created with drug use. The aim of study was to evaluate the pattern of drug utilization of antibiotics in patients.

Methods: This was a prospective observational study which was done in six months from August 2018 – February 2019. 100 patients were enrolled in the study. Which were taking antibiotics from in-patient department of medicine ward of tertiary care teaching hospital. **Results:** It was observed that out of 100 patients, 52 were female and 48 were males. Majority of the patient lies in the age group of 20-40 years. It was observed that total 623 drugs were prescribed out of which 146 were antibiotics (23.43%). The use of these antibiotics was in intravenous (87) and oral (59). There were 78 conditions in which antibiotic were prescribed empirically and in 22 conditions prophylactically. The maximum antibiotic prescribed was observed in Urinary Tract Infection (20.51%). Major cost was rendered by Cephalosporin class (36.98%) and the least was of tetracyclines (2.05%). The ratio of cost of total drugs to the antibiotics was found to be 49.37%.

Conclusion: Thus the study conclude that the Drug Utilization Study can help to understand the usage pattern and extra cost rendered by the patient due to intravenous antibiotic and thus providing a helping hand in the designing of antibiotic policies.

Keywords: *Antibiotic, Drug utilization study, Antibiotic usage pattern.*

Introduction

In contrast to the public health, resistance of antibiotic becomes a major threat as the consumption of antibiotic increases [(1)]. Antibiotics-resistant pathogens have become evident and spread among human and animal populations worldwide [(2, 3, 4)]. Pathogens such as methicillin-resistance staphylococcus aureus (MRSA) [(5)] and carbapenem-resistant *Enterobacteriaceae* (CRE) [(6, 7)] have become a worldwide problem. The loss of efficacy against common pathogens has not only led to a shift towards extortionate antibiotic drugs in high-income countries, but also to increased morbidity and mortality in low-income and middle-income countries, where it restricts their use due to affordability of second line drugs [(8)]. An inappropriate prescription increases the cost of the medical treatment and it also increases the morbidity and mortality. The impact of the irrational prescription of drugs also leads to an increase in the incidence of adverse drug events. To control the worldwide ascendancy of bacterial resistance, to minimize the side effects and to reduce the cost of

Corresponding author
Dr. Manish Kumar
Professor, M M College of Pharmacy,
Maharishi Markandeshwar (Deemed to be University),
Mullana, Ambala, Haryana, India
E-mail: manish_singh17@rediffmail.com

the treatment, the rational use of antibiotics is being increasingly recognized as an important contributor [9].

In recent years, issues of quality assurance and cost control have often focused on the use of antibiotics [10, 11]. This has led to the broadcasting of antibiotic utilization review which is an authorized, structured, ongoing review of prescribing, dispensing and use of medication. Antibiotic utilization review results are used to foster more efficient use of scarce health care resources. It provides opportunity to identify trends in prescribing within groups of patients whether by disease-state or drug-specific criteria [12, 13, 14, 15].

So this study was undertaken in an active inpatient environment of tertiary care teaching hospital to evaluate the usage pattern of intravenous and oral antibiotics, to assess the additional cost rendered by the patients due to over utilization of antibiotic and drug related problems evaluation associated with the antibiotic.

Study Design

A prospective observational study on antibiotic utilization pattern was conducted by the department of pharmacy practice in collaboration with M.M. Hospital, mullana-ambala (India) with a sample size of 100 patients. The study was conducted for a period of six months from August 2018 to February 2019. A total of 100 patients were analyzed on the basis of inclusion and exclusion criteria. All the prescription had complete documentation of information including, patient demographic characteristics, date of admission and discharge, clinical diagnosis, drug name, dose and route of administration, investigations, rationality and outcome of health status. The data of the patients who received antibiotic was recorded and analyzed further for drug utilization studies. The study protocol and all the other documents which were related to the study were approved by the Institutional Ethics Committee.

Inclusion Criteria

All the patient of either gender with any kind of diseased condition admitted in medicine ward of M.M. hospital during the study period were included in the study.

Exclusion Criteria

We excluded the inpatients who discharged on the day of admission, outpatient and patients admitted to ICU. All the pediatrics, geriatrics, pregnant/lactating mothers were also excluded in the study.

Method of Data Collection

During our study, we reviewed the case record sheets of all patients who met the inclusion criteria. Data was collected using a well-structured case record form (CRF) which includes patient's demographics, drug allergies, patient's disease history, medication chart, culture reports and laboratory parameters. The culture and sensitivity reports were analyzed to assess the appropriateness of the antibiotic selection. Any medication error and drug related problems that were found in our cases were also recorded. All the discrepancies observed have been documented appropriately in the CRF designed for our study.

Results

A total of 100 patients were enrolled in the study from August 2018 to February 2019. The subjects were segregated into 5 major groups as discussed in table 2. The mean age of the subjects was found to be 38.97 ± 19.70 years. It implies that the maximum patients were in the age group of 20 – 40 years with standard deviation of 19.70 years. Moreover, it was observed that male-female ratio almost equal, contributing to 1:1.1(48; 52). The mean age of male population was observed as 39.09 ± 19.67 years whereas; in female population it was found to be 38.98 ± 19.70 years. This implies that the majority of male and female patients were from the age group of 20 – 40 years.

It was observed that, majority of the subjects are from the age group of 20-40 years with 17 males and 21 females patients, followed by the patients under 41-60 years (29 Females; 11 male) shown in figure 1.

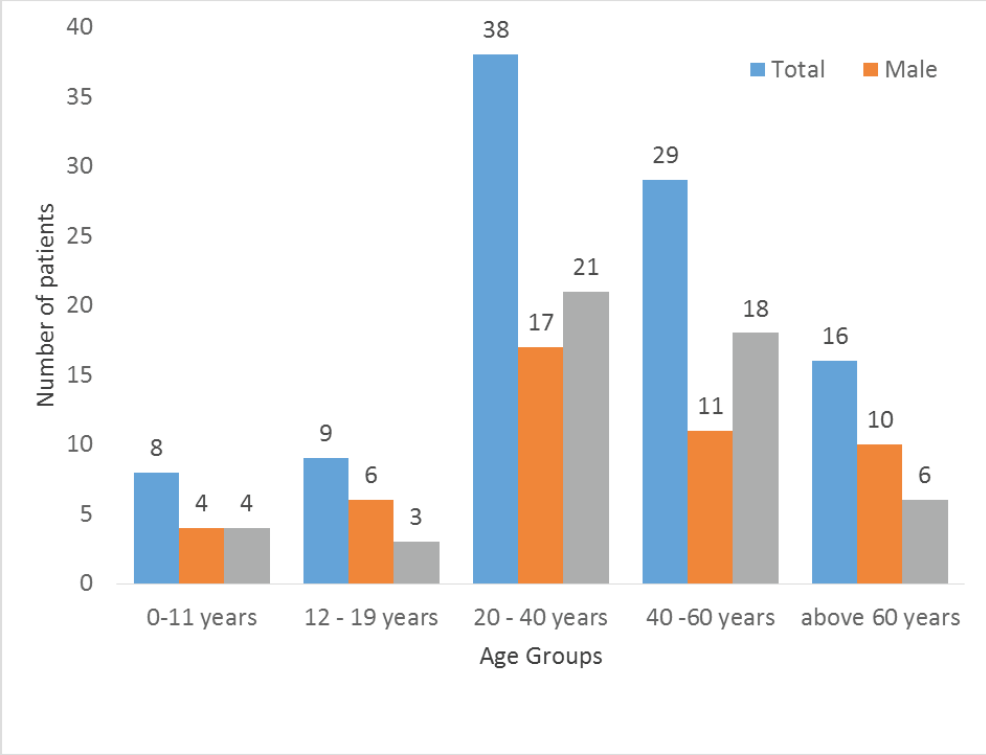


Figure 1: Gender wise age-distribution

Antibiotics were the most used drug along with anti-tubercular drugs and anti-malarial drugs (n=146; 23.43%), followed by antacids (n=100; 16%), utilization of multivitamin and supplements was less (n=78; 12.52%), followed by NSAIDS (Non-steroidal Anti-inflammatory drugs) (n=70; 11.23%). (Table 2).

Table 1 Antibiotic usage pattern

Medication class	Total number(n)	Percentage
Antacid	107	17.17%
Anti-allergic	13	2.09%
Anti-anemic	7	1.12%
Antibiotic	146	23.43%
Anti-emetics	47	7.54%
Anti-epileptic	20	3.21%
Anti-hypertensive	27	4.33%
Anti-thyroid	5	0.8%
Anti-viral	1	0.16%
Hypoglycemic	8	1.28%
Hypolipidemic	3	0.48%
Laxatives	21	3.37%
Multivitamins & supplements	78	12.52%
NSAIDS	70	11.23%
Others	45	7.22%
Probiotics	8	1.28%
Steroids	15	2.4%
Vaccine	2	0.32%

The comorbid conditions of the subjects (n=100) were classified into three types. Patients with one morbidity was the highest (n=49), followed by the patients with two comorbid conditions (n=31) and the patients with more than two comorbidities was the least (n=20) (Table 1).

Systemic conditions	Total drugs (n1)	Antibiotic (n2)	Percentage (n2/n1)
Infectious	263	62	23.57
Gastro intestinal	147	37	25.17
Renal	56	11	19.6
CNS	47	10	21.27
Reproductive	41	11	26.82
Respiratory	37	10	27.25
CVS	14	2	14.28
Hematologic	10	1	10
Musco-skeletal	5	2	40

Table 2: Pattern of antibiotic usage in various systemic conditions

There were total 78 conditions in which antibiotics were prescribed empirically and 22 conditions in which antibiotics were prescribed prophylactically. The antibiotic count was maximum in Urinary tract infection (UTI) (n=16, 20.51%) following hepatitis (n=14; 17.94%), fever (n=12; 15.38%), dengue (n=7; 8.97%), pneumonia (n=6; 7.69%), cystitis (n=5; 6.41%), psoriasis (n=4; 5.12%), sinusitis (n=3; 3.84%), malaria (n=3.84%) and scabies (n=2; 2.56%). (Table 2).

Table 3 Various infection conditions

Infection condition	Total number (n)	Percentage
UTI	16	20.51
Hepatitis	14	17.94
Fever	12	15.38
Dengue	7	8.97
TB	6	7.69
Pneumonia	6	7.69
Cystitis	5	6.41
Psoriasis	4	5.12
Sinusitis	3	3.84
Malaria	3	3.84
Scabies	2	2.56

It was observed that, a total of 11 different antibiotic classes were used during the study. A major proportion of the antibiotics involved the usage of cephalosporin (n=54; 36.98%) (Table 3).

Table 4 Various classes of antibiotic used

Antibiotic	Total number (n)	Percentage	Cost (INR)
Cephalosporin	54	36.98	8894
Fluroquinolones	22	15.01	4403
Penicillin	16	10.95	3329
Beta-lactams	10	6.84	3304
Aminoglycosides	9	6.16	2250
Macrolides	9	6.16	1376
Nitroimidazoles	8	5.47	1260
Nitrofurantoin	7	4.79	451
Tetracycline	3	2.05	438
rifaximin	3	2.05	2347

The cumulative cost of 623 drugs was found to be INR 64,573. The average cost of total drugs was found to be INR 443 with a quartile range of 322.5-601 INR. The cumulative cost of 146 antibiotics was observed as INR 25,705. The average cost of antibiotic was found to be INR 224 with the quartile range of 144-288 INR .The ratio of cost of total drugs to the antibiotics was found to be 49.37% of total cost of the medication of a single patient was spent on antibiotic itself. Thus it was clearly evident that, a major portion of the medication cost comprises of antibiotics (Table 4).

Discussion

As India, the most populous country in the world, with over 1.21 billion people (2011 census), India houses more than a sixth of world's population. Already containing 17.5 % of the world's population, India is projected to be the world's most populous country by 2025, surpassing China, with its population reaching 1.6 billion by 2050. India has more than 50% of its population below the age of 25 and more than 65% below age of 35. The life expectancy level has been improving over these decades for both male and female population[16]. The improvement among female is better than male population [17, 18]. Sex ratio has improved from 930 in 1961 to 940 in 2011 which is an appreciable improvement but still below the international levels. The country has a long way to go before attaining the levels achieved by developed countries and many developing countries [19, 20].

A majority of the study subjects were housewives (n= 44), followed by students (n= 27), workers (n=11), businessmen (n=8) and farmers (n=8).

The WHO prescribing indicators provided earlier, gives a comprehensive idea regarding the pattern of antibiotic use in this institution. The overall antibiotic encounter rate as per our study was 23.43%, which is not much different from the WHO standard of 20-26.8%. This is certainly a welcome attitude, and could reflect the concern of the practicing doctors for the rapidly spreading bacterial resistance. This is significantly less

than the values reported from many other parts of India – (47.6%, 73>1% and 81.8% from T.puram, Chennai, Vellore and Lucknow) respectively [21, 22, 24]. In another study from South India, the percentage of injections was as low as 1.6%. It is a well-accepted fact that parenteral therapy is significantly costlier, because of the higher price for the formulations, the cost of the syringes as well as nursing charges. The significant use of injectable in this institution requires pointed focus for the reduction of use of injectable to deserve appreciation [24].

The selection of individual agents in most instances raises a big question mark on their scientific basis. In our study, there were 78 conditions in which antibiotic were prescribed empirically and 22 conditions in which antibiotic were prescribed prophylactically. Lab reports from microbiology had not been given due to definitive line of management in majority of infections. This also appears to be the situation in many developing countries [25, 26].

The use of tetracyclines, however, was high in the rural hospital setup in the Vellore study.[27,28] Among the newer agents, meropenem, linezolid and tigecycline found only very little usefulness probably due to their high cost and because of exclusion of ICU patients from this study.

Management of infections like Urinary Tract Infection, Upper Respiratory Tract Infection as well as Skin Infection with a single antimicrobial could be appreciated, though this was probably feasible as the involved pathogen could be correctly guessed/ identified[29,30]. In management of Urinary Tract Infection, especially as an empirical therapy, use of flouroquinolones (15.01%) goes certainly against the currently accepted policy. Nitrofurantoin is now considered as the first line agent for treatment and prophylaxis of lower Urinary Tract Infection, based on its proved effectiveness and established safety accrued from its long term use[31, 32, 33]

Conclusion

The study highlighted the usage pattern of antibiotics. The average antibiotics prescribed was found to be low but there was an overuse of intravenous dosage form that had increased the cost of treatment. Also more antibiotic was prescribed based on the empirical therapy followed by the prophylactic therapy. Thus the study conclude that the Drug Utilization Study can help to understand the usage pattern and extra cost rendered by the patient due to antibiotic and thus providing a helping hand in the designing of antibiotic policies.

Acknowledgment: The authors gratefully acknowledge co-operation of the resident doctors and the senior physician of the medicine department in the M.M. Institute of Medical Science and Research for their valuable guidance and support.

Ethical Clearance: The Ethical approval has taken from IEC committee from department.

Conflict of Interest : The authors declare no conflict of interest, financial or otherwise.

Source of Funding - Self

References

1. Rutkowska K., Przybyla M., Misiolek H. Healthcare associated infection in the newly opened intensive care unit. Anaesthesiol Intensive Ther. 2013; 45(2): 62-66
2. Katia I.A., Pierre A., Hanna B., Pascale S., Raad E.B. Antibiotic consumption in non-teaching Lebanese hospotals: A cross sectional study. Journal of Infection and Public Health 2016; 9: 618-625
3. Levy S.B., Marshall B. Antibacterial resistance worldwide: cause, challenges and responses. Nat Med 2004; 10:S122-29
4. WHO, Antimicrobial resistance factsheet. http://www.who/int/mediacentre/factsheet/fs194/en (accessed dec 19, 2013)
5. Grundmann H., Aires-de-Sousa M., Boyce J., Tiemersma E. Emergence and resurgence of methicillin-resistance staphylococcus aureus as a Public Health Threat. Lancet 2006; 368: 874-85.
6. Nordmann P., Naas T., POirel L. Global spread of carbapenemase-producing Enterobacteriaceae. Emerg Infect Dis 2011; 17: 1791- 98
7. Laxminarayan R., Duse A., Wattal C., et. Al. Antibiotic resistance- the need for global solution. Lancet Infect Dis 2013; 13: 1057-98
8. Uppal R., Sarkar U., Giriyappanavar Cr., Kacker V. Antimicrobial drug use in Primary health care. Journal of Clinical epidemiology 1993; 46(7); 671-673
9. Counts G.W. Review and control of antimicrobial usage in hospitalized patients: a recommended

collaboration approach, JAMA 1980; 238: 2170-2

10. American Society of health System Pharmacist. ASHP guidelines on medication use evaluation. 1996; (53): 1953-5
11. Finland M. The antibiotic audit- its value in the individual patient. In: Lorian V,ed. Significance of medical microbiology in the case of patients. 2nd ed. Baltimore: Williams and Wilkins, 1982; 300-24
12. Fishman N. Antimicrobial Stewardship. Am J Med 2006; 119(6A): 553-561
13. Jain P., Prabhal M., Nain P., Kaur J. Drug utilization stufy of antibiotic in Medicine Department of a Tertiary Care Teaching Hospital: A Descriptive Observational Study. IJPCR 2018; 10(11): 252-255
14. Birth Rate, Death Rate, Infant Mortality Rate and Total Fertility Rate; India and States- National Commission on Population, Government of India, 2010
15. World Population Prospect: United nations, Department of socio-Economic Affairs, Population Division, Population Estimates and Projections section, 2010
16. Human Development Reports: 2005, 2006, 2007-08, 2010 and 2011, United Nations Development Program.
17. Indira KK, Chandy SJ, Jeyaseelam L, Kumar R, Suresh S. Antimicrobial prescription patterns for common acute infections in some rural and urban health facilities of India. Indian Journal of Medial Research. 2008 Aug 1;128(2):165.
18. 19th WHO Model list of Essential Medicines; April 2015:6-9
19. Remesh A, Salim S, Gayathri AM, Nair U, Retnavally KG. Antibiotics prescribing pattern in the in-patient department of a tertiary care teaching hospital. Archives of pharmacy practice. 2013 April 1;4(2):71
20. Narayanan DS, Mangesh MM. A study of prescription pattern of antibiotics in paediatric inpatients at a tertiary care hospital in Central India. International J. of Pharmacological research 2016;6(08):286-90
21. Prasad PS, Rudra JT, Vasanthi P, Sushitha U, Sadiq MJ, Narayana G. Assessment of drug use pattern using World Health Organisation core drug use Indicators at Secondary Care Referral Hospital of south India. CHRISMED Journal of Health and Research. 2015 Jul 1;2(3):223
22. Mishra S, Sharma P. Prescription audit and drug utilization pattern in a tertiary care teaching hospital in BHOPAL. International Journal of Basic and Clinical Pharmacology. 2016;5(5):1845-9
23. Indian Medical Council (Professional conduct, Etiquette and Ethics) Regulations, 2002. Substitution in use of Generic names of drugs. Notification No. MCI-211(2)/2016(ethics)/131118; September 2016
24. Khade AM, Shakeel M, Bashir M. Prescription pattern of antimicrobial agents in a teaching hospital of South India. Int J Basic Clin Pharmacol. 2013 Oct;2(5):567-70.
25. Giri BR, Pant HP, Ravishankar P. Surgical site infection and antibiotic use pattern in a tertiary care hospital in Nepal. J. Pak Med Assoc: 2008:58(3):148-51
26. Malpani AK, John NN, Srividya VL, Santoshi Y, Paul S. A broad survey and comprehensive study on utilization pattern of antibiotic in tertiary care teaching hospital in North Karnataka. Int J Pharm Sci Res. 2013;4(2):628-32
27. Chandy SJ, Thomas K, Mathai E, Antonisamy B, Holloway KA, Lundborg CS. Patterns of antibiotic use in the community. J Antimicrob chemother. 2013;68:229-36
28. Susan Mani, Hariharan TS. A comparative invitro study of cephalosporin – beta lactamase inhibitor combinations against gram negative bacilli: Indian J Physiol Pharmacol. 2013;57(4):425-31
29. National symposium on antibiotic stewardship and infection control and prevention, Antibiotic Guidelines, Dep of health and FW, Govt of Kerala. 2016:97,93
30. Cunha BA, Schoch PE, Hage JR. Nitrofurantoin: preferred empiric therapy for community- acquired lower urinary tract infections. In Mayo Clinic Proceedings. 2011 Dec;86(12):1243-4
31. World Health Organization: WHO global strategy for containment of antimicrobial resistance. 2001
32. Linda MS, Peter CM, Robert JC, Ruthanne R, Grace DL. Drug-Related Problems: Their Structure and Function. DICP, The Annals of Pharmacotherapy. 1990;24:1093-97
33. Lazarou J, Pomeranz BH, Corey PH. Incidence of adverse drug reactions in hospitalized patients: a meta-analysis of prospective studies. JAMA 1998;279: 1200-5.

Effect of Postnatal Exercises and Education on Lowback Pain in Early Postnatal Mothers

Meena Sekar[1], B. Sathyaprabha[2], N.Venkatesh[3], R.Siva Kumar[4]

[1]Post graduate, [2]Associate Professor, [3]Chairman and Professor, [4]Principal and Professor, Faculty of Physiotherapy, Sri Ramachandra Institute of Higher Education and Research (Deemed to be University), Porur, Chennai

Abstract

Background: Back pain is one of the most common problems during postpartum period. The physical and mental changes and demands in postpartum period challenge the quality of life of postnatal mothers. Approximately 70% of women report back pain at some point in their postnatal period. This study aimed to analyze the effect of postnatal exercises and education on functional outcomes of low back pain in early postnatal mothers. **Methodology**: Experimental group was treated with core stabilization exercises along with education on postural care and back care while control group were on conventional postnatal exercises and education. Follow up sessions were conducted once in two weeks for experimental group and both the groups were followed up by phone calls. **Results**: There is a significant reduction in disability from baseline ($p<0.05$*) in the study group and both the group had shown significant reduction in VAS from baseline ($p<0.05$*). **Conclusion**: Core stability exercises along with postural care and education will increase the strength of lumbo-pelvic muscles, improve posture, physical activity level, decrease the pain intensity, and improve the functional disability in postpartum period.

***Keywords**: postnatal, low back pain, stabilization exercises, core muscle exercises and postnatal back care.*

Introduction

The postnatal period is the duration after the birth of a child and extending for about six weeks. Majority of (72%) women regaining their physical energy level within 6 weeks after normal vaginal delivery [1]. During postnatal period hormone levels and uterus size returns to a non–pregnant state, fluctuating hormone levels results supporting ligaments in the body to soften and become lax or stretch. This could lead to various musculoskeletal problems such as excessive joint mobility, weakness of core stabilizers in postpartum period. The common musculoskeletal postpartum complications are low back pain, upper back pain, pubic pain, coccyx pain, pelvic girdle pain, general fatigue and tiredness[2].

Approximately 70% of women have reported low back pain (LBP) at some point in their lives and majority of them were affected in their first pregnancy. LBP during pregnancy is considered to be the most important risk factor for postpartum LBP which could have impact on daily routine and quality of life[3]. Greater BMI, younger age, a history of low back pain during pregnancy, before pregnancy, multiparty and joint hyper mobility have been found to be predisposing factors of low back pain in women after childbirth [4].

The classical hypothesis of low back pain postulates that weight gain experienced during pregnancy results in postural changes that produce pain and weak abdominal muscles may also have a role in pathology of low back pain during postpartum period. Due to the anterior displacement of the center of gravity of the trunk and abdomen, women may unconsciously shift their head and upper body posteriorly over their pelvis, inducing hyperlordosis of the lumbar spine. This shift generates stress on intervertebral disks facet joints, ligaments, and inflammation of the joint capsule creates pain and increase sensitivity to movement [5].

The control and activation of the deep spinal muscles are impaired during postpartum period. Lumbar stabilizing muscles are local and global muscles .The multifidus, transverse abdominis, internal oblique, medial fibers of external oblique, quadratus lumborum, diaphragm, and pelvic floor muscles constitute the local

stabilizer muscles. The global stabilizing muscles are rectus abdominus, lateral fibers of external oblique, psoas major and erector spinae [6].

The duration of the postpartum recovery is affected by many physiological and social factors such as lack of sleep, new born care, family support, upper back pain and low back pain [7]. Mild to moderate intensity postpartum exercises helps to improve their quality of life. Postpartum exercises results in improved cardiovascular fitness, facilitated weight loss, increased positive mood , lactation, decreased anxiety and depression [8].

There are several guidelines such as ACOG (American College of Obstetrics and Gynecology and NICE (National Institute for Health and Care Excellence) which mentioned about postpartum exercises for low back pain and pelvic pain [9]. The Canadian guidelines suggested that if pregnancy and delivery are uncomplicated, a mild exercise programme consisting of walking, pelvic floor exercises and stretching of all muscle groups can be started immediately [5]. Earlier studies stated that the pelvic stabilization exercises are important to reduce the incidence of low back pain. This study aimed to analyze the effectiveness of early postnatal exercises and education on low back pain and functional outcomes in postnatal mothers.

Methodology

This Study was approved by the Ethics committee for Students proposals (CSP/17/OCT/61/280). This Quasi experimental study was conducted during December 2017-April 2018.The estimated sample size was calculated using comparison of two means (Power -80 %) (CI – 95%), sample size was rounded to 50 subjects in each group. The subjects were recruited by purposive sampling from the family welfare outpatient clinic and pediatrics outpatient department from G-block of Sri Ramachandra Medical Center and Hospital. Women between the age group of 20-35, assisted vaginal delivery or spontaneous vaginal delivery, postpartum mothers up to 4 weeks after delivery were included. Caesarian delivery, Diastasis recti, previous musculoskeletal problems, pubic pain, severe anemia, respiratory and cardiac conditions , poorly controlled diabetes and hypertension were the exclusion criteria.

Mothers who met the inclusion criteria will be allotted to interventional (27) and control group (25) by purposive sampling. Written informed consent obtained in accordance with the guidelines of the ethics committee.

Base line assessment was done using performa which include demographic data, maternal history, labour history, gynaecological history, occupation, Numerical Rating Scale, BMI, mode of delivery, body chart, Schober's test, and special test. Experimental group participated 20 minutes supervised post natal programme, once in two weeks from 4th week to 10th week. The postnatal exercises sessions include the following- greeting and warm-up, diaphragmatic breathing exercises, general stretches, postural care, basic core stability exercises. Borg scale-(13-14)) and Audio visual aids were used for conducting postnatal supervised sessions.

Control group received conventional postnatal exercises at 4th week and they continued home exercises programme up to 10 weeks. Both the groups will be receiving the exercise information sheet and the follow up ensured with exercise follow up diary and by phone calls. The primary outcomes were pain and functional status. At 4th week and 10th week, both the group mothers will be evaluated by using visual analog scale for pain severity and the Oswestry disability index questionnaire will be used to measure the severity of functional disability[10].

Table-1- Base line characteristics of postnatal mothers

DEMOGRAPHIC CHARACTERSTICS N=52		
CHARACTERSTICS	EXPERIMENTAL GROUP(n=27)	CONTROL GROUP (n=25)
Age (years)	25.92 (2.55)	27.3 (3.61)
Height(cm)	156.77(4.90)	155.48 (4.60)
Weight(kgs)	63.75 (1.64)	62.68 (9.97)

Cont... **Table-1- Base line characteristics of postnatal mothers**

BMI (kgm²)	25.92 (2.64)	25.86 (3.45)
	N (%)	N (%)
Homemaker	17(63)	11(44)
Employed	10(37)	14(56)
Primiparity	10(37)	16(64)
Multiparity	17(63)	9(36)
NVD	13(48.1)	12(48)
AVD	14(51.9)	13(52)

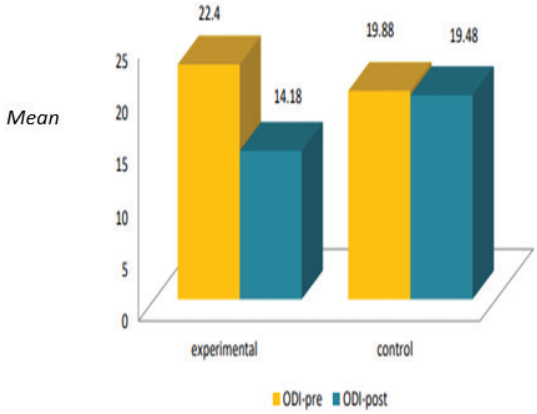


Figure -1 -Analysis of ODI within group

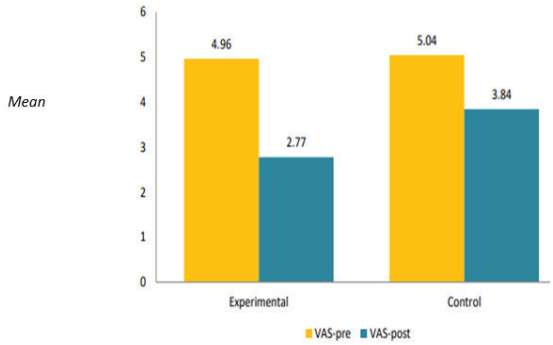


Figure-2- Analysis of VAS within the experimental and control group significant at p≤0.05, Wilcoxon Sign rank test

Table-2 -Analysis of ODI score between the experimental and control group

ODI	**Control**	**Experimental**	**Mean difference**	**z value**	**p-value**
	Mean±SD	**Mean±SD**			
pre-4th week	19.88(9.68)	22.4 (8.44)	-2.52	-1.057	0.665
Post-10th week	19.48(8.10)	14.18(7.90)	5.3	-2.906	0.008*
VAS					
pre-4th week	5.04(1.27)	4.96(1.15)	0.08	-0.294	0.769
Post-10th week	3.84(1.84)	2.77(1.45)	1.07	-2.316	0.021 *

Significant at *p<0.05, Mann Whitney 'U'test

Results

Statistical analysis was performed by using SPSS software version 20.0.Wilcoxon signed rank test is used to determine the difference in ODI and VAS within the groups. Mann Whitney "U" test is used to determine the difference in ODI and VAS in between the groups. Significance level of ($p \leq 0.05$) was used throughout all statistical tests. Similarly interventional group had shown better improvement in ODI score (Fig-1). Both the groups had a significant difference in VAS but interventional group had shown better improvement than the control group (Fig-2). There was a significant reduction in the low back pain in the subjects of the experimental group after the intervention (Table-2). The between group analysis showed improvement in ODI at 10^{th} week ($P \leq 0.05$*).The functional disability level is more improved in experimental group than the control group.

Discussion

Postpartum lumbo-pelvic pain is the discomfort experienced by the women, as it has an impact on their activities of daily living which may influence on their family, social, economic characteristics and physical health. More than 50% of women complain postpartum low back pain which may persist up to one year.

In similar to this study, (Britt stuge *et al,* 2004) stated that the ODI scores revealed minimal disability in 85 % of the SSEG (spinal stabilization) as compared to 47% in the CG ($p<0.001$*) [11]. There was a significant reduction in VAS from baseline ($p<0.05$*) in both the groups but the results showed that significant improvement seen in experimental group than the control group.

Turgut F *et al*, (1998) observed that multigravida women who experience recurrent low back pain relate their first episode of pain to pregnancy [3]. Thus, pregnancy seems to represent a risk for long term lumbopelvic pain which could be managed efficiently through the core stabilizing exercise[12]. Hence, specific stabilization exercises focusing on multifidus and transverse abdominis muscles will provide support for the lumbar spine thereby preventing muscle imbalance in chronic low back pain patients[13].

Stuge *et al*(2004) & (Bennett, 2014) concluded that specific stabilization exercises programme showed a significant reduction in pain intensity, lowering disability, and increased the quality of life in women with post partum pelvic pain. In this study, the mothers received stabilization exercises showed a statistically significant reduction in pain severity. This result is in concordance with the study conducted by Hides et al. 1996, compared lumbar stabilization exercises and medical treatment in acute low back pain patients and reported a significant decrease in pain severity in both the lumbar stabilization exercise program group and control group. These study findings suggested that the experimental group which received a core stabilization exercises programme mainly focused on activation of local muscles and global muscles along with basic post natal care and education with three follow ups showed a significant improvement than the control group. Pain related fear and avoidance appears to be an essential feature in development of the low back pain. Patients who were in the early stage of treatment experienced that stabilizing exercises did not provoke their pain and the functional disability level is more improved in experimental group than the control group [14].

National Health Service -UK (2011) reported that exercise programmes are most effective if performed regularly over prolonged periods and the national institute for health and clinical excellence (NICE 2009) guidelines on chronic low back pain recommended the exercise sessions for several weeks 3-5 times per week with 20-30 minutes of duration[15,16]. Early postnatal exercise sessions from 4^{th} week to 10^{th} week could bring about better outcomes on postnatal low back pain and disability.

Limitations

- Small sample size.
- Limited follow-up period.

Conclusion

The post natal exercises and education improve the pain and functional disability in early postpartum mothers.

Sources of Funding- Self

Conflict of Interest- NIL

Ethical Clearance - Taken from Sriramachandra Institute of Higher education and Research- Ethics committee for Students proposals (CSP/17/OCT/61/280)

References

1. Liddle S, Pennick V. Interventions for preventing and treating low-back and pelvic pain during pregnancy. Cochrane Database of Systematic Reviews. 2015.
2. A.Tanvi A. Effect of Proprioceptive Neuromuscular Facilitation Program on Muscle Endurance, Strength, Pain, and Functional Performance in Women with Post-Partum Lumbo-Pelvic Pain. IOSR Journal of Dental and Medical Sciences. 2013;7(3):58-65.
3. Ostgaard H, Andersson G. Postpartum Low-Back Pain. Spine. 1992; 17(1):53-55.
4. Parikh, Shweta , Suchi, Joshi. Prevalence of low back pain and its impact on quality of life in post partum women. International Journal of Scientific Research. 2016; 7: 14342-14348.
5. Unsgaard-tøndel, M., Vasseljen, O., Woodhouse, A., & Mørkved, S. Exercises for Women with Persistent Pelvic and Low Back Pain after Pregnancy.2016; *8*(9):107–120. https://doi.org/10.5539/gjhs.v8n9p107
6. Tseng, P.-C., Puthussery, S., Pappas, Y., & Gau, M.-L. A systematic review of randomised controlled trials on the effectiveness of exercise programs on Lumbo Pelvic Pain among postnatal women. *BMC Pregnancy and Childbirth*.2015; *15*(1): 316. https://doi.org/10.1186/s12884-015-0736-4.
7. Vermani, E., Mittal, R., & Weeks, A. Pelvic girdle pain and low back pain in pregnancy: A review. *Pain Practice*.2010 https://doi.org/10.1111/j.1533-2500.2009.00327.x
8. Richard, H., Mary, P., Norman, E., Sherburn, M., Osborne, R. H., & Galea, M. P. Research Report An Exercise and Education Program Improves Well-Being of New Mothers : A Randomized Controlled Trial.2010;*90*(3) :348–355.
9. Bennett, R. J. Exercise for postnatal low back pain and pelvic pain. *Journal of the Association of Chartered Physiotherapists in Women's Health*.2014; *115:* 14–21.
10. Vincent, J. I., MacDermid, J. C., Grewal, R., Sekar, V. P., & Balachandran, D. Translation of Oswestry Disability Index into Tamil with Cross Cultural Adaptation and Evaluation of Reliability and Validity§. *The Open Orthopaedics Journal*.2014; *8*(1): 11–19.
11. Stuge B, Veierød MB, Laerum E, Vøllestad N. The efficacy of a treatment program focusing on specific stabilizing exercises for pelvic girdle pain after pregnancy: a two-year follow-up of a randomized clinical trial. Spine (Phila Pa 1976). 2004 May 15; 29(10):E197-203. Pub Med PMID: 15131454.
12. Gutke, A., Lundberg, M., Östgaard, H. C., & Öberg, B. Impact of postpartum lumbopelvic pain on disability, pain intensity, health-related quality of life, activity level, kinesiophobia, and depressive symptoms. *European Spine Journal*.2011;*20*(3): 440–448. https://doi.org/10.1007/s00586-010-1487-6
13. Gutke, A., Sjödahl, J., & Öberg, B. original report specific muscle stabilizing as home exercises for persistent pelvic girdle pain after pregnancy : a randomized , controlled clinical trial.2010:929–935. https://doi.org/10.2340/16501977-0615
14. Ferreira PH, Ferreira ML, Maher CG, Herbert RD, Refshauge K. Specific stabilization exercise for spinal and pelvic pain: a systematic review. Australian Journal of Physiotherapy. 2006 Jan 1; 52(2):79-88.
15. Artal, R., & O' Toole, M. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period. *Clinical Obstetrics and Gynecology*.2003; *37*(1):6–12. Retrieved from www.uptodate.com.
16. https://www.nice.org.uk/guidance/cg88/documents/press-releases2

Time management skills among medical students

Meenal Kulkarni

[1]*Associate Professor, Community Medicine, NKP Salve Institute of Medical Sciences and Research Centre, Digdoh Hills, Hingna, Nagpur, Maharashtra*

Abstract

Background: Time management is the art of arranging, organizing, scheduling and budgeting one's time for generating more effectiveness work and productivity. Effective time management techniques help us to judiciously organise and plan time which we spend on various activities with the aim to increase productivity and quality of life. Students' time is a limited resource. Time management plays a vital role in improving student's academic performance. So the present study was conducted to assess the time management skills among medical students and to find out correlation between time management and academic performance. **Material and Methods:** After taking informed consent, cross sectional study was conducted from July 2018 to September 2018 among second year medical students. All medical students from second year willing to participate were included in the study (n= 115 students). The data was collected by using self administered close ended questionnaire. The questionnaire consisted of Time Management Questionnaire (TMQ) developed by Britton and Tesser (5 point Likert scale) with 18 questions. The data was analysed by percentage, mean and Pearson's correlation test. **Results and conclusions:** Mean score of time management was found to be 56.29±8.65 with maximum score of 81 and minimum score 36. A weak positive correlation (γ=0.21) was found between time management score and academic performance. Sessions regarding time management skills should be conducted for students.

Keywords- *time management skills , academic performance, medical students*

Introduction

The concept of time has been widely discussed throughout history, and it has been expressed in different ways that time is of vital importance for all beings in the universe. Although, time is the same for everybody, actually, time cannot be borrowed or lent; time cannot be saved or changed and it can only be used[(1).] Time management has been referred to as set of principles, practices and skills which enable a person to get things done by working smarter but not harder[(2)]. A lot of university students complain about shortage of time when asked them to do a certain task, they get frustrated because they are not able to make it before the deadline. On the other hand, others find enough time to meet their friends and complete their assignments with no struggle [(3)].

Time management is the art of arranging, organizing, scheduling and budgeting one's time for generating more effectiveness work and productivity [(3)]. Effective time management techniques help us to judiciously organise and plan time which we spend on various activities with the aim to increase productivity and quality of life [(2)]. Students' time is a limited resource. Like other limited resources, time can be more or less effectively managed [(4)].

Academic performance is the outcome of education, that is, the extent to which a student, teacher or institution has achieved their educational goals. Medical students have vast curriculum. It may be difficult for some of them to manage their study . Time management plays a vital role in improving student's academic performance [(5)]. Academic performance seems to increase when time

Corresponding author
Dr. Meenal Kulkarni,
Associate Professor, Community Medicine, NKP Salve Institute of Medical Sciences and Research centre,
Digdoh hills , Hingna ,Nagpur, Maharashtra
email id. meenalkulkarni76@gmail.com

management skills are well-handled. Time management is a skill that perhaps impacts the student's academic performance. Prioritization of tasks may make studying and work less overwhelming and more enjoyable[6].

So the present study was conducted to assess the time management skills among medical students and to find out correlation between time management scores and academic performance.

Aims and Objectives

1) To assess the time management skills among medical students

2) To find out correlation between time management scores and academic performance

Material and methods

- Study design-cross sectional study
- Study population-second year medical college students.
- Study area-Medical college attached to a tertiary care hospital.
- Study duration -August 2018 to November 2018(four months)
- Sample size-All medical students from second year willing to participate were included in the study (n=115).
- Sampling method-convenient sampling
- Statistical analysis- Pearson's correlation test by using EPI info statistical software

After taking informed consent the cross sectional study was conducted among second year medical students. All medical students willing to participate were included in the study (n=115). After finishing of classes, the students were contacted. The data was collected by using self administered close ended questionnaire. The questionnaire included demographic information of students, Time Management Questionnaire (TMQ) and percentage of marks obtained in the last examination.

The time management questionnaire (TMQ) developed by Britton and Tesser (4)was used. It includes 18 questions .All the questions were value based on the Likert scale of five value scores: Always (5), frequently (4), sometimes (3), infrequently (2), Never (1). Except for question number 8, 10, 12 and 15, here the responses were reverse. The range of possible scores was 18-90. Higher values on the scale correspond to better time management practices. The data was analysed in percentages. Pearson's correlation test was used to find out co-relation between time management scores and academic performance.

Findings

Total 115 students were included in the study. Mean Age of student was found to be 20.37±1.16 years. Proportion of Female and a male student was found to be 60.87%and 39.13% respectively.

Time management score of students

Overall Mean score of time management was found to be 56.29±8.65 with maximum score of 81 and minimum score 36. Very few students (4.35%) make a list of things to do each day.11%students make schedule of the activities to do on work days and plan the day before start. More than 50% students never or rarely spend time for each day planning. Approximately half of the students believe that there is room for improvement in time management. More than half of the students complete the assignment on time. One fourth of the students keep the desk clear of everything other than what they currently working on. (Table no. 1).

Mean scores were better for the response number 7,9,11,12 and 16 i.e. I set and honour priorities, I believe that there is room for improvement in the way I manage my time , I feel I am in charge of my own time by and large, On an average class day I spend more time in personal grooming than doing college work, I keep my desk clear of everything other than what I am currently working on. Mean scores were poor for the response number 4,6,10,14 i.e. I write a set of goals for myself for each day, I spend time each day planning, I find myself doing things which interfere with my college work simply because I hate to say-No to people, The night before the major assignment is due, I still working on it.

Correlation between time management and academic performance

A weak positive correlation (γ=0.21) was found between time management score and academic performance. This may be due to small sample size.

Table no. 1: Responses on items of time management skills by students (n=115)

Factors/items	Responses No.(%)				
	Always 5	**Often 4**	**Some Times 3**	**Rarely 2**	**Never 1**
1.I make a list of things that I have to do each day	5(4.35)	18(15.65)	46(40)	29(25.22)	17(14.78)
2.I make a schedule of the activities that I have to do on work days	13(11.30)	20(17.39)	49(42.61)	19(16.52)	14(12.17)
3.I plan the day before I start it	12(10.43)	32(27.83)	38(33.04)	23(20)	10(8.70)
4.I write a set of goals for myself for each day	9(7.82)	22(19.13)	27(23.89)	42(37.17)	15(13.27)
5.I have a clear idea of what I want to accomplish during the next week	7(6.09)	23(20)	41(35.65)	32(27.83)	12(10.43)
6.I spend time each day planning	7(6.09)	17(14.78)	33(28.69(	40(34.78)	18(15.66)
7.I set and honor priorities	30(26.09)	40(34.78)	27(23.48)	13(11.30)	5(4.35)
8.I continue unprofitable routines and activities	13(11.30)	26(22.61)	39(33.91)	28(24.35)	9(7.83)
9.I believe that there is room for improvement in the way I manage my time	54(46.96)	34(29.57)	22(19.12)	00	5(4.35)
10.I find myself doing things which interfere with my college work simply because I hate to say-No to people	11(9.57)	27(23.48)	29(25.22)	32(27.83)	16(13.91)
11.I feel I am in charge of my own time , by and large	41(35.65)	37(32.18)	23(20)	9(7.82)	5(4.35)
12.On an average class day I spend more time in personal grooming than doing college work	18(15.65)	47(40.87)	27(23.48)	14(12.17)	9(7.83)
13.I make constructive use of time	7(6.09)	41(35.65)	50(43.48)	12(10.44)	5(4.34)
14.The night before the major assignment is due, I still working on it.	9(7.83)	12(10.44)	33(28.69)	38(33.04)	23(20)
15.I have a set of goals for entire quarter	8(6.96)	33(28.70)	42(36.52)	20(17.39)	12(10.44)
16.I keep my desk clear of everything other than what I am currently working on	29(25.22)	32(27.83)	22(19.13)	19(16.52)	13(11.30)
17.When I have several things to do, I think it is best to do a little bit of work on each one.	24(20.87)	35(30.43)	37(32.17)	14(12.17)	5(4.35)
18.I review my class notes ,even when a test is not imminent	10(8.7)	26(22.61)	39(33.91)	28(24.35)	12(10.43)

Table no.2 : Mean score of time management skills among medical students.

Items	Mean ±SD	mode
1.I make a list of things that I have to do each day	2.69 ± 1.044	3
2.I make a schedule of the activities that I have to do on work days	2.99 ± 1.13	3
3.I plan the day before I start it	3.11 ± 1.11	3
4.I write a set of goals for myself for each day	2.69±1.13	2
5.I have a clear idea of what I want to accomplish during the next week	2.81±1.04	3
6.I spend time each day planning	2.58±1.08	2
7.I set and honor priorities	3.71±1.08	4
8.I continue unprofitable routines and activities	3.05±1.11	3
9.I believe that there is room for improvement in the way I manage my time	4.14±1.09	5
10.I find myself doing things which interfere with my college work simply because I hate to say-No to people	2.86±1.44	2
11.I feel I am in charge of my own time , by and large	3.91±1.08	5
12.On an average class day I spend more time in personal grooming than doing college work	3.46±1.11	4
13.I make constructive use of time	3.31±0.8	3
14.The night before the major assignment is due, I still working on it.	2.49±1.13	2
15.I have a set of goals for entire quarter	3.01± 1.07	3
16.I keep my desk clear of everything other than what I am currently working on	3.39±1.32	4
17.When I have several things to do, I think it is best to do a little bit of work on each one.	3.51±1.08	3
18.I review my class notes ,even when a test is not imminent	2.94±1.11	3

Discussion

Rai A [7] conducted among school students and found that school performance is better among students who manage work according to the time. A direct positive relationship was found between academic performance and time management.In a study [8]conducted among engineering students, a positive correlation was found between time management and grades of students. A study was conducted among nursing students in Tehran [9]found a positive correlation between time management and academic satisfaction. It was found that 49% of students had moderate level of time management skills. a study [10] was conducted in Saudi Arabia among 89 medical students, it was found that more than half participants had inadequate time management. Positive correlation was found between time management and academic performance. A study was conducted in Egypt [11]found positive correlation between time management and GPA. In a study[12] conducted to find out the relationship between the time management and academic achievement of the university students found out that time management is highly related to the academic performance of the university students. The findings are similar to the present study findings.

Abraham et al [13]conducted a study among first year undergraduate medical students in Manipal and found time management skills among the students were moderate.

In a study conducted by Khanam N et al.[3] Showed that 51.90% of the participants possessed moderate to low level time management score. Participants who obtained higher percentages of mark (70-80%) also had high mean score on general time management.24.1% of the participants never write a set of goals for their self for each day and 21.5% never spend time for each day planning which was poor as compared to the present study(13.27% and 15.66% respectively). 48% always keep their desk clear of everything other than what they are working on it, 40.5% sometimes review their class notes, even when a test is not imminent which was better than the present study(25.22.% and 24.35 % respectively), 37.9% sometimes make a schedule of the activities that they have to do on work days and 37.9% sometimes make constructive use of their time. Approximately only ten percent of the students always have a set of goals for the entire quarter which is comparable with present study findings (7%).

Conclusions

Educational sessions should be conducted for medical students to improve time management skills.

Limitations of the study: As the study was conducted in a single institute, the results cannot be generalised.

Conflicts of Interest-Nil

Funding Source- Self

Ethical Clearance –permission of IEC was obtained before the study was started.

References

1. Karakose T. The Relationship between Medical Students' Time Management Skills and Academic Achievement. Ethno Med. 2015;9(1):19–24.
2. Mohammed Alshaya H, Ali Roomi M, Amouri Alzayer M, Khaleel Alonze S, Fahad Alshaalan R. Is Time Management Related To Better Academic Performance and Perceived Academic Satisfaction Among Medical Students? a Cross-Sectional Survey in Saudi Arabia. Int J Adv Res [Internet]. 2017;5(1):2320–5407. Available from: http://dx.doi.org/10.21474/IJAR01/2998
3. Khanam N, Sahu T, Rao E V, Kar SK, Quazi SZ. A study on university student ' s time management and academic achievement. 2017;4(12):4761–5. Available from: http://dx.doi.org/10.18203/2394-6040.ijcmph20175365
4. Britton BK, Tesser A. Effects of Time-Management Practices on College Grades. J Educ Psychol. 1991;83(3):405–10.
5. Alsalem WSY, Alamodi LA, Hazazi ATM, Shibah AM, Jabri SA, Albosruor ZA. The Effect of Time Management on Academic Performance among Students of Jazan University. Egypt J Hosp Med [Internet]. 2017;69(8):3042–9. Available from: http://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=28&sid=c893a1c5-603d-4a28-a176-d8935643fd2a%40pdc-v-sessmgr01
6. Florence Aduke A. Time Management and Students Academic Performance in Higher Institutions, Nigeria — A Case Study of Ekiti State. Int Res Educ [Internet]. 2015;3(2):1. Available from: http://www.macrothink.org/journal/index.php/ire/article/view/7126

7. Rai A. A Study of Impact of Time Management on Academic Performance of Students Studying in School Anjana Rai Faculty , UIM RDVV Jabalpur. PARIPEX-Indian J Res [Internet]. 2016;(June):149–50. Available from: http://www.worldwidejournals.in/ojs/index.php/pijr/article/view/8311
8. Adams R V., Blair E. Impact of Time Management Behaviors on Undergraduate Engineering Students' Performance. SAGE Open. 2019;9(1).
9. Mohamadkhani Ghiasvand A, Naderi M, Zagheri Tafreshi M, Ahmadi F, Hosseini M. Relationship between time management skills and anxiety and academic motivation of nursing students in Tehran. Electron physician. 2017;9(1):3678–84.
10. Alshaya. H, Roomi. M, Alzayer. M, Alonze. S, Alshaalan. R. Is Time Management Related To Better Academic Performance and Perceived Academic Satisfaction Among Medical Students? Across-Sectional Survey in Saudi Arabia. Int J Adv Res. 2017;5(1):2205–13.
11. Nermin M. Eid. The Effect of Time Management Skills and Self Esteem of Students on Their Grade Point Averages (GPA)\n. IOSR J Nurs Heal Sci [Internet]. 2015;4(1):82–8. Available from: http://www.iosrjournals.org/iosr-jnhs/papers/vol4-issue1/Version-1/O04118288.pdf
12. Razali SNAM, Rusiman MS, Gan WS, Arbin N. The Impact of Time Management on Students' Academic Achievement. J Phys Conf Ser. 2018;995(1):66–72.
13. Abraham RR, Velladath SU, Ezie Elman ZEB, Sobri LBM, Bin Saha MDS, Ghazali MSB, et al. Exploring time management skills of first year undergraduate medical and allied health science students. J Clin Diagnostic Res. 2018;12(10):JC07-JC10.

To assess the Effectiveness of Planned Teaching on Knowledge Regarding the Risk of Metabolic Syndrome among General Population

Meera R. Pohane[1], Ruchira Ankar[2]

[1]M.Sc. Nursing, Smt. Radhikabai Meghe Memorial College of Nursing, Sawangi (Meghe), [2]Assistant Prof. Department of Medical Surgical Nursing, Smt. Radhikabai Meghe Memorial College of Nursing, Sawangi (Meghe), Wardha, Maharashtra, India. Datta Meghe Institute of Medical Sciences (Deemed University), Sawangi (Meghe), Wardha, (M.S.)

Abstract

Abstract: Metabolic syndrome is a grouping of cardiac risk factors that result from insulin resistance. A person with metabolic syndrome has a greatly increased risk of cardiovascular disease and premature death. While the mortality and morbidity from coronary artery disease has been falling in the western world, it has been climbing to epidemic proportion among the Indian population. **Objectives:** 1) To assess the existence knowledge regarding the risk of metabolic syndrome among general population. 2) To evaluate the effectiveness of planned teaching on knowledge regarding the risk of metabolic syndrome among general population. 3) To associate the post-test knowledge score with selected demographic variable. **Material and Methods**: Non experimental design **Research approach**: Interventional evaluatory approach **Sampling techniques**: Non probability convenience sampling and **Sample size**: 60 people. **Result:** The study shows that 8(13.33%) had good level of knowledge score, 34(56.67%) have very good level of knowledge 18(30%) had excellent level of knowledge score. Hence planned teaching was effective, calculated 't' value is more than tabulated value and calculated 'p' value was less than accepted level of P=0.05 thus H_1 is statistically accepted. There is significant association of knowledge score associated with family history of hypertension and diabetic. **Conclusion:** The study showed that the planned teaching on the risk of metabolic syndrome among general population was effective in improving the knowledge of general population and thus helps them to understand the meaning.

Keywords*: Metabolic syndrome, knowledge, effectiveness and planned teaching.*

Introduction

Metabolic syndrome is a metabolic disorder that involves not one, but a combination of three or more of the following health issues: abdominal obesity, high blood sugar, high triglyceride levels, high blood pressure or low HDL ("good") cholesterol.[1]

Corresponding Author:
Ms.Ruchira Ankar
Smt. Radhikabai Meghe Memorial College of Nursing, Sawangi (meghe)**,** Datta Meghe Institute of Medical Sciences (Deemed University),
Sawangi (Meghe), Wardha – 442001 (M.S.)
Email: ruchirashende@yahoo.com
Mobile No. 7620978673

Metabolic syndrome is a grouping of cardiac risk factors that result from insulin resistance. A person with metabolic syndrome has a greatly increased risk of cardiovascular disease and premature death. While the mortality and morbidity from coronary artery disease has been falling in the western world, it has been climbing to epidemic proportion among the Indian population.[2]

Metabolic syndrome is a complex web of metabolic factors that are associated with a 2-fold risk of cardiovascular diseases and a 5-fold risk of diabetes. Metabolic syndrome is a constellation of multiple cardiometabolic abnormalities including truncal (central) obesity, borderline and high blood pressure, high fasting glucose, high triglycerides, and low high-density lipoprotein cholesterol. Studies performed

in India have reported the prevalence of metabolic syndrome among adults as to be from 11% to 56%, depending on the definition used. NCEP, ATP-III defines it with the presence of three out of five clinical and/or biochemical abnormalities also the International Diabetes Federation recommends abdominal obesity as an obligatory criterion and the presence of at least two other abnormal criteria.[3]

Worldwide prevalence of metabolic syndrome ranges from <10% to as much as 84%, depending on the region, urban-rural environment, composition (sex, age, race, and ethnicity) of the patient, and the definition used. The prevalence of metabolic syndrome in India has been documented to be from 11% to 41% across this vast country with numerous socio-cultural varieties. The present study was undertaken to find out the demographic profile of the metabolic syndrome in Kanpur region of northern India. The prevalence of Metabolic syndrome was more than 40% and its prevalence in <40 years age group is rapidly increasing. It's high time to be more active physically, before fatal cardiovascular events.[4]

The aim of study was to determine the prevalence of metabolic syndrome (MetS) in people with type 2 diabetes mellitus. National Cholesterol Education Program (NCEP) ATPIII Criteria, International Diabetes Federation (IDF) and the World Health Organization (WHO) definitions were used in quantifying the metabolic syndrome and also the concordance between these three criteria's used for identifying metabolic syndrome. The Prevalence of metabolic syndrome was found to be 45.8%, 57.7% and 28% following NCEP-ATPIII Criteria, IDF and WHO definitions, respectively.[5]

Problem statement

To assess the effectiveness of planned teaching on knowledge regarding the risk of metabolic syndrome among general population.

Objective

1. To assess the existence knowledge regarding the risk of metabolic syndrome among general population.

2. To evaluate the effectiveness of planned teaching on knowledge regarding the risk of metabolic syndrome among general population

3. To associate the post- test knowledge score with demographic variable

Assumption

1. General population may have some knowledge regarding the risk of metabolic syndrome.

2. Knowledge may vary from one another.

Hypothesis:

H_1:- There is significant increase in post-test knowledge score.

Methodology

Research approach: Interventional Evaluatory approach.

Research design: Non experimental one group pre test post test design

Setting of the study: This study was conducted in Wardha

Sample: General population

Sample size: The sample of the study consists of 60.

Sampling technique: Non probability convenient sampling

Tool- structured knowledge questionnaire including demographic variables will be used for the study.

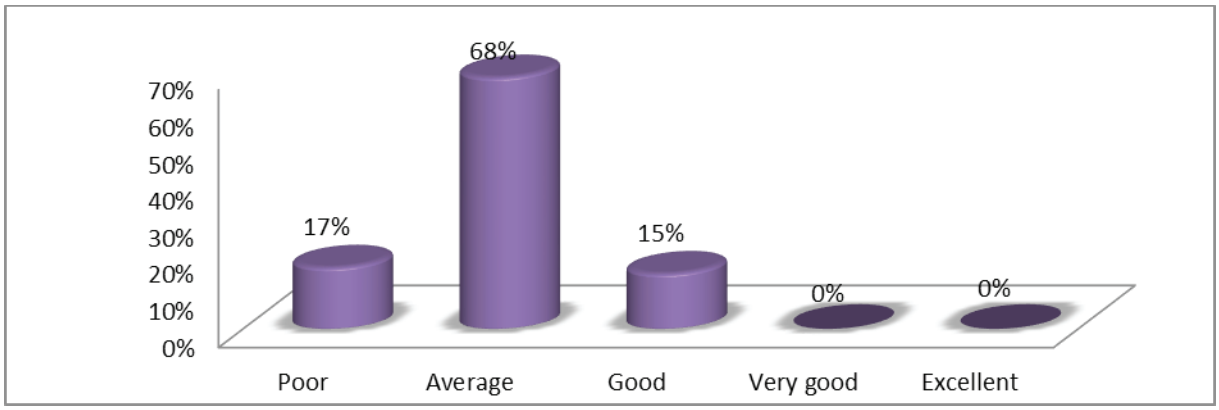
Independent variable: planned teaching regarding the risk of metabolic syndrome.

Dependent variable: knowledge of people regarding the risk of metabolic syndrome.

Result

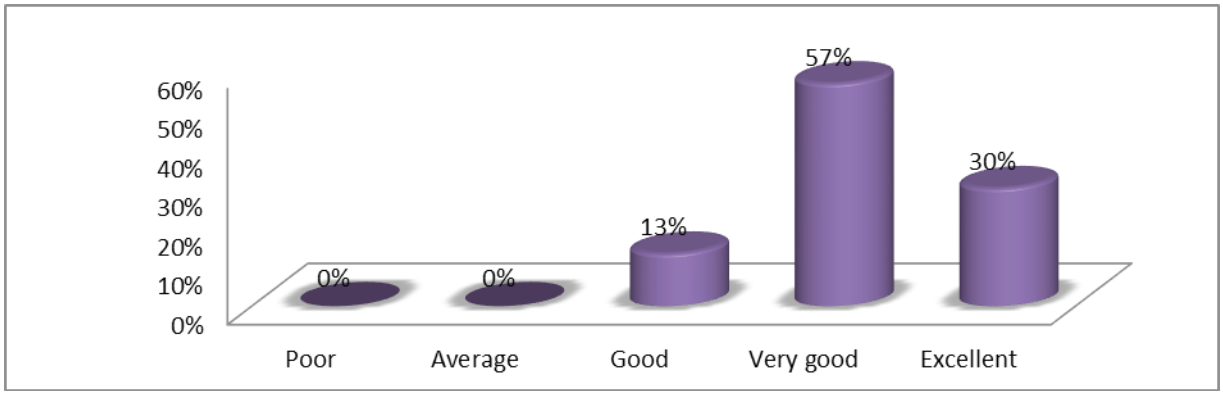
Graph No.1 Assessment of existing knowledge score regarding the risk of metabolic syndrome among general population.

The finding of the study shows that pretest 41(68.33%) having average level of knowledge, 10(16.67%) having poor level of knowledge, 9(15%) having good level of knowledge.



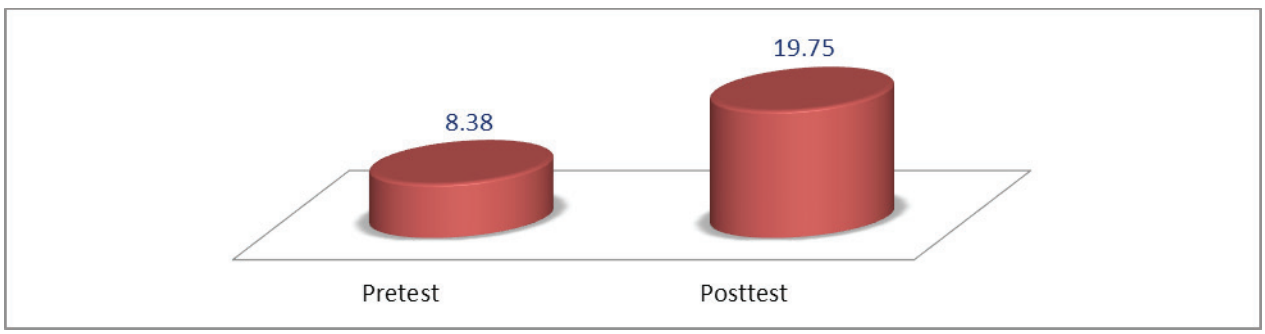
Graph No.2 Assessment of posttest knowledge grading the risk of metabolic syndrome among general population

The finding of the study show that post test 34(56.67%) having very good level of knowledge, 18(30%) having excellent level of knowledge. 8(13.33%) having good level of knowledge.



Graph No.3 Percentage wise distribution of Effectiveness of planned teaching on knowledge regarding the risk of metabolic syndrome among general population.

The overall mean knowledge scores of pre test and post test of general population which reveals that post test mean knowledge score was higher 19.75% with SD of ± 2.678 when compared with pre test mean knowledge score value which was 8.38% with SD of ±2.552. The statistical Student's paired t test implies that the difference in the pre test and post test knowledge score found to be 30.067 which is statistically significant at 5% level of significance($p<0.05$). Hence it is statistically interpreted that planned teaching on knowledge regarding the risk of metabolic syndrome among general population was effective. Thus H_1 is accepted.



Association of knowledge score with selected demographic variables

There is significant association of knowledge score associated with family history of hypertension and diabetic.

Analysis of data showed that there was significant difference between pre test and post test knowledge scores. Hence it is concluded that the planned teaching significantly brought improvement in the knowledge regarding the risk of metabolic syndrome among general population.

Discussion

In this study it is indicated that post test show that 34(56.67%) very good level of knowledge, 18 (30%) having excellent level of knowledge and 8(13.33%) having good level of knowledge. The overall mean knowledge scores of pre test and post test of general population which reveals that post test mean knowledge score was higher 19.75 % with SD of ± 2.678 when compared with pre test mean knowledge score value which was 8.38 % with SD of ± 2.552. the calculated t-value is 30.067 and tabulated t-value is 2.02, which is statistically significant at 5% level of significance($p<0.05$). Hence it is statistically interpreted that planned teaching on knowledge regarding the risk of metabolic syndrome was effective. There is significant association of knowledge score associated with family history of hypertension and diabetic.

Yadav D et al in their study the Prevalence of metabolic syndrome was found to be 45.8%, 57.7% and 28% following NCEP-ATPIII Criteria, IDF and WHO definitions, respectively. Using all the three definitions the prevalence was higher in women in all age groups. ATP III and IDF criteria showed good agreement (k 0.68) compared to ATP III with WHO (k 0.54) and IDF with WHO (k 0.34) criteria. Highest prevalence was observed following IDF definition.[6]

KwabenaNsiah et al in their study the prevalence of Metabolic syndrome was 58% in the studied Ghanaian population. Hypertension was the commonest risk factor (60%), followed by central obesity (48.67%) and dyslipidemia (37%). Female type 2 diabetics had a higher prevalence of metabolic syndrome, and carried more components than their male counterparts. Regression analysis showed three factors; femininity, high body mass index and low educational status were the most critical predictive risk factors of metabolic syndrome, according to this study.[7]

Puepet FH et al in there study the prevalence of Metabolic syndrome was 63.6% (74.5% in males and 54.9% in females, $p<0.05$). The mean (SD) age of patients with was Metabolic syndrome 54.7(9.5) years. About 80% of the patients were centrally obese, 63% had hypertension, 62% had high triglycerides and 70% with low high density lipoprotein cholesterol. Among patients with, 79% had metabolic syndrome dyslipidemia, 41% had body mass index 30, and 36% had microalbuminuria.[8]

Conclusion

The researcher as a part of her post graduate programmed, conducted an intervention research on the topic "To assess the effectiveness of planned teaching on knowledge regarding the risk of metabolic syndrome among general population".

The researcher aimed to improve the level of knowledge of risk of metabolic syndrome. She predetermined certain objectives, to precede the study. The objectives were adequate to reach into the findings. A particular time period has been allocated for each step. Investigator had presented her hypothetical views about the study in its beginning. The study had done by separating the topic into 5 chapters. And finally the researcher reached into her findings. The result of this study shows that 34(56.67%) having very good level of knowledge, 18(30%) having excellent level of knowledge 8(13.33%) having good level of knowledge, to find the effectiveness of planned teaching's' test was applied and t value was calculated, post test score was significantly higher at 0.05 level than that of pre test score. Thus it was concluded that planned teaching on the risk of metabolic syndrome was found effective as a teaching strategy.

Ethical Clearance- It has been Obtained by Datta Meghe Ethical Committee, Dmims, Sawangi Meghe Wardha.

Conflict of Interest: NIL.

Source of Funding: SEL

References

1. Singh V. Munjal YP, et al. Reducing the burden of coronary artery disease in India: Challenges and oppurtunities. Indian Heart. Val 60(2):2008:161-75 www.ncbi.nlm.nih.gov/pubmed/19218731
2. Misra A, Vikram N. Insulin resistance syndrome

(metabolic syndrome) and obesity in Asian Indians: evidence and implications. Nutrition. 2004;20(5):482-491.

3. Khadanga S, Khan Y, Lalchandani A, Gupta A, Kumar S. Prevalence of metabolic syndrome crossing 40% in Northern India: Time to act fast before it runs out of proportions. Journal of Family Medicine and Primary Care. 2018;7(1):118.
4. Jeemon P, Prabhakaran D, Ramakrishnan L, Gupta R, Ahmed F, Thankappan K et al. Association of high sensitive C-reactive protein (hsCRP) with established cardiovascular risk factors in the Indian population. Nutrition & Metabolism. 2011;8(1):19.
5. Nsiah K, Shang V, Boateng K, Mensah F. Prevalence of metabolic syndrome in type 2 diabetes mellitus patients. International Journal of Applied and Basic Medical Research. 2015;5(2):133.
6. Puepet F, Uloko A, Akogu I, Aniekwensi E. Prevalence of the metabolic syndrome among patients with type 2 diabetes mellitus in urban North-Central Nigeria. African Journal of Endocrinology and Metabolism. 2010;8(1).

Category : Original Research Article

Use of L-Arginine for inhaled Nitric Oxide (iNO) dependent hepatopulmonary syndrome (HPS) Post-Liver Transplant

Mohnish Kataria[1], Abhinav Rastogi[2], Sajaad Manzoor[3], Himanshu Tanwar[2], Sivaji Patibandla[2], Vishal V Singh[4]

[1]Assistant Professor, Gastroenterology, [2]DM Cardiology Resident, [3]Director, Interventional Cardiology, [6]Assistant Professor Cardiology, Affiliation: Department of Cardiology, MM Institute of Medical Sciences (Deemed to be University), Mullana, Ambala (INDIA)

Abstract

Hepatopulmonary syndrome (HPS) is one of the recognised complications of liver cirrhosis which warrants urgent liver transplantation. We report a case of 7 year old girl who underwent orthotopic liver transplantation (OLT) for severe HPS. Post transplantation the patient had a stormy respiratory course and became severely hypoxemic. She was started on inhaled NO and showed a good response. However, the patient then became NO dependent and multiple attempts to wean iNO failed albeit minimal ventilatory requirements. Following IV L-Arginine infusion, iNO could be weaned within 6 hours without recurrence of hypoxemia. L-Arginine infusion should be considered as a treatment option when facing difficulties to wean iNO in an otherwise well responding patient.

Keywords*: Hepatopulmonary syndrome, liver transplantation, L-Arginine.*

Introduction

Hepatopulmonary syndrome (HPS) is one of the recognised complications of liver cirrhosis which warrants urgent liver transplantation. The symptoms usually improve post transplantation but might take 6-12 months to resolve completely. Severe hypoxemia post liver transplantation, especially when done for hepatopulmonary syndrome has been reported. iNO use for the same has been reported in literature with good response. However it is practically very difficult to continue iNO in a stable child on a portable ventilator due to problems of scavenging. We report a case of 7 year old girl who underwent orthotopic liver transplantation (OLT) for severe HPS.

Case:

A 7 year old girl was referred to our centre for liver transplantation for hepatopulmonary syndrome secondary to cryptogenic liver cirrhosis. On admission she was centrally cyanosed with oxygen saturations of 75-80%. She was otherwise well and comfortable. She had bilateral grade III digital clubbing. She was noted to have hepatosplenomegaly. The contrast enhanced echocardiography prior to transplant showed a structurally normal heart with multiple aortopulmonary collaterals secondary to pulmonary arteriovenous malformations (AVMs) as concluded by the appearance of microbubbles as contrast in the left atrium within 3 cardiac cycles; there was no evidence of pulmonary hypertension. Liver MRI prior to transplant showed patent portal venous structures and no features of portal hypertension. No other vascular shunts were identified.

The patient was urgently listed for liver transplantation, and underwent cadaveric liver transplant. The procedure itself was uneventful. Her ventilation was gradually weaned aiming to keep oxygen saturations > 75%.

She was extubated on **day 3** post OLT to high flow nasal cannula device. She had a postoperative transthoracic echocardiogram which showed good cardiac function with no evidence of significant pulmonary hypertension. On **day 4** post OLT she developed a significant pleural effusion on right side

Corresponding Author:
Dr. Abhinav Rastogi,
Department of Cardiology, MMIMSR, Mullana, Ambala, Email id: dr.abhinav2017@gmail.com

which was drained. **Day 6** post OLT the patient was changed over to Continuous Positive Airway Pressure Ventilation (Non-invasive CPAP) in view of increased work of breathing, falling oxygen saturations, and persistent right lower lobe atelectasis. Her mixed venous saturations then were 35-50%.**On the 7th** post transplant day, she had to be intubated and ventilated because of respiratory failure. She was extremely difficult to oxygenate, she required moderate ventilator pressures to achieve acceptable tidal volume . She remained in 100% oxygen with arterial saturations of 50%. The patient was started on inhaled nitric oxide (iNO) at 5ppm which improved oxygenation to 70-80%. No difference was noted in oxygenation on high dose inhaled nitric oxide (iNO) of 20ppm. Oxygenation index remained borderline around 40.

Her ventilation remained stable but multiple attempts to wean iNO were unsuccessful. She eventually underwent tracheostomy to facilitate long term ventilation on **day 30** post OLT. She was started on Sildenafil (Dose range 0.5 mg/kg to 1 mg/kg every 4-6 hourly was tried) to wean iNO (from 5ppm to 1 ppm). However, by Day-60, the patient was still dependent on iNO though the ventilator requirements were minimal. Patient was completely interactive but would rapidly desaturate and become cyanosed on stopping iNO(1 ppm). Due to problems in scavenging of iNO with portable ventilators and practicalities in discharging a patient home on iNO, we were desperately looking for an alternative to iNO. On **day 68** post surgery after discussion with regional pulmonary hypertension team patient was started on L Arginine infusion to be able to wean off iNO, (details in the table). Her L-Arginine levels were 32 umol/L (normal range 26 – 180) prior to commencing L-Arginine.

Weaning regimen:
Acute: Intravenous L-Arginine infusion 15 mg/kg/min given over 20 minutes. Sildenafil in the dose of 0.3 mg/kg was administered after 2 hours of starting infusion. We weaned FiO2 to 0.3 after 90 minutes of Sildenafil administration. We then increased FiO2 to 0.6 & stopped inhaled Nitric Oxide after 24 hours of starting L Arginine infusion.
Same dose L-Arginine (15 mg/kg) was given daily intravenously for 1 month
Long term: Arginine was weaned to half the dose every alternate day for 1 month and then dose was gradually tapered over 1 month and stopped.

Patient was discharged to local hospital on **day 94** post OLT (1 month after starting L-Arginine and stopping iNO)on BIPAP through tracheostomy with a plan to wean Sildenafil and L Arginine over 2 months. Her Oxygen saturations were 75-80%. She was in 40% Oxygen. Patient's blood Arginine level was within normal limits [69 umol/L (Range 26 - 180)] prior to discharge.

Follow-up of this patient 6 months after transplantation revealed that she was discharged home on 0.5 litres/minute of nasal cannula oxygen, tracheostomy has been successfully decannulated and L-Arginine and sildenafil were stopped as planned. She was reviewed after 2 years for elective abdominal closure. She was noticed to be saturating more than 95% in room air.

Discussion

Hypoxemia in patients with liver cirrhosis may occur in the context of hepatopulmonary syndrome (HPS) together with portopulmonary hypertension (PPH). Although portopulmonary hypertension and the hepatopulmonary syndrome are associated with the same underlying diseases, they have contrasting pathophysiological backgrounds, and hence their management is different.

HPS is triad of Hypoxemia, underlying chronic liver disease and intrapulmonary vascular dilations (IPVD) [1]. In the paediatric population the prevalence of HPS is described as 8-20% in children with liver cirrhosis[2] . From a radiological standpoint, HPS is characterized by diffuse dilatation of the peripheral pulmonary vasculature. In this case, the diagnosis of HPS was discussed following contrast-enhanced transthoracic

echocardiography with agitated saline in detecting the presence of pulmonary arteriovenous malformations (AVMs). During this procedure, saline is shaken to produce microbubbles greater than 10μm in diameter and administered through a peripheral vein in the arm. The presence of microbubble opacification in the left atrium within 3 to 6 cardiac cycles following opacification of the right atrium is considered a positive test for the presence of intrapulmonary vascular shunting. In consequence, contrast echocardiography is the recommended study for the evaluation of IPVD in diagnosing HPS, as it is more sensitive than the lung perfusion scan with technetium and has no radiation exposure. CT angiogram showed the findings of dilated pulmonary vasculature (**Figure 1**). Thus, CT angiogram can be helpful in a patient with liver disease and unexplained hypoxemia.

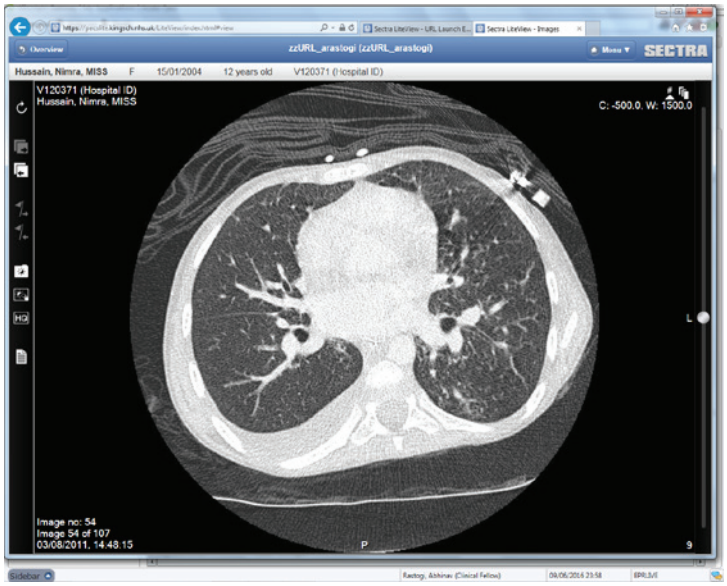
Mortality of HPS has been reported to be around 25% to 46 % [3] .This syndrome is due to abnormal intrapulmonary vascular dilatation, which results in an excess perfusion for a given state of ventilation. This complication is characterised by anatomical shunting and a diffusion-perfusion abnormality[4] . Evidence is growing rapidly that excess production of Nitric Oxide plays a central part in pathogenesis of HPS[5] . Excess production of Nitric oxide is secondary to altered bowel perfusion and an increased rate of enteral translocation of gram-negative bacteria and endotoxin, due to altered bowel perfusion[6] .Diets containing low amount of Arginine (Substrate for nitric oxide),IV Methylene blue have been tried without much success. Complete resolution of condition post transplant is well documented.

In the literature, cases of transient or fatal deterioration of intrapulmonary shunting post OLT with dramatically worsening hypoxia had been described. Schiller et al reported a case of 10 year old patient who was treated with inhaled Nitric oxide for post OLT hypoxemia. iNO was stopped successfully on day 14 post OLT in their patient[7] . In another case report by PH Durand at al, patient responded very well to NO and they were able to wean NO by day 10 post OLT[8] .

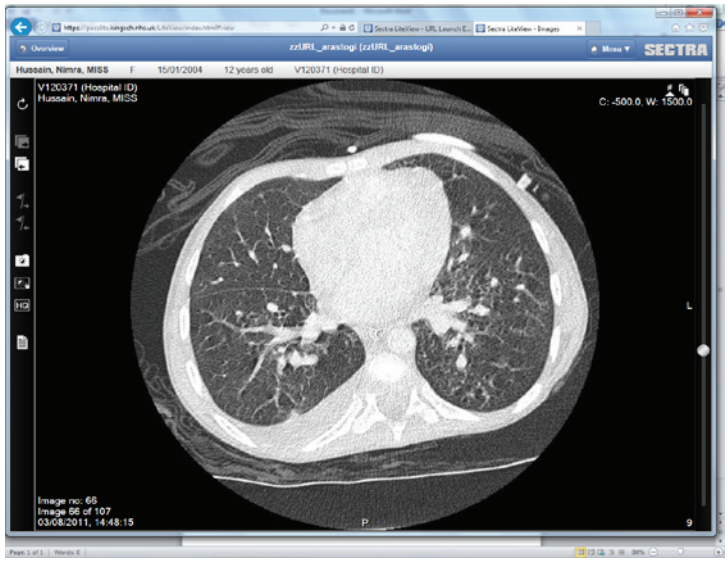
In our patients multiple attempts to wean and stop NO were unsuccessful and patient would become clinically cyanotic with oxygen saturations <60% if iNO was dropped to less than <1ppm. Patient was essentially iNO dependent for 8 weeks post OLT. Clearly the respiratory process in our patients was iNO responsive. The alternative therapies to iNO include IV L Arginine infusion, IV Citruline infusion.

L-Arginine is the nitrogen donor for synthesis of nitric oxide. Hence in theory administration of L Arginine would increase endogenous production of Nitric oxide which is a potent pulmonary arterial vasodilator. Several studies have demonstrated therapeutic benefits of L-Arginine therapy for pulmonary hypertension[9]. L-Arginine infusion has decreased pulmonary vascular resistance and improved oxygenation in infants with persistent pulmonary hypertension[10] . L-Arginine supplementation has been shown to improve pulmonary artery pressures and hemodynamics in patients with primary and secondary pulmonary hypertension[9] . Claudia et la, demonstrated that Oral Arginine produced a 15.2% mean reduction in estimated pulmonary artery systolic pressure after 5 days of therapy in 10 patients with sickle cell disease. Due to problems in using iNO on a portable ventilator associated with problems in use of iNO at home, we were desperate to find an alternative to iNO which in our case was L-Arginine. The protocol we followed was based on a study protocol used by Schulze-Neick at al. in their study on children with cardiac disease[11] . It was modified to suit our patient's needs.

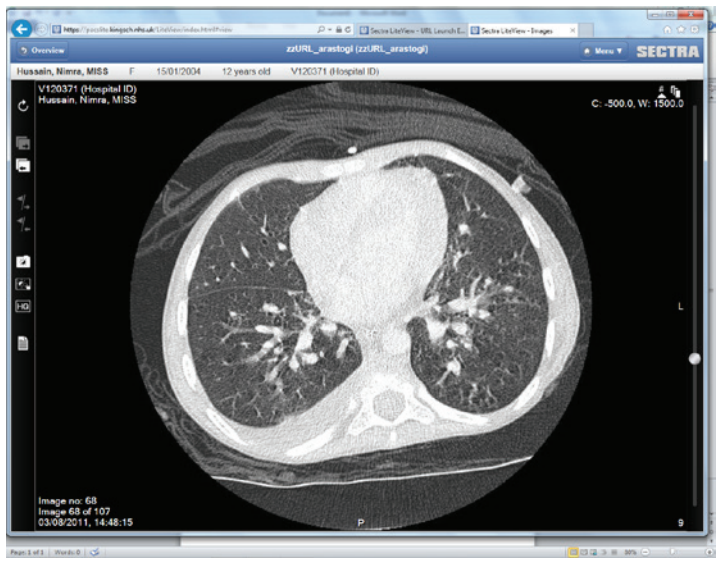
In all previous case reports of hypoxemia post OLT, response to iNO was good and weaning of iNO was possible within 2 weeks post OLT without recurrence of hypoxemia. To the best of our knowledge this is a first case reported in literature where in patient who underwent OLT for HPS became hypoxic post surgery and remained iNO dependent, but responded well to L Arginine infusion. We therefore recommend use of L-Arginine and low dose Sildenafil in case of iNO dependent patient with HPS.



A



B



C

Figure 1.Axial computed tomography angiography images using intravenous contrast below the level of carina (A) towards the base (B, C).

Diffuse dilatation of the pulmonary vasculature is seen to be more prominent in caudal sections (B, C). Lung parenchyma is normal

Ethical Clearance- Taken from IEC (Institutional Ethical Committee)

Source of Funding- Self

Conflict of Interest – NIL

References

1. Krowka MJ, Cortese DA. Hepatopulmonary syndrome. Chest;1990;98(5):1053–1054
2. Khalid N, Melinda S, Fraser G, Martin P. Prevalence of Hepatopulmonary Syndrome in Children. Pediatrics; 2008;121
3. Barbe´ T, Losay J, Grimon G, et al. Pulmonary arteriovenous shunting in children with liver disease. J Pediatr; 1995;126(4):571–579
4. Whyte MK, Hughes JM, Peters AM, Ussov W, Patel S, Burroughs AK. Analysis of intrapulmonary right to left shunt in the hepatopulmonary syndrome. J Hepatol; 1998; 29: 85–93
5. Vallance P, Moncada S. Hyperdynamic circulation in cirrhosis: a role for nitric oxide? Lancet 1991; 337: 776–78
6. Nunes H, Lebrec D, Mazmanian M, et al. Role of nitric oxide in hepatopulmonary syndrome in cirrhotic rats. Am J Respir Crit Care Med 2001; 164: 879–85
7. Schiller O, Nitric oxide for post-liver-transplantation hypoxemia in pediatric hepatopulmonary syndrome: Case report and review. Pediatric Transplantation; Volume 15, Issue 7, pages E130–E134, November 2011
8. Durand P, Reversal of hypoxemia by inhaled nitric oxide in children with severe hepatopulmonary syndrome, type 1, during and after liver transplantation. Transplantation; 1998; 65(3):437-9
9. Mehta S, Stewart D, Langleben D, Levy R. Short-term pulmonary vasodilation with l-arginine in pulmonary hypertension. Circulation 1995;92: 1539–1545
10. McCaffrey M, Bose C, Reiter P, Stiles A. Effect of L-Arginine infusion on infants with persistent pulmonary hypertension of the newborn. Biol Neonate 1995;67:240–243
11. Schulze-Neick I ,L-Arginine and substance P reverse the pulmonary endothelial dysfunction caused by congenital heart surgery. Circulation. 1999;100:749-755

Type of article: Original article

Prevalence of Extended Spectrum β- Lactamase Genes among the Oral Gram Negative Rods Isolated from HIV Infected Patients

Monica Singh[1], Arindam Chakraborty[2]

[1]Assistant Professor, [2]Associate Professor, Department of Microbiology, Motilal Nehru Medical College, Prayagraj Uttar Pradesh. India

Abstract

Objective: We investigated the incidence of gram negative rods from the oral flora of HIV infected patients, possession of ESBL genes and their sensitivity pattern.

Methods: A total of 100 HIV infected patients were included in the study. Their oral swabs were cultured on blood agar and Mac-conkey agar. Organisms were identified based on standard technique. Antibiotic sensitivity was done by the Kirby Bauer disc diffusion method. Detection of ESBL gens (TEM, SHV, CTXM) were performed by multiplex PCR methods.

Result: A total of 57 gram negative rods were isolated from oral swab of 100 HIV positive patients. Out of 57 isolates Pseudomonas *spp* (21 isolates) followed by *Klebsiella* (17 isolates), *E.coli* (10 isolates) and *Acinetobacter* (9 isolates) respectively. Thirty four (60 %) isolates were ESBL producer by phenotypic methods and 35 isolates carried ESBL genes detected by PCR methods. By Kirby Bauer disk diffusion methods 14 (25%) isolates were resistance to three or more antibiotics were reflected as multidrug – resistance (MDR) organism.

Conclusion: All the HIV positive patients respiratory sample should be include in routine screening for the MDR isolation. This will help the physician to choses the appropriate antibiotic when needed and to prevent the morbidity and mortality of the HIV patients due to the MDR gram negative isolates.

Key word: *HIV, Oral flora, Gram negative bacilli. ESBL, MDR.*

Introduction

According to estimates by WHO and UNAIDS, 36.7 million people were living with HIV globally at the end of 2016. That same year, some 1.8 million people became newly infected, and 01 million died of HIV-related causes. [1] The infection is alarming due to the unique pathogenesis of the virus that mainly affect the CD4 cells count, due to this there is the emergence of opportunistic infections in the host, the infection become worse with low CD4+ T cell counts.[2] Among the various opportunistic infections, respiratory infections account for up to 70% of AIDS defining illness. Studies have found an incidence of 5-10% of the HIV-infected patients had colonization with different species of *Enterobacteriaceae.* [3]

It was well known fact that unselective use of antibiotics may cause a shift of upper respiratory tract microbiota and favour colonization with gram negative bacteria. [4] In recent year high level of drug resistance among the gram negative rods are a serious issue, such extended-spectrum-β–lactamase (ESBL) producers have widely spread, and at present, they lead to a serious threat to human.[5] Aim of the present study was to find out the incidence of ESBL genes in commensal isolates and to establish any upsurge in resistance against the commonly use antimicrobial agents and also to find out the incidence of gram negative rods as commensals in oropharyngeal isolates.

Material and Method

The study was conducted during the period from

June 2017 to August 2018 in a multispecialty tertiary care teaching hospital at Prayagraj UP India. A total of 100 HIV positive patients who satisfied the following inclusion/exclusion criteria, were included in the study.

Inclusion criteria:

Subjects who were positive with HIV and no respiratory complication were included in the study.

Exclusion criteria:

I. Subjects who received antibiotic during the past one month.

II. Upper respiratory tract infection.

III. HIV infected patients who were under antiretroviral drugs.

Method

After obtaining the institutional ethics committee's clearance, the patient related data were collected in a structured proforma. The data included the demographic details, CD4 count and complete blood count of the patients.

Specimen collection:

Normal saline mouth gargles or oral washings were collected in a sterile containers from the study population. [6]

Isolation and identification of the organism:

The samples were culture in 5% sheep Blood agar and MacConkey's Agar using standard procedures. Isolates were identified based on colony morphology on blood agar, MacConkey's agar, Two to three suspected colonies from each bacterial plate were picked, cultured and then identified by the various biochemical tests. Biochemical tests were performed to confirm different gram negative organism using gram stain, catalase test, indole, methyl red, Voges-proskauer test, nitrate reduction , urease production, simmon citrate agar, oxidase test and various sugar fermentation tests. [7] LF and NLF isolates were catagorized based on lactose fermentation on MacConkey's agar.

Antimicrobial susceptibility testing:

Antibiotic susceptibility testing was done by Kirby–Bauer disk diffusion method as per Clinical and Laboratory Standards Institute guidelines [8] . The antibiotic disks (Hi-Media,India) used were ampicillin (10 µg), piperacillin (10 µg), piperacillin/tazobactam (100/10 µg), ceftriaxone (30 µg), cefotaxime (30 µg), ciprofloxacin (5 µg), norfloxacin (10 µg), amikacin (30 µg), gentamicin (10 µg), cotrimoxazole (1.25/23.75 µg), cefoperazone + sulbactam (75/30 µg), imipenem (IPM; 10 µg), meropenem (MRP; 10 µg), and ertapenem (ETP; 10 µg).

Screening for ESBL Production:

Gram negative rods which were resistance to third generation cephalosporines were tested for ESBL production by combination disk method using cefotaxime (30 µg), cefotaxime/ clavulanic acid (10 µg), ceftazidime (30 µg) and ceftazidime/ clavulanic acid (10 µg). A ≥5 mm increase in diameter of inhibition zone of cephalosporin + clavulanate disc when compared to cephalosporin disc alone was interpreted as evidence of ESBL production. [8]

Preparation of template DNA:

To 500 µl sterile distilled water taken in a micro centrifuge tube was added 2-3 identical colonies of the isolate. This suspension was heated in a water bath at 95 ° C for 10 min and then centrifuged at 10,000 rpm for 10 min. the supernatant were collected which contain the bacterial DNA was used as template for polymerase chain reaction (PCR). [9]

Genotypic detection of ESBL encoding genes:

A multiplex PCR assay was performed to detect bla $_{TEM}$, bla $_{SHV}$ and bla $_{CTX-M}$ genes as per the primers and conditions previously described, with minor changes [10, 11] . To summarize, PCR was done in a final reaction volume of 50 µl containing 750 Mm Tris HCl, 200Mm $(NH4)_2SO4$, 2.5mM $MgCl_2$, 0.2 mM each of dNTP, 0.5 µl of each primer, 1.5U of Taq DNA polymerase And 5µl of template DNA. The program for amplification included a step of initial denaturation at 95 ^{0}C for 3 min followed by 30 cycles of 95 ° C for 1 min, 58 ° C for 1 min and 72 ° C for 1 min and final extension step at 72 ° C for 7 min. The PCR products were loaded in 2% (w/v) agarose gel prepared in tris borate EDTA buffer at 120 V for 1h and detected using ethidium bromide staining after electrophoresis.

Statistical Analysis

Statistical analysis was performed by using SPSS, version 17.0. Correlation of numerical data with drug

resistance and virulence was done using Pearson's correlation coefficient and all categorical data were correlated by chi-square test. A value of $P < 0.05$ was considered statistically significant.

Results

A total of one hundred respiratory samples from HIV infected patient were included in the study. Out of 100 patients 78 were males and 22 were females. Of the total of 100 patients oral sample 57 sample contain gram negative rods. Of the total of 57 isolates maximum number of the isolates were *Pseudomonas spp* (21 isolates) followed by *Klebsiella spp* (17 isolates), *E. coli* (10 isolates) and *Acinetobacter* (9 isolates) respectively. The most common age group colonised by gram negative rods were 41-60 years followed by 17-40 years. (Table1). Maximum numbers (47.50%) of gram negative rods were isolated from the patients with the CD4+T cell count of 200-600 cells/µl (Table1). Prevalence of different gram negative rods with different CD4 cell count groups is summarized in Table 2.

Of the total of 57 gram negative isolates 34 (60 %) isolates were ESBL producer by phenotypic methods and 35 isolates harbouring ESBL genes which code for single or multiple enzymes**.** A total of 32 (91%) strains out of 35 isolates were positive for bla $_{CTX-M}$ gene, 6 (17%) isolates were positive for bla $_{TEM}$ and only 2 organism were positive for bla $_{SHV}$. Two organism were positive for both bla $_{TEM}$ and bla $_{CTX-M}$, However , non of the isolate was positive for all ESBL genes. When the isolates –wise distribution of ESBL genes was considered, 52% *Pseudomonas* isolates were harbouring bla $_{CTXM}$ genes (Table 3). The results obtained from the Kirby Bauer disk diffusion methodes indicated that, of the 57 gram negative bacilli all of them were fully susceptible to Ertapenem , Meropenem and Imipenem respectively. Around 25% isolates were resistance to three or more antibiotics and thus were considered as multidrug – resistance (MDR) strains. Around 95% of the all isolates were resistant to ampicillin and around 75% of the isolates were resistant to fluroquinolones group of drugs. In addition, the resistance profiles of the drugs among the isolates are summarized in figure 2.

Table 1: demographic details and CD4 cell count of the patients:

		HIV infected patients respiratory sample contain no GNB	**HIV infected patients respiratory sample contain GNB**	**Total**
Sex (N=100)	Male	40	38	78
	Female	3	19	22
Age (N=100)	0-16	3	4	7
	17-40	34	20	54
	41-60	9	26	35
	>60	1	3	4
CD4 Cell count (N=100)	<200	8	15	15
	200-600	11	27	29
	>600	24	15	15

Table 2: Prevalence of Gram negative rods with different CD4 cell count group:

Bacteria isolated n=57	**CD4 <200**	**CD4 200-600**	**CD4 >600**
Pseudomonas (21)	12.2%(7)	19.2%(11)	5.2 %(3)
Klebsiella (17)	5.2%(3)	52 % (9)	23.8% (5)
E.coli (10)	3.5%(2)	7%(4)	10.52%(6)
Acinetobacter(9)	5.26 % (3)	8.7% (5)	1.7% (1)
Total	15	29	15

Table 3: Phenotypic and Genotypic distribution of ESBL producing organism.

Organism		**Phenotypic n=34**	**Genotypic n=35**		
			TEM n=6	**SHV n=2**	**CTXM n=32**
1.	Pseudomonas n=21	13	1	1	11
2.	Klebsiella n=17	8	1	1	6
3.	E.coli n=10	6	2	0	7
4.	Acinetobacter n=9	7	2	0	7

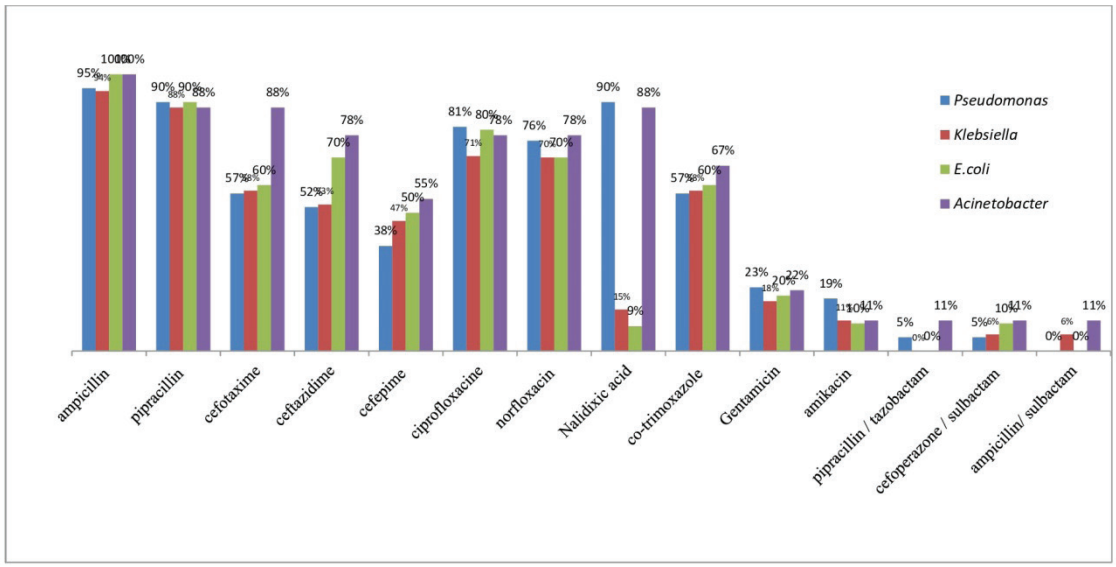


Figure 1: Antimicrobial resistance pattern of commonly used antibiotic among the isolates.

Discussion:

In the present study, we observed a high rate of colonization of gram negative rods (57%) among the HIV positive patients respiratory sample which is similar to the study done by Hegde et al. [6] where they have found around half of their isolates were gram negative rods.

We are not the first to observed that male were mostly effected by HIV in compare to female several other investigator also reported the same. We also witnessed that the incidence of colonization of gram negative bacilli were significantly higher in male patients. The age group mostly affected was the 41-60 years; this is consistent with the findings of *Hedge et al* [6] and Leynaert et al.[12] . Who reported the highest incidence of HIV in the late thirties.

In the study, we also observed that , the incidence of gram negative rods were significantly higher in patients who have lower CD4 cell count, which is similar to studies done by Sarkar K et al. [13] and Hegde et al. [6]

In our study population we found that around half of the HIV infected patients oral sample contain gram negative isolates, Among these isolates the most common were *Pseudomonas spp* (37%) followed by *Klebsiella spp* (30%). However a study done by Schmidt- *Westhausen et al*. [14] found that 5% of the HIV infected individuals oral cavity contain different species of *Enterobacteriaceae*. Yet in another study from India have reported 32% of their isolates were gram negative rods. [6]

On analysis of the antibiotic sensitivity testing by phenotypic methods of the isolates we observe a significantly high degree of resistance to first line of antibiotics which is in accordance to study done by Manfredi et al. [15] and Molyneux .[16] Many retrospective studies on commensal isolates from HIV positive patients reported a high degree of resistance among the commonly used antibiotics.

Regarding the possession of ESBL genes such as CTXM, TEM & SHV, our finding indicate that one in three HIV positive individual were harbouring gram negative rods with ESBL genes (100/35). However the incidence of ESBL producing isolates were significantly higher among the total gram negative rods isolated (57/35) from HIV positive individual. There are several study on *E.coli* phylogenetic groups indicates that commensal groups such as A & B1 were harbouring drug resistance genes and causing life threating infection. [17, 18]

In our study we also observed that CTXM is the most common ESBL gene harbouring by the isolates, the presence CTXM gene among the commensal isolates may act as a reservoir of antibiotic resistance genes.

It is well know that opportunistic infections are the most common causes of death in HIV infected patients and most of them are caused by commensal bacteria which are otherwise harmless in a normal individual. In our study we have reported that those commensal gram negative rods were harbouring ESBL genes, a finding that is of a major worry to attending clinicians and present day treatment modalities. Based on our finding we can suggest that the HIV positive individuals respiratory sample should be routinely scan for the pathogens and if there are any gram negative rods grown they should treated with the appropriate antibiotic. This will help in the fight against multidrug resistance organism and if corrective actions are not taken, in the absence of novel agents in the near future, the spread of MDR isolates and infection cause by those isolates in HIV infected individual may lead to therapeutic dead ends.

Acknowledgment: We would like to thanks Motilal Nehru Medical College, Prayagraj for providing us the infrastructure and financial support for the study.

Ethical Clearance: Institutional ethical committee Motilal Nehru medical college. ECR/922/INST/ UP/2017/ DATED: 26/12/2018.

Source of Funding: Self

Conflict of Interest : NIL.

References

1. UNAIDS/WHO (2019) Global AIDS update.
2. Vidya Vijayan KK, Karthigeyan KP, Tripathi SP, Hanna LE. Pathophysiology of CD4+ T-Cell Depletion in HIV-1 and HIV-2 Infections. *Front Immunol*. 2017; 23;8:580.
3. Schmidt-Westhausen A, Fehrenbach FJ, Reichart PA Oral enterobacteriaceae in patients with HIV infection. J Oral Pathol Med. 1990: 19(5):229–231.
4. Nord CE, Kager L, Heimdahl A Impact of anti-microbial agents on the gastrointestinal microflora and the risk of infection. Am J Med. 1984; 76:99–106.

5. Cantoin R, Coque TM. The CTX-M beta-lactamase pandemic. Curr opin Microbiol 2006;9:466-75.
6. Hegde MC, Kumar A, Bhat G, Sreedharan S. Oral Microflora: A Comparative Study in HIV and Normal Patients. *Indian J Otolaryngol Head Neck Surg*. 2014;66(Suppl 1):126–132.
7. Mims C Diagnosis of infections and assessment of host defence mechanism. In: Mims C, Dockerell HM, Goering RV, Ivan R, Wakelin D, Zuckerman M (eds) Medical microbiology. Elsevier, London, 2004; pp 453–471.
8. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing: 27th informational supplement. Wayne, PA: CLSI; 2017.
9. Blanco M, Blanco JE, Mora A, Dahbi G, Alonso MP, González EA, *et al.* Serotypes, virulence genes, and intimin types of Shiga toxin (verotoxin)-producing *Escherichia coli*isolates from cattle in Spain and identification of a new intimin variant gene (eae-xi). J Clin Microbiol 2004;42:645-51.
10. Hosoglu S, Gündes S, Kolayli F, Karadenizli A, Demirdag K, Günaydin M, *et al.* Extended-spectrum beta-lactamases in ceftazidime-resistant *Escherichia coli* and *Klebsiella pneumoniae* isolates in Turkish hospitals. Indian J Med Microbiol 2007;25:346-50.
11. Muzaheed DY, Adams-Haduch JM, Endimiani A, Sidjabat HE, Gaddad SM, *et al.* High prevalence of CTX-M-15-producing *Klebsiella pneumoniae* among inpatients and outpatients with urinary tract infection in Southern India. J Antimicrob Chemother 2008;61:1393-4.
12. Leynaert B, Downs AM, de Vincenzi I Heterosexual transmission of human immunodeficiency virus: variability of infectivity throughout the course of infection. European study group on heterosexual transmission of HIV. Am J Epidemiol. 1998; 148(1):88–96.
13. Kumar R, Jha P, Arora P, Mony P, Bhatia P, Millson P, Dhingra N, Bhattacharya M, Remis RS, Nagelkerke N, International studies of HIV/ AIDS (ISHA) investigators. Trends in HIV1 in young adults in south India from 2000 to 2004: a prevalence study. Lancet. 2006; 367(9517):1164–1172.
14. Schmidt-Westhausen A, Fehrenbach FJ, Reichart PA Oral enterobacteriaceae in patients with HIV infection. J Oral Pathol Med, 1990; 19(5):229–231.
15. Manfredi R, Nanetti A, Valentini R, Chiodo F Acinetobacter infections in patients with human immunodeficiency virus infection: microbiological and clinical epidemiology. Chemotherapy. 2001;47(1):19–28.
16. Molyneux E. Bacterial infections in children with HIV/ AIDS. Trop Dr 2004;34(4):195–198.
17. Chakraborty A, Adhikari P, Shenoy S, Saralaya V. Clinical significance and phylogenetic background of extended spectrum β-lactamase producing *Escherichia coli* isolates from extra-intestinal infections. J Infect Public Health. 2015;8, 248—253.
18. Zhao R, Shi J, Shen Y, Li Y, Han Q, Zhang X, Gu G, Xu J. Phylogenetic Distribution of Virulence Genes Among ESBL-producing Uropathogenic Escherichia coli Isolated from Long-term Hospitalized Patients. *J Clin Diagn Res*. 2015;9(7):DC01-4.

Knowledge of students about rabies and its post exposure prophylaxis and health seeking behaviour in University of Western UP.

Monika Gupta[1] Chhavi Kiran Gupta[2] Sartaj Ahmad[3] Bhawana Pant[4] Kaynat Nasser [5] Deepak Kumar[2]

[1]Associate Professor, [2] Assistant Professor, Department of Community Medicine, Subharti Medical College Meerut, [3] Associate Professor, Medical Sociology, Swami Vivekananda Subharti University Meerut , [4]Professor, Department of Community Medicine ,Subharti Medical College Meerut, [5]Assistant Professor(Biostatistics), Department of Community Medicine, Subharti Medical College Meerut

Abstract

Introduction: Rabies is a major public health problem in Asia. Of the estimated 55,000 human cases that occur annually worldwide, more than half occur in Asian countries. Rabies is exceptionally fatal encephalitis but can be prevented by appropriate post exposure prophylaxis. **Objectives:** To assess the knowledge of students about rabies and its causes, reservoir , mode of transmission , symptoms, wound management , post exposure prophylaxis , seeking behaviour, site for anti rabies vaccine administration after dog bite. **Methodology:** This cross-sectional study was conducted among 375 college students in various colleges under Swami Vivekananda Subharti University Meerut UP. **Results:** (55%) of students knew that rabies is caused by a virus. 18.66% students knew correct first aid measures such as wash with soap and water. **Conclusion:** The findings of the study indicated lack of knowledge on various aspects of the rabies & its prevention. There are many misconceptions and lack of awareness about rabies. There is strong need to organize awareness programme using educational session.

Key words: *Students, Rabies, Misconception, Health seeking behaviour*

Introduction

Rabies is an enzootic and epizootic disease of worldwide importance. Rabies is a major public health problem in Asia. Of the estimated 55,000 human cases that occur annually worldwide, more than half occur in Asian countries [1] In India, rabies is a zoonotic problem of considerable magnitude. Annual mortality more than 30,000 reported by national authorities may not be a complete picture because, since 1985 India continues to report the same every year.[2] Every year approximately 1.1 to 1.5 million people are receiving post exposure prophylactic treatment. Although two million bites occur each year in India and more than 95% of these cases are bitten by dogs [3]

Corresponding author:
Dr Chhavi Kiran Gupta
Email:chhavikirangupta@gmail.com

The most well-known and ubiquitous lyssavirus is the rabies virus (RABV), which circulates in New World bats and both Old and New World terrestrial mammals. The vast majority of human rabies cases worldwide are transmitted by dogs infected with RABV. [4] In recent decades, initiatives aimed at raising rabies awareness (e.g. the World Rabies Day campaign) and lowering human exposure risk through mass vaccination of leading reservoir species have been implemented globally, coinciding with the development of highly potent human rabies vaccines.[5]

This study was undertaken to find out the knowledge, attitude, and practice regarding rabies and its prevention among the college going students.

Objectives of the present study were:

1) To assess the knowledge and awareness of students about rabies.

2) To ascertain the management of wound practiced

by students after dog bite.

3) To assess the awareness of students regarding anti rabies vaccine & their health seeking behaviour.

Material and Method

This cross-sectional study was conducted among 375 college students in various colleges under Swami Vivekananda Subharti University Meerut UP. A Total of *375* first year students of three colleges were interviewed. Out of them, Law (185), Pharmacy (142) and Mass communication (48) students were randomly selected for interview. A predesigned semi structured, pre-tested questionnaire was used after taking consent of the students. Permission from the institutional ethics committee of Subharti medical college, SVSU, Meerut was taken. A data collection for the study was carried out during from October to December 2019. The data was entered and analyzed by using Micro soft Excel software and the results were expressed in percentages and chi square test.

Results

Table 1: Distribution of study participants according to Knowledge of cause and reservoir of rabies.

Knowledge about cause of rabies	Law students (N=185)	Pharmacy students (N=142)	Mass Communication students (N=48)	Total (N=375)
Virus	105 (56.75)	82 (57.74)	20 (41.66)	207 (55.2)
Others	48 (25.94)	25 (17.60)	15 (31.25)	88 (27.46)
P value= 0.00 (Significant differences) Knowledge about reservoir of rabies				
Dog	160 (86.48)	125 (88.02)	32 (66.66)	317 (84.53)
Monkey	42 (22.70)	35 (24.64)	13 (27.08)	90 (24.0)
Cattles	18 (09.72)	13 (09.15)	04 (08.33)	35 (09.33)
Cat	15 (08.09)	14 (09.05)	08 (10.41)	37 (09.06)
Rat/others	10 (05.40)	03 (02.11)	07 (31.26)	21 (05.32)

P value= 0.04 (Significant differences)

Table 2: Distribution of study participants according to Knowledge regarding Mode of Transmission & symptoms of rabies:

Mode of Transmission	Law students (N=185)	Pharmacy students (N=142)	Mass Communication students (N=48)	Total (N=375)
Animal bite	180 (97.29)	135 (95.07)	40 (83.33)	355 (94.66)
Scratch by animal	28 (15.35)	25 (17.60)	12 (25.00)	65 (17.33)
Lick on broken skin	22 (11.89)	13 (09.15)	09 (18.75)	44 (11.73)

Cont... **Table 2: Distribution of study participants according to Knowledge regarding Mode of Transmission & symptoms of rabies:**

Touching secretions of rabid animal/person	47 (25.39)	32 (22.5)	20 (41.60)	99 (25.59)
Drinking unboiled milk of rabid animal	18 (09.72)	23 (16.19)	15 (31.39)	56 (14.93)
P value =0.05 (No Significant differences) **Knowledge about Symptoms**				
Hydrophobia	48 (25.94)	25 (17.60)	15 (31.25)	88 (27.46)
Convulsions	18 (09.72)	13 (09.15)	04 (08.33)	35 (09.33)

P value=0.92 (No Significant differences)

Table 3: Distribution of study participants according to the knowledge regarding wound management:

Wound management	**Law students (N=185)**	**Pharmacy students (N=142)**	**Mass Communication students (N=48)**	**Total (N=375)**
Wash with soap & water	48 (24.94)	14 (9.85)	08 (16.66)	70 (18.66)
Apply Chilly Powder	66(35.68)	80 (56.33)	30 (62.05)	176 (46.93)
Used herbal Paste	12 (6.48)	13 (9.15)	05 (10.41)	30 (8.0)
Apply oil etc	05 (2.70)	03 (2.11)	03 (6.25)	11 (2.93)

P value=0.00 (Highly significant association)

Table 4 : Distribution of study participants according to Knowledge regarding post exposure prophylaxis & health seeking behaviour

Knowledge about Number of doses of ARV	**Legal Education (N=185)**	**Pharmacy (N=142)**	**Mass Communication (N=48)**	**Total (N=375)**
05 Dose	20 (10.81)	35 (24.62)	13 (27.08)	113 (30.13)
14 Dose	115 (62.16)	80 (56.33)	25 (52.08)	175 (46.66)
01/2 /3 Doses	005 (2.70)	04 (2.80)	05 (10.41)	14 (3.73)
P value= 0.00 (Highly significant association) Knowledge about Site for Anti Rabies Vaccine administration				
Upper arm / Anterolateral thigh	05 (2.70)	18 (12.67)	13 (27.08)	36 (9.06)
Buttock/ abdomen	120 (64.86)	95 (66.89)	33 (66.66)	247 (57.68)

Cont... **Table 4 : Distribution of study participants according to Knowledge regarding post exposure prophylaxis & health seeking behaviour**

P value =0.00 (Highly significant association) Health seeking behaviour				
Private Practitioners	126 (68.10)	97 (68.30)	23 (47.9)	246 (65.6)
Government Health centers	32 (17.29)	18 (12.67)	12 (25.00)	62 (16.53)
Quacks/ Traditional healers	27 (14.57)	27 (18.20)	13 (27.07)	67 (17.86)

P value= 0.04 (Significant association)

In this study, 61% of the study subjects were males and 39% were females. Majority of the students (67%) were in the age group of 17 > years. Only about half of the subjects (55.2 %) knew that rabies was caused by a virus. There was significant difference in knowledge about causes of rabies.

(84.53 %) respondents thought that the reservoir of rabies was dog. Knowledge regarding other animal reservoir was monkey (24.0 %), cattle's (9.33%), cat (9.06%), and rest to rat and other animals (05.32%). There was significant difference in knowledge about reservoir of rabies.

(94.66%) students knew that rabies could be transmitted by animal bite. Besides animal bite students knew that rabies could also be transmitted by scratch by animals (17.33%), lick on broken skin or mucous membrane (11.73%), touching secretions of rabid person/animals (25.59%), and drinking unboiled milk of rabid animal (14.93%). There was not significant difference in knowledge about mode of transmission of rabies.

Symptoms of rabies were found hydrophobia (27.46 %) and convulsion (9.33%). There was not significant difference in knowledge about symptoms of rabies.

Application of chilly powder (46.93%) and herbal paste (08. %) was found management of wound. Only (18.66%) students knew that wash with soap and water was better management of wound after animal bite. There was highly significant association in knowledge about management of wound after dog bite.

Only (30.13%) knew of 05 doses of anti rabies vaccines (ARV) for prevention against rabies and majority (46.6%) still opined that 14 injections (ARV) had to be taken. There was highly significant association in knowledge about doses of anti rabies vaccines (ARV) for prevention against rabies.

In our study, very few (9.06%) students knew that anti rabies vaccines (ARV) should be given over arm/ anterolateral part of thigh. (57.68%) students believed that anti rabies vaccines were given around the umbilicus or intra abdominal. There was highly significant association with knowledge about site for ARV doses.

In case of visit for health services after animal bite, private practitioners (65.6%) were first choice of students. (16.53%) students wanted to go to the government health centers, and (17.86%) prefer to quacks and others traditional healers. There was significant in knowledge association with health seeking behavior.

Discussion

In this study, 61% of the study subjects were males and 31% were females, maximum students were in age group 17-20 years (67%). Only about half of the subjects (55.2%) knew that rabies is caused by a virus. There was significant difference in knowledge about causes of rabies.

(94.66%) students knew that rabies could be transmitted by animal bite. Besides animal bite students knew that rabies could also be transmitted by scratch by animals (17.33%), lick on broken skin or mucous membrane (11.73%), touching secretions of rabid person/animals (25.59%), and drinking unboiled milk of rabid animal (14.93%). There is no significant difference in knowledge about mode of transmission of rabies. Similar results were reported in a survey of knowledge, attitudes, and practices of dog and cat owners in Ottawa.

Carleton stated that 95% of respondents were aware that they were likely to get rabies from a bite or 77% from a scratch of a rabid animal. [6]

In our study, only (18.66%) students knew that wash with soap and water was better management of wound after animal bite. There are many myths and false beliefs associated with wound management such as application of oils, herbs, and red chilies on the wounds inflicted by rabid animals. In this study , 46.93% students told that chilly powder should be applied after dog bite where as 8% students told that herbal paste should be applied after dog bite. A study done by Sekhon AS et al (2002) also revealed many myths and false beliefs associated with wound management such as application of oils, herbs, and red chilies on the wounds inflicted by rabid animals. [7]

A study done by S. Sehgal, D. Bhattacharya et al. (1994) in Delhi on the victims of dog bite reported that by the incidence of mortality from dog bite could be prevented by proper wound toilet with soap and water and prophylactic tetanus toxoid injection.[8] A study conducted by Sekhon AS et al(2002) revealed that only 21.2% students practiced washing wound with soap and water. [7] Rabies expert suggested that a detergent or carbolic soap should be available to the patient for wound washing , although plain water could be used, in case of non-availability of a soap. If the wound was large or deep, it should be cleaned by a dresser or health staff using antiseptic cream or solution. It was important to remove the saliva. Simply washing the wound and application of antiseptic lotion could reduce the risk of rabies by about 50%.

In the present study, only 30.13% students had knowledge that number of ARV doses required were 5 whereas 46.66% students still thought that 14 doses of ARV were required for management of dog bite. It was comparable to the findings of report by CDS of Rabies: Introduction . [9] A study conducted by Sehgal S. et al. (1994) suggested that people had very basic knowledge about anti-rabies treatment getting 14 injection after dog bite, as per the old concept, but not aware of the disease which could occur if they do not manage dog bites properly. About 0.40 million people continue to receive the sheep brain vaccine despite the fact WHO has recommended for its discontinuation.

In our study, very few (9.06%) students knew that anti rabies vaccines (ARV) should be given over arm/ anterolateral part of thigh. (57.68%) students wrongly believed that anti rabies vaccines are given around the umbilicus or intra abdominal. It indicated the need of increase in awareness among students regarding management of rabies among university students. There was highly significant association with knowledge about site for ARV doses. The most widely used WHO Essen regime calls for a 1 ml dose intramuscular, administered in upper deltoid region or anterolateral area of thigh for children on day 0, 3,7,14 & 28 regularly.[10] Study conducted by Singh US [11] , 79% of study subjects told 14 injections and 5.7% told that the site of administration of rabies vaccine was over abdomen. An another study conducted by Bhatia R et al. (1994) revealed that gluteus region is not recommended as it has high fat content that slow the absorption of the vaccine.[12] It implied that the private practitioners should be made aware about correct techniques of rabies vaccines administration.

In case of visit for health services after animal bite, private practitioners (65.6%) was first choice of students. (16.53%) students wanted to go to the government health centers, and (17.86%) preferred to quacks and others traditional healers. It might be due to poor availability of rabies vaccine at governmental health centers. A study conducted by Bhalla S et al. (2005) suggested that 56% of the general practitioners preferred to give the anti rabies vaccine in gluteus region.[13]

Conclusion

It was observed that knowledge on various aspects of the rabies was poor among college students. It was also observed that there are many myths and misconceptions associated with wound management. The modern treatment is available but not properly utilized by the students because they have poor knowledge about current anti-rabies treatment .Awareness is the most effective tool for the prevention of rabies. So, there is strong need to organize awareness activities about rabies prevention using educational session. It may include various interventional activities for health education, distribution of IEC materials and role play activities in colleges to promote prevention through appropriate health-care practices.

Acknowledgement: We are thankful to all students who participated in this study

Ethical Clearance: Permission from the institutional ethics committee of Subharti medical college, SVSU, Meerut was taken.

Source of Funding -Nil

Conflict of Interest- There are no conflict in interest.

References

1. World Health Organization (2005) WHO Expert Consultation on Rabies. 1stReport. WHO Technical Report Series, No. 931 Geneva, Switzerland.
2. Goa Health News: Survey on rabies deaths in Goa. The Navhind Times April 13, 2003 issue Page 3.
3. Park. K: Park's textbooks of Preventive and Social Medicine. 24th edition, Jabalpur: M/s Banarsidas Bhanot;2017 pages 291-294.
4. Familusi JB,Osunkoya BO,Moore DL, et al.A fatal human infection with Mokola virus. Am J Trop Med Hyg.1972; 21: 959–63.
5. Briggs D, Hanlon CA. World Rabies Day: focusing attention on a neglected disease. Vet Rec.2007;161: 288–9. doi: 10.1136/vr.161.9.288.
6. Ottawa carleton .A Survey of Knowledge, Attitudes and Practices of dog and cat owners With respect to vaccinating their pets against rabies, Ontario July 2000, volume 28-01, 1 January 2002.
7. Sekhon AS, Singh A, Kour P, Gupta S. Misconceptions and Myths in the management of animal bite case. Indian Journal of Community Medicine. volume xxvii No. 1, Jan-March 2002, pages 9-11.
8. S. Sehgal, D. Bhattacharya, M. Bhardwaj and V. Parsi Studies on victims of bite by a dog in Delhi Indian Journal of Public Health. 1994 vol xxxviii No. 1 January-March, pages 18-21.
9. CDC. Rabies: introduction page 1-3 by US Department of Health and Human Services.
10. Dreesen D, vaccine 1997, Vol 15 Supp Pg S3
11. Singh US, Choudhary SK. Knowledge, attitude,behaviour and practice study on dog bites and its management in the context of prevention of rabiesin a rural community of Gujarat. Indian JCommunity Med. 2005 Jul-Sep;30(3):81-3
12. Bhatia R, Ichhpujani RL. "Rabies- The killer disease"1994 Ed . pg 109-110
13. Bhalla S, Mehta JP, Singh A. Knowledge and practice among GPs of Jamananagar city regarding animal bite. Indian J. Community Med. 2005, 30:94-6

Awareness about Periodontal Diseases and Its Management among Medical Students- A Questionnaire Study

Mounika. S[1], Arvina Rajasekar[2]

[1]Intern, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India, [2]Senior Lecturer, Department of Periodontology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India

Abstract

Aim: To assess the awareness about periodontal diseases and its management among medical students.

Materials and Method: A web based questionnaire consisting of 11 questions was formulated and circulated among 100 medical students. The responses were then subjected to statistical analysis.

Results and Conclusion: The present study depicts that the level of awareness among medical students is not very encouraging. This emphasizes the urgent need for educating the budding medical students about the periodontal diseases, its association with systemic diseases and its management.

Keywords: *Gingivitis, Periodontitis, Oral health.*

Introduction

Periodontitis is a chronic inflammatory disease which causes destruction of supporting structures of teeth resulting in formation of pathological pocket around the diseased tooth, loss of connective tissue attachment and alveolar bone loss. Eventhough bacterial plaque is the primary etiology of the disease, there are variety of predisposing factors like systemic diseases, genetic background, environmental factors like smoking and stress.[1,2,3] Microorganisms specifically gram negative anaerobic bacteria play a major role with development and progression of periodontal disease.[4,5,6]

The treatment for periodontal disease depends on the factors such as oral hygiene status,[7] gingival condition,[8] pocket depth, attachment level,[9] alveolar bone height. [10] Treatment for a periodontal compromised patient ranges from oral prophylaxis, curettage, flap surgery, osseous surgery, LASERs, extraction of the involved teeth that has poor prognosis, its replacement by means of implants, crowns and bridges etc. The prognosis of any periodontal therapy includes the following factors such as patient's compliance, patient's ability to maintain good plaque control and regular dental visits.

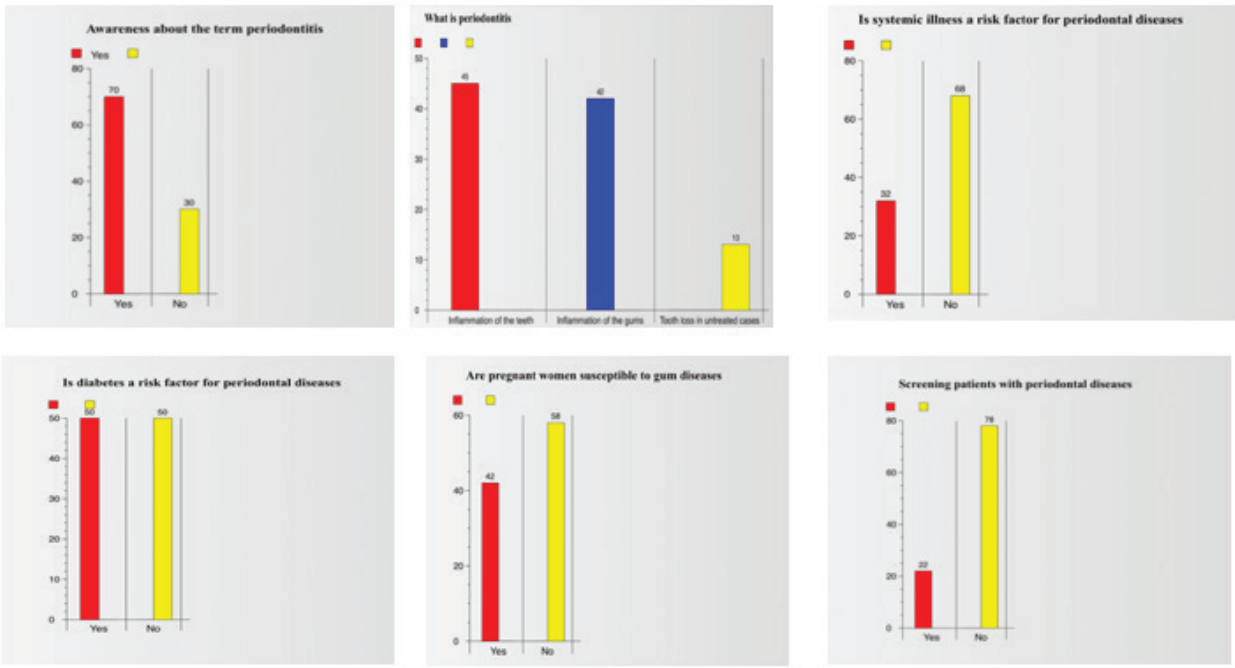
In case of advanced periodontal diseases, the destruction of attachment apparatus calls for extraction of several teeth. In such cases only a few teeth will remain which would be in reduced periodontal tissue support that would eventually result in continuous progression of the disease.[11] It thus becomes difficult to restore the function. Hence, early identification and intervention is very important for better prognosis.

Medical and dental field goes hand in hand towards providing betterment in patient's life. This study pertains to the contribution of the medical students in identifying, referring and suggesting treatment for patients with periodontal diseases. Therefore the present study was conducted to assess the awareness about periodontal diseases and its management among medical students.

Materials and Method

The study was conducted among 100 medical students in Tamil Nadu during the month of January 2019. A web based questionnaire comprising of 11 questions with 7 questions relating to awareness about periodontal diseases and 4 questions relating to periodontal disease management was formulated and circulated. The responses were then subjected to statistical analysis. The study protocol was reviewed and approved by the Institutional Ethical Committee of Saveetha Dental College and Hospitals, Chennai.

Results



Graph 1 shows that among 100 students 70% of the students were aware with the term periodontitis. Graph 2 shows that only 42% was aware that periodontitis is the inflammation of gums. Graph 3 shows that 32% of the students considered systemic illness to be the risk factor for periodontitis. Graph 4 shows that 50% of them considered diabetes as a risk factor for periodontal diseases. Graph 5 indicates 42% of the students were aware that pregnant women are susceptible to gum diseases. Graph 6 indicates only 22% of the students screen patients for periodontal diseases. Study shows only 5% of them very often refer patients with gum diseases to the dentist.Study show shows 42% of the students insisting pregnant women for dental checkup. Study shows that 29% of the students are aware about the interdental cleaning aids.

Study shows 49% were aware that LASERs are used to treat periodontal diseases. Study shows 82% were aware that implants are used to replace the missing teeth.

Discussion

The present study assessed the awareness about periodontal diseases and its management among medical students.

Literature search reveals positive association between periodontal disease and systemic illness. This association is a matter of debate for past fifty years. This is due to the fact that periodontal infection may act as a focus of infection for systemic diseases. In periodontitis, due to increased microbial load, the epithelial barrier is breached and thus microorganisms get an access to the underlying blood vessels thereby entering systemic blood circulation. This is the primary mechanism of periodontitis related systemic diseases.[12-15]

Several studies have revealed positive link between periodontal diseases and other systemic illness like coronary heart disease,[16-18] coronary heart disease-related events such as angina, myocardial infarction and atherosclerosis,[19] stroke,[20] diabetes mellitus,[21,22] preterm low birth-weight infants,[23] chronic obstructive pulmonary diseases and hospital-acquired pneumonia.[24] The agenda behind the present study is to assess the awareness about the periodontal diseases and its management among the young medical students who would be future medical professionals.

A study conducted among final year medical students and interns demonstrated that most of them were not aware about the association between periodontitis and systemic diseases.[25] Our results were in accordance with the above mentioned study, as only 32% of the students considered systemic illness to be a risk factor for periodontitis and 50% of them considered diabetes

as a risk factor for periodontal diseases.

Also, another study by Kalburgi V et al[26] demonstrated that awareness about treatment modalities of periodontal diseases was poor among medical interns and postgraduates. Similarly in our study, only 29% of the students were aware about the interdental cleansing aids, 49% were aware that LASERs are used to treat periodontal diseases.

However, it is important to note that the findings described above cannot be generalized because the study was conducted among a small population. Hence a correspondent study on a large scale is required to give more appropriate results.

Conclusion

The present study depicts that the level of awareness among medical students is not very encouraging. This emphasizes the urgent need for educating the budding medical students about the periodontal diseases, its association with systemic diseases and its management.

Ethical Clearance- Nil

Source of Funding-Nil

Conflict of Interest -Nil

References

1. Mattila KJ, Valtonen VV, Nieminen M, Huttunen JK. Dental infection and the risk of new coronary events: prospective study of patients with documented coronary artery disease. Clin Infect Dis. 1995 Mar 1;20(3):588-92.
2. Beck J, Garcia R, Heiss G, Vokonas PS, Offenbacher S. Periodontal disease and cardiovascular disease. J Periodontal. 1996 Oct 1;67:1123-37.
3. Joshipura KJ, Rimm EB, Douglass CW, Trichopoulos D, Ascherio A, Willett WC. Poor oral health and coronary heart disease. J Dent Res. 1996 Sep;75(9):1631-6.
4. Socransky SS. Microbiology of periodontal disease-present status and future considerations. J Clin Periodontol. 1977 Sep 1;48(9):497-504.
5. Slots J. Subgingival microflora and periodontal disease. J Clin Periodontol. 1979 Oct;6(5): 351-82.
6. Dzink JL, Tanner AC, Haffajee AD, Socransky SS. Gram negative species associated with active destructive periodontal lesions. J Clin Periodontol. 1985 Sep;12(8):648-59.
7. Silness J, Loe H. Periodontal disease in pregnancy II. Correlation between oral hygiene and periodontal condition. Acta odontolo Scand . 1964 Jan 1;22(1):121-35.
8. Loe H, Silness J. Periodontal disease in pregnancy I. Prevalence and severity. Acta Odontolo Scand. 1963 Jan 1;21(6):533-51.
9. Ramfjord SP, Nissle RR, Shick RA, Cooper H. Subgingival curettage versus surgical elimination of periodontal pockets. J Clin Periodontol. 1968 May 1;39(3):167-75.
10. Ortman LF, McHenry K, Hausmann E. Relationship between alveolar bone measured by 125I absorptiometry with analysis of standardized radiographs: 2. Bjorn technique. J Clin Periodontol. 1982 May 1;53(5):311-4.
11. Lindhe J. The role of occlusion in periodontal disease and the biological rationale for splinting in treatment of periodontitis. Oral Sci Rev. 1977;10:11-42.
12. Gur A, Majra JP. Awareness regarding the systemic effects of periodontal disease among medical interns in India. J Glob Infect Dis. 2011 Apr;3(2):123-9.
13. Mealey BL. Influence of periodontal infections on systemic health. Periodontol 2000. 1999 Oct;21(1):197-209.
14. Rai B. Systemic effect of oral disease. Internet J Fam Pract. 2007;5(1):123-7.
15. Page RC, Beck JD. Risk assessment for periodontal diseases. Int Dent J. 1997 Apr;47(2): 61-87.
16. Beck J, Garcia R, Heiss G, Vokonas PS, Offenbacher S. Periodontal disease and cardiovascular disease. J Clin Periodontal. 1996 Oct 1;67:1123-37.
17. Beck JD, Offenbacher S, Williams R, Gibbs P, Garcia R. Periodontitis: a risk factor for coronary heart disease? Ann Periodontol. 1998 Jul 1;3(1):127-41.
18. Rai B, Kharb S. Effect of scaling and root planning in periodontitis on peripheral blood. Internet J Dent Sci. 2008;6(1):1-4.
19. Mattila KJ, Valle MS, Nieminen MS, Valtonen VV, Hietaniemi KL. Dental infections and coronary atherosclerosis. Atherosclerosis. 1993 Nov 1;103(2):205-11.
20. Syrjanen J, Peltola J, Valtonen V, Iivanainen M, Kaste M, Huttunen JK. Dental infections in

association with cerebral infarction in young and middle-aged men. J Intern Med. 1989 Mar;225(3):179-84.

21. Sammalkorpi K. Glucose intolerance in acute infections. J Internal Med. 1989 Jan; 225(1):15-9.
22. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. Ann Periodontol. 1998 Jul 1;3(1):51-61.
23. Hill GB. Preterm birth: associations with genital and possibly oral microflora. Ann Periodontol. 1998 Jul 1;3(1):222-32.
24. Pugin J, Auckenthaler R, Lew DP, Suter PM. Oropharyngeal decontamination decreases incidence of ventilator-associated pneumonia: a randomized, placebo-controlled, double-blind clinical trial. J Am Med Assoc. 1991 May 22;265(20):2704-10.
25. Manovijay B, Sayeeganesh N, Saranya R, Jayachandran D, Priya K, Subhasini V. Periodontal health awareness among medical students- A survey. Clin Res Open Access. 2015;1(2):1-4.
26. Kalburgi V, Sravya L, Warad S, Vijayalaxmi K, Sejal P, Hazeil DJ. Role of systemic markers in periodontal diseases: a possible inflammatory burden and risk factor for cardiovascular diseases? Ann Med Health Sci Res. 2014;4(3):388-92.

Outcome of Transscleral Cyclophotocoagulation in Refractory Glaucoma at a Tertiary Eye Hospital in India

Neetha I R Kuzhuppilly[1], Shibi Dev[2], Shilpa N Patil[3], Aditya Deo[4]

[1]Assistant Professor, Department of Ophthalmology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka, [2]Glaucoma Fellow, Nethradhama Superspeciality Eye Hospital, Kanakapura Main Road, 7th Block, Jayanagar, Bangalore, [3]Glaucoma Consultant, [4]Glaucoma Fellow, Nethradhama Superspeciality Eye Hospital, Kanakapura Main Road,, 7th Block, Jayanagar, Bangalore

Abstract

Background: Transscleral cyclophotocoagulation (TSCPC) is a cyclodestructive procedure used to control elevated intra ocular pressure(IOP) in refractory glaucoma. We studied the efficacy and safety of TSCPC in refractory glaucoma at our hospital.

Method: Data was collected retrospectively from patients who underwent TSCPC over a two year period. Primary outcome measure was success in terms of IOP reduction and the secondary outcome measures were relief of symptoms and incidence of complications.

Results: 27 of 42 patients who underwent TSCPC were included for analysis which included 16 men and 11 women with mean age 61.8±13years and visual acuity ranging from 6/24 to no perception of light.

Mean IOP decreased from 46.0±8.6 mmHg(range: 26-58 mmHg) pre-procedure to 16.7±13.4 mmHg($p<0.001$) at last follow-up. Complete success was achieved in 22.2%, qualified success in 18.5%, 29.6% eyes had hypotony and 29.6% failed. Mean glaucoma medications decreased from 3.2±1.3 to 0.9±1.2($p<0.001$). Patients were asymptomatic; complications were phthisis and vitreous hemorrhage which resolved (one case each).

Conclusion: TSCPC is a safe and effective method of controlling IOP in refractory glaucoma. It may not be restricted to eyes with poor vision potential and a pain-free patient is often the end result.

Key Words: *Glaucoma, Cyclophotocoagulation, Lasers in glaucoma, Pain*

Introduction

Cyclodestructive procedures are used to manage glaucoma in refractory cases where conventional medical and surgical treatments are ineffective in controlling elevated intra ocular pressure(IOP).[1] It can be performed using β-irradiation, electrolysis, photocoagulation, cryotherapy, ultrasound or microwave cyclodestruction. Transscleral Cyclophotocoagulation(TSCPC) is one of the common cyclodestructive procedures in use today. It reduces the aqueous production by damaging the pars plicata, either by destruction of the ciliary epithelium or by reduced vascular perfusion. It may also increase the outflow through an effect on the pars plana.[2]

Many studies have shown that it is an effective method to control IOP in advanced, refractory glaucoma.[3,4,5,6,7,8,9] It has also been reported to have a role in glaucoma management in patients with good vision, with comparable visual outcomes to trabeculectomy or tube shunt surgery.[10] Recent literature suggests that

Corresponding author:
Neetha I R Kuzhuppilly
MS Ophthalmology, Assistant Professor
Department of Ophthalmology, Kasturba Medical College, Manipal, Manipal Academy of Higher Education, Manipal, Karnataka 576104
Email: cinnineetha@gmail.com
ORCID: 0000-0002-7297-829X

cyclophotocoagulation is being performed increasingly as the primary surgery for various types and stages of glaucoma.[11,12] Nevertheless, cyclodestructive procedures carry the risk of serious complications like hypotony and visual loss.[13] Literature from the Indian subcontinent regarding TSCPC is limited and hence we studied the efficacy and safety of TSCPC in refractory glaucoma managed over a two year period at our hospital.[14,15,16]

Materials and Method

The retrospective, observational study was conducted at a tertiary eye hospital and included all patients who underwent TSCPC from January 2013 to August 2015. The Institutional Ethics Committee reviewed and approved the protocol prior to conducting the study.

All patients underwent a comprehensive eye examination and the decision to treat was based on presence of pain/symptoms, visual potential, elevated IOP on maximal tolerated medical therapy. Under peribulbar anaesthesia TSCPC(Oculight SLx, Iridex Corporation, Mountain View, CA) was performed using a G-probe(Iris Medical Instruments, Mountain View, CA, USA). The probe was placed adjacent to the corneoscleral limbus, power set at 1750mW for 2000ms and increased until a 'pop' was heard and adjusted to a sub-threshold level. 6-9 spots of laser were applied in each quadrant, with total spots ranging from 24-35.

Patients were examined on the next day, at one week, one month, three months and six monthly after that. At each follow-up, symptoms, vision, the anterior segment, IOP and posterior segment details were documented along with any change in treatment. Patients were excluded from analysis if the follow-up period was less than 3 months. All data was collected from the electronic medical records of the patients at the hospital.

Efficacy was evaluated in terms of IOP reduction, symptom relief and reduction in anti-glaucoma medication(AGM). Complete success was defined as IOP ≤21mmHg and ≥6mmHg without medication or additional treatment. Qualified success was defined as an IOP between 6-21mmHg with additional treatment. Hypotony was defined as IOP <6mmHg and failure as IOP>21mmHg. The safety was assessed in terms of complications that occurred during/after procedure.

Statistical analyses were done with Statistical Package for Social Sciences(SPSS 22) (IBM Corp. IBM NY, USA). Paired t-test was used for comparison of before and post-procedure IOP and AGM. p value <0.05 was taken as statistically significant. Numerical data was expressed in the form of mean±standard deviation when distribution of outcome variable was normal.

Table 1: Vision in the eyes that have undergone TSCPC

Pre-treatment Vision	Vision at last follow-up	Number of eyes
No PL	No PL	13
PL Present	No PL	3
	HM	1
HM	HM	2
	CFCF	1
CFCF	No PL	1
	CFCF	1
	Counting fingers at 3m	2
6/24	6/24	1
6/36	6/60	1
6/60	6/60	1

PL: Perception of light, HM: Hand movements, CFCF: Counting fingers close to face

Table 2: Reduction of IOP post TSCPC

Paired t-test comparing Pre procedure IOP with IOP on follow up	Mean reduction in IOP(mmHg)	Std.Deviation	95% Confidence Interval of the Difference		P value
			Lower	Upper	
First day	24.00	14.68	14.14	33.86	<0.001
First week	28.44	11.44	23.72	33.16	<0.001
First month	24.09	12.19	18.69	29.50	<0.001
Third month	20.55	14.29	13.86	27.23	<0.001
Sixth month	23.64	14.05	17.41	29.86	<0.001
One year	26.61	13.35	19.97	33.25	<0.001
Last visit	29.33	15.05	23.38	35.29	<0.001

Results

A total of 42 patients underwent TSCPC from January 2013 to August 2015. 27 eyes of 27 patients were included in this retrospective analysis of which 16 were men and 11 women. The remaining 15 were referred cases who followed up with their referring doctors. The mean age of patients was 61.81±12.98 years(range:18-74yrs). Visual acuity in the eyes undergoing TSCPC ranged from 6/24 to no perception of light. Ten eyes had vision better than or equal to Hand Movements(HM) and 17 had vision poorer than HM.(Table 1)

The indications for TSCPC included neovascular glaucoma(NVG) (18eyes), post vitreo-retinal surgeries(4), trauma(2), primary angle closure glaucoma(1), primary open angle glaucoma(POAG) (1) and uveitis(1). The median follow-up period was 16months(Q1= 10 months)

The mean IOP reduced from 46.0±8.6 mmHg(range:26-58 mmHg) to 16.7±13.4 mmHg (range:1-46 mmHg). This difference was significant statistically($P<0.001$) in all postoperative intervals accounted for.(Table.2)

Complete success was achieved in six eyes(22.2%), qualified success in five eyes(18.5%), eight eyes had hypotony(29.6%), and eight failed to achieve IOP ≤21mmHg(29.6%). The mean IOP reduction from baseline was 63.7%. In 24 eyes(88.9%) IOP reduction was more than 30% of baseline IOP. Three eyes(11.1%) failed to get an IOP reduction of at least 30% from baseline.

The mean number of preoperative AGM was 3.2±1.3 which decreased to 0.9±1.2($p<0.001$). Four eyes underwent a single repeat TSCPC. Pain was the most prominent symptom, others included redness, watering and diminution of vision. At last follow-up, all 27 patients were pain-free.

There was no statistically significant change in vision after TSCPC. In 66.7% the visual status remained stable, in 14.8% there was improvement and in 18.5% there was worsening of vision.(Table 1) The complications included phthisis of one eye and vitreous hemorrhage in one eye which resolved spontaneously.

Discussion

Management of refractory glaucoma can be challenging. The response to medications is poor, traditional surgery like trabeculectomy can fail and often the patients have intolerable symptoms. In our study we found that TSCPC reduced IOP significantly, with modest success, good reduction of AGM and pain relief.

Previous studies have noted effective IOP reduction by TSCPC in refractory glaucomas.[3,4,5,6,7] Osman and Frezzotti reported a success rates of 82.8% and 63.0% and Schlote described success of 44% in traumatic and aphakic glaucomas.[3,4,7] Our study too confirms this efficacy with mean reduction of IOP of 63.7%, but lower success rate due to larger number of eyes developing hypotony. Hypotony was most common in NVG, similar to report by Iliev.[8] Kaushik hypothesized that Asian eyes needed lower energy levels to reduce IOP, and even with a limited 180 degrees TSCPC, Bezci-Aygün found the procedure reasonably successful.[16,17] The large variation in the success rates among studies is explained by the variation in the etiologies and in the laser parameters. By tailoring the parameters to patient response, the results may be optimized.[18]

Even with a poor visual potential, intolerable pain compels the patients to undergo TSCPC.[5,6] In our study, all patients were pain-free on follow-up, even those in whom TSCPC failed. Pain relief could be because of damage to the sensory nerve supply of the anterior segment in addition to lower IOP.[4] Mistlberger and Schlote have taken pain relief as one of the indicators of success when vision was poorer than HM.[5,6] In our study, among the 16 unsuccessful eyes, 11 had pre-procedure vision poorer than HM. By redefining success in terms of pain relief, the success rate becomes 81.48%.

In the Indian subcontinent, Kaushik reported a reduction of AGM following TSCPC from 2.6±0.9 to 1.8±1.2, similar to our study.[16] Other reports around the world also show significant reduction of AGM.[8,11,23]

There was only one case of phthisis in our study and vision was stable in the majority, unlike earlier reports.[13,19] TSCPC is increasingly tried in patients with good vision potential and as primary treatment in glaucoma.[10,13] Shah found TSCPC effective in eyes with good visual potential, but 33% had a vision drop of ≥2lines due to iritis and cystoid macular oedema.[20] In a study by Ghosh, ≥2lines reduction in vision was seen in 23.9% cases but with a success rate of 84.8% and good safety.[10] Contrary to this, Bleisch found that the visual fields continued to worsen after cyclophotocoagulation and Hasan reported cyclophotocoagulation is less effective that trabeculectomy in POAG.[21,22] Abdull found TSCPC to be safe and effective in cases of primary glaucoma where regular follow-up is not critical.[12] Stanca described a 'slow-burn' technique which can be used in eyes with better vision.[23] These reports are not conclusive about suitability of TSCPC in eyes with good vision or POAG. In secondary glaucomas TSCPC still continues to play a significant role. In fact, Choy and colleagues have found that TSCPC fared better that tube surgery in NVG cases.[24]

High intensity focused ultrasound(HIFU), endocyclophotocoagulation(ECP) and micropulse TSCPC(MP-TSCPC) are newer cyclodestructive procedures.[25,26,27,28] Graber and colleagues have found HIFU to be safer but less effective than TSCPC(25% success versus 52%).[25] ECP is reported to be comparable to other treatments, in refractory glaucoma and pediatric glaucomas.[29,30] One disadvantage of ECP is that it is an invasive procedure.

Zaarour reported a success of 73.3% with MP-TSCPC and Subramaniam found it to be effective and repeatable in keratoplasty eyes with good graft survival.[31,32] Abdelrahman found MP-TSCPC to be better than TSCPC in pediatric refractory glaucomas.[33] MP-TSCPC is not devoid of complications; vision change, pain, corneal edema, hyphema, persistent hypotony, choroidal detachment and phthisis have all been reported.[34] The IOP reduction in MP-TSCPC is partly due to inflammation of the ciliary body and once it settles, IOP can potentially build up again.

In the era of emerging MP-TSCPC, the distinct advantage TSCPC has is that the G probe can be reused after ethylene oxide sterilization, even up to 30 sessions.[35,36] Rootman has devised a sterile disposable cover for G probes eliminating risk of contamination on reuse.[37] In contrast, the MP-TSCPC probe is not reusable making it a more expensive procedure. This advantage of TSCPC makes it indispensable in developing nations around the world.

A few patients who underwent TSCPC at our centre could not be included in the study due to inadequate follow-up. These patients had been referred to our institute for TSCPC and would follow-up elsewhere. Our study is limited by its retrospective nature and unequal

follow-up periods among the patients.

Future studies can be conducted with grading of pain before and after. Studies where the laser is tailored to the patient or disease condition are necessary, to avoid hypotony complications. Further randomized controlled trials would be needed to establish the role of TSCPC in eyes with good visual potential or in cases of primary glaucomas.

Transscleral cyclophotocoagulation is an effective and safe method of controlling intra ocular pressure in refractory glaucoma. It is repeatable, may not be restricted to eyes with poor vision potential and a symptom-free patient is often the end result. It continues to have a role even with the advent of newer cyclodestructive procedures.

Ethical Clearance: From the Institutional Ethics Committee

Source of Funding: Self

Conflict of Interest: Nil

References

1. Ndulue JK, Rahmatnejad K, Sanvicente C, Wizov SS, Moster MR. Evolution of Cyclophotocoagulation. J Ophthalmic Vis Res. 2018;13(1):55-61.
2. Liu GJ, Mizukawa A, Okisaka S. Mechanism of intraocular pressure decrease after contact transscleral continuous-wave Nd:YAG laser cyclophotocoagulation. Ophthalmic Res.1994;26(2):65-79.
3. Osman EA, Al-Muammar A, Mousa A, Al-Mezaine H, Al-Obeidan SA. Controlled Cyclophotocoagulation with diode laser in refractory glaucoma and long term follow up at King Abdulaziz University Hospital, Riyadh. Saudi J Ophthalmol. 2010;24(1):9-13.
4. Frezzotti P, Mittica V, Martone G, Motolese I, Lomurno L, Peruzzi S, Motolese E. Longterm follow-up of diode laser transscleral cyclophotocoagulation in the treatment of refractory glaucoma. Acta Ophthalmol. 2010;88(1):150-5.
5. Mistlberger A, Liebmann JM, Tschiderer H, Ritch R, Ruckhofer J, Grabner G. Diode laser transscleral cyclophotocoagulation for refractory glaucoma. J Glaucoma.2001;10(4):288-93.
6. Schlote T, Derse M, Rassmann K, Nicaeus T, Dietz K, Thiel HJ. Efficacy and safety of contact transscleral diode laser cyclophotocoagulation for advanced glaucoma. J Glaucoma. 2001;10(4):294-301.
7. Schlote T, Grüb M, Kynigopoulos M. Long-term results after transscleral diode laser cyclophotocoagulation in refractory posttraumatic glaucoma and glaucoma in aphakia. Graefes Arch Clin Exp Ophthalmol. 2008;246(3):405-10.
8. Iliev ME, Gerber S. Long-term outcome of trans-scleral diode laser cyclophotocoagulation in refractory glaucoma. Br J Ophthalmol. 2007;91(12):1631-5.
9. Cheung JJC, Li KKW, Tang SWK. Retrospective review on the outcome and safety of transscleral diode laser cyclophotocoagulation in refractory glaucoma in Chinese patients. Int Ophthalmol. 2019;39(1):41-46.
10. Ghosh S, Manvikar S, Ray-Chaudhuri N, Birch M. Efficacy of transscleral diode laser cyclophotocoagulation in patients with good visual acuity. Eur J Ophthalmol. 2014;24(3):375-81.
11. Winkler NF, Funk J. Transscleral cyclophotocoagulation as primary surgical intervention in glaucoma. Klin Monbl Augenheilkd. 2013;230(4):353-7.
12. Abdull MM, Broadway DC, Evans J, Kyari F, Muazu F, Gilbert C. Safety and effectiveness of primary transscleral diode laser cyclophotoablation for glaucoma in Nigeria. Clin Exp Ophthalmol. 2018;46(9):1041-1047.
13. Ishida K. Update on results and complications of cyclophotocoagulation. Curr Opin Ophthalmol.2013;24(2):102-10.
14. Gupta V, Agarwal HC. Contact trans-scleral diode laser cyclophotocoagulation treatment for refractory glaucomas in the Indian population. Indian J Ophthalmol. 2000;48(4):295-300
15. Shakir M, Bokhari SA, Zafar S, Kamil Z, Rizvi SF. Transscleral Diode Laser Cyclophotocoagulation for Refractory Glaucoma. Pak J Ophthalmol. 2012;28(1):22-6
16. Kaushik S, Pandav SS, Jain R, Bansal S, Gupta A. Lower energy levels adequate for effective transcleral diode laser cyclophotocoagulation in Asian eyes with refractory glaucoma. Eye (Lond). 2008;22(3):398-405.

17. Bezci Aygün F, Mocan MC, Kocabeyoğlu S, İrkeç M.Efficacy of 180° Cyclodiode Transscleral Photocoagulation for Refractory Glaucoma. Turk J Ophthalmol. 2018;48(6):299-303.
18. Quigley HA. Improved Outcomes for Transscleral Cyclophotocoagulation Through Optimized Treatment Parameters. J Glaucoma. 2018;27(8):674-681.
19. Chen MF, Kim CH, Coleman AL. Cyclodestructive procedures for refractory glaucoma. Cochrane Database Syst Rev. 2019 Mar 10;3:CD012223. doi: 10.1002/14651858.CD012223.pub2.[Epub ahead of print]
20. Shah P, Bhakta A, Vanner EA, Kishor KS, Greenfield DS, Maharaj ASR. Safety and Efficacy of Diode Laser Transscleral Cyclophotocoagulation in Eyes With Good Visual Acuity. J Glaucoma. 2018;27(10):874-879
21. Bleisch D, Furrer S, Funk J.Rates of glaucomatous visual field change before and after transscleral cyclophotocoagulation: a retrospective case series. BMC Ophthalmol. 2015;15:179.
22. Hasan S, Theilig T, Unterlauft JD. Comparing the efficacy of trabeculectomy and diode laser cyclophotocoagulation in primary open-angle glaucoma. Int Ophthalmol. 2019 Mar 4. doi: 10.1007/s10792-019-01093-w.[Epub ahead of print]
23. Stanca HT1, Munteanu M, Jianu DC, Motoc AGM, Tăbăcaru B, Stanca S, Ungureanu E, Boruga VM, Preda MA. New perspectives in the use of laser diode transscleral cyclophotocoagulation. A prospective single center observational cohort study. Rom J Morphol Embryol. 2018;59(3):869-872.
24. Choy BNK, Lai JSM, Yeung JCC, Chan JCH. Randomized comparative trial of diode laser transscleral cyclophotocoagulation versus Ahmed glaucoma valve for neovascular glaucoma in Chinese-a pilot study. Clin Ophthalmol. 2018;12:2545-2552.
25. Graber M, Rothschild PR, Khoueir Z, Bluwol E, Benhatchi N, Lachkar Y. High intensity focused ultrasound cyclodestruction versus cyclodiode treatment of refractory glaucoma: A retrospective comparative study. J Fr Ophtalmol. 2018 Sep;41(7):611-618.
26. Kuchar S, Moster MR, Reamer CB,Waisbourd M. Treatment outcomes of micropulse transscleral cyclophotocoagulation in advanced glaucoma. Lasers Med Sci.2016;31(2):393-6.
27. Marra KV, Wagley S, Omar A, Kinoshita T, Kovacs KD, Silva P, Kuperwaser MC, Arroyo JG. Case-matched comparison of vitrectomy, peripheral retinal endolaser, and endocyclophotocoagulation versus standard care in neovascular glaucoma. Retina. 2015;35(6):1072-83.
28. Morales J, Al Qahtani M, Khandekar R, Al Shahwan S, Al Odhayb S, Al Mobarak F, Edward DP. Intraocular Pressure Following Phacoemulsification and Endoscopic Cyclophotocoagulation for Advanced Glaucoma: 1-Year Outcomes. J Glaucoma. 2015;24(6):e157-62.
29. Yang Y, Zhong J, Dun Z, Liu XA, Yu M. Comparison of Efficacy Between Endoscopic Cyclophotocoagulation and Alternative Surgeries in Refractory Glaucoma: A Meta-analysis. Medicine (Baltimore). 2015;94(39):e1651.
30. Kraus CL, Tychsen L, Lueder GT, Culican SM. Comparison of the effectiveness and safety of transscleral cyclophotocoagulation and endoscopic cyclophotocoagulation in pediatric glaucoma. J Pediatr Ophthalmol Strabismus. 2014;51(2):120-7.
31. Zaarour K, Abdelmassih Y, Arej N, Cherfan G, Tomey KF, Khoueir Z. Outcomes of Micropulse Transscleral Cyclophotocoagulation in Uncontrolled Glaucoma Patients. J Glaucoma. 2019;28(3):270-275.
32. Subramaniam K, Price MO, Feng MT, Price FW Jr. Micropulse Transscleral Cyclophotocoagulation in Keratoplasty Eyes. Cornea. 2019 Feb 6. doi: 10.1097/ICO.0000000000001897.[Epub ahead of print]
33. Abdelrahman AM, El Sayed YM. Micropulse versus Continuous Wave Transscleral Cyclophotocoagulation in Refractory Pediatric Glaucoma. J Glaucoma. 2018;27(10):900-905.
34. Yu SW, Ma A, Wong JK. Micropulse Laser for the Treatment of Glaucoma: A Literature Review. Surv Ophthalmol. 2019 Jan 10. pii: S0039-6257(18)30060-2. doi: 10.1016/j.survophthal.2019.01.001. [Epub ahead of print]
35. Tham CC, Lai JS, Fung PC, Chua JK, Poon AS, Lam DS. Physical effects of reuse and repeated ethylene oxide sterilization on transscleral cyclophotocoagulation laser G-probes. J Glaucoma.

2002;11(1):21-5.

36. Carrillo MM, Trope GE, Chipman ML, Buys YM. Repeated use of transscleral cyclophotocoagulation laser G-probes. J Glaucoma. 2004;13(1):51-4.
37. Rootman DB, Howarth D, Kerr JQ, Flanagan JG, Trope GE, Buys YM. Sterile single use cover for the G-probe Transscleral Cyclodiode. J Glaucoma. 2011;20(4):260-5.

A Descriptive Study to Identify the High-Risk Factors of Pregnancy among Married Women in Selected Areas of Derabassidistrict Mohali Punjab

Neha Brari[1], Nikhil Raj[2], Imran Khan[3]

[1]Assistant Professor, [2]Associate Professor, in the mental health nursing department, School of Nursing Science and Research-Sharda University, [3]Assistant Professor in the Medical-Surgical Nursing Department, Prakash Institute of Physiotherapy, Rehabilitation and Allied Medical Sciences, Greater Noida, Uttar Pradesh

Abstract

Background Pregnancy is the concept of the reproductive process through which a baby conceived, incubated and ultimately born into the world.Pregnancy, also known as gestation, is the time during which one or more offspring develops inside a woman.The risk of early loss of fertility is mainly due to low levels of HCG, infections, medical conditions, immune system responses, uterine abnormalities etc.… Identifying a pregnancy as high risk ensures that it receives extra attention and proper care and prenatal care can help to prevent complications. The researcher in the view of facts and figures analysed the present research under various **Objectives** they are to identify the high-risk factors of pregnancy among married women, to find the association between the high-risk factors of pregnancy among married women with selected demographic variables. **Methodology** a non-experimental descriptive research design conducted to find the various high-risk factors of pregnancy. A total of 100 subjects selected via purposive sampling technique. The **results** showed that the mean and standard deviation of high-risk factors of pregnancy were 6.91± 4.50.Among the 100 samples selected, 93% of the married women had low-risk factors of pregnancy, 7% had no risk, and none of them had high and very high-risk factors of pregnancy.Hence, the obstetric results suggested that reducing high-risk cases to be identified as early as possible.The **conclusion** shows that most of the married women had low-risk factors of pregnancy. The study results show a significant association between high-risk factors of pregnancy and the number of pregnancieswas seen to be significant($F=3.22$ at $p<0.05$).

Keywords: *High-risk factors, Pregnancy and married women.*

Introduction Or Background

Being a mother is the most blessed and the most challenging job in the world.(1)The woman's incredibly creative and nurturing powers highlighted during the process of pregnancy.(2)A healthy lifestyle during the pre-natal period of pregnancy is a start to a healthy outcome for infants.(3)A high-risk pregnancy is one that threatens the health or life of the mother or her fetus, while some women are at increased risk for complications even before they get pregnant for a variety of reasons.(4) The risk factors which may lead to complications during pregnancy are maternal age, medical conditions that are pre-existing to pregnancy, medical conditions that occur during pregnancy, lifestyle choices, surgical history, etc. (5)(6).

The preventive measures such as scheduled prenatal visits and check-ups, counselling, attentive lifestyle practices, avoid substances and medications without doctors supervision, regular screening via bio-physiological profiles, treat the pre-existing conditions, test for birth defects and genetic diseases, prevent complications that mothers have had before.(7)(8)

In the present study,the risk factors which put mothers under high-risk pregnancy classified into high-risk physical factors, high-risk medical factors, high-risk gynaecological factors, high-risk obstetrical factors and high-risk family factors. The researcher then identified many indicators representing the broader classifications of high-risk factors. The significant findings of the present study indicated that married women had the highest risk factors of pregnancy in the area of physical

factors and least in the area of gynaecological factors.

Materials and Method

Research Approach

In this research,a quantitative research approach was used.

Research design

Non-experimental descriptive research design were used.

Demographic Variables

The attributes in this study are age, type of family, educational status, occupation, educational status of the husband, occupation of husband,total family income, residence, religion and number of pregnancy.

Settings of the study

The present study was conducted in selected areas of District Mohali, Punjab.

Sample

In this study, the sample comprised of married women.

Sample size

In this study, the sample size was 100

Sampling technique

Purposive sampling was used to select the samples.

Criteria for sample selection

Inclusion criteria

Married women who were:

- Willing to participate in the study
- Available at the time of data collection.

Married women who have one or more children in a previous pregnancy.

Exclusion criteria

- Currently pregnant married women.
- Married women who were never pregnant.

Description of the tool

The instrument consists of the following

- Section A:-Frequency, percentage, mean, standard deviation and association of demographic variables.

o Demographic variables included age, type of family, educational status, occupation, educational status of the husband, occupation of husband, total family income, residence, religion and number of pregnancy.

- Section B:-anthropometric and bio-physiologicalmeasurementto identify

o The physicalhigh-risk factors of pregnancy which consisted of 5 items.

- Section C:-structured interview schedule to assess:

o Medical high-risk factors

o Obstetrical high-risk factors

o Gynaecological high-risk factors

o Familyhistory high-risk factors

Analysis and Findings

The data were analysed using descriptive statistics which included the organisation of data in master sheet, frequency and percentage for analysis of demographic data, mean/standard, the association between high-risk factors of pregnancy and selected demographics carried out by chi-square test.

Section A

Frequency, percentage, mean, standard deviation and association of demographic variables analysed for 100married women who fulfilled the inclusion criteria, and the findings showed in the age the df=3.96, P=0.20 and F=1.53, among age groups 20-25 (n=51, 5.98±4.45), 26-30 (n=39, 7.84±4.41), 31-35 (n=7, 7.71±4.95), 36-40 (n=3, 8.66±4.50). The type of family df=2.97, P=0.03 and F=2.03, among nuclear family (n=64, 6.45±3.95), joint family (n=30, 8.46±5.41), extended family (n=3, 4.00±2.68). The educational status df=4.95, P=0.72 and F=0.52, the married women were illiterate (n=4, 9.00±3.74), primary education (n=13, 6.07±4.44), secondary education (n=33, 6.39±4.32), senior secondary (n=29, 7.24±4.81), graduates and above

(n=21, 7.38±4.70). The occupation df=2.97, P=0.26 NS F=1.34, married women with government jobs were (n=7, 4.57±4.46), private jobs (n=17, 7.88±4.12), home maker (n=76, 6.90±4.57). The educational status of husband df=2.97, P=0.47 and F=0.733, husbands had secondary education (n=31, 7.48±4.92), senior secondary (n=35, 7.11±4.12), graduate and above (n=34, 6.17±4.52). The occupation of husband df=3.96, P=0.01 and F=2.10, the husbands had occupation in government job (n=20, 5.95±4.66), private jobs (n=41, 7.43±4.22), self employed (n=35, 6.14±4.49), unemployed (n=4, 13.00±0.00). The total family income df=2.97, P=0.59 and F=052, under 5001-10000 (n=19, 7.42±3.80), 10001-15000 (n=41, 7.21±5.14), above 15000 (n=40, 6.35±4.15). The residence of married women df=2.97, P=0.92, and F=0.08, residence of urban area (n=23, 7.04±4.59), semi-urban (n=57, 6.75±4.40), rural (n=20, 7.20±4.89). The religion df=9.8, P=0.33 and F=0.97, hindus (n=40, 7.45±4.40), sikh (n=60, 6.55±4.57). The number of pregnencies df=2.97, P=0.04 and F=3.22, women with one pregnency (n=46, 5.89±4.24), Two pregnencies (n=51, 5.98±4.45), three and above (n=20, 6.7±4.74). The obtained F value of the demographic variable number of pregnancy (F=3.22) at $p<0.05$ level were higher than the table value indicating significant association between the high-risk factors of pregnancy and the above variable.

Section B

Anthropometric and bio-physiological measurement represented by frequency and percentage distribution of high-risk physical factors of pregnancy among married women consisted of the respondents, i.e. 100 married women, analysed for having high-risk physical factors of pregnancy. The results showedn=4 (4%) respondents had a height less than 145cm, n=11 (11%) had a BMI more than 29, and n=16 (16%) had a BMI less than 29.n=48 (48%) married women had Hb level less than 10 gm%, none of them had Rh incompatibility and age less than 17 years, and n=5 (5%) respondents had aged more than 35 years.

Section C

Structured interview scheduled results of medical risk factors, Gynaecological high-risk factors, Obstetrical high-risk factors and family history high-risk factors

a. Frequency and percentage distribution of high-risk medical factors of pregnancy among 100 married women, reveals that among the married women having high-risk medical factors of pregnancy, n=11 (11%) of the married women had high blood pressure, n=7 (7%) in each had diabetes mellitus and kidney diseases, n=0 (0%), i.e. none of them had Convulsions, Tuberculosis, HIV/AIDS, Endocrinal disorder and took drugs like phenobarbital, streptomycin and folic acid antagonists etc., n=4 (4%) had lung diseases, n=2 (2%) in each had thyroid disease and cardiopulmonary diseases, only 1% had hepatitis and 32% of the married women took excessive amount of caffeine.

b. Frequency and percentage distribution of obstetrical history high-risk factors of pregnancy among 100 married women, obstetrical history high-risk factors of pregnancy, 30% of the respondents had history of abortions, 8% in each had history of high blood pressure and history of amniotic sac rupture before completing 37weeks, 2% in each had history of convulsions and history of pregnancy outside the normal uterine cavity (fallopian tubes, ovary, abdomen, cervical canal etc., 24% had history of anaemia, 6% in each had history of excessive bleeding immediately after delivery, history of abnormal fetal presentation (breech, face, brow, compound etc.) and history of puerperal fever and sepsis, none of them had history of excessive bleeding within 6 weeks after delivery, history of excessive bleeding (from 24h week to term), delivered more than five times, excess amount of amniotic fluid, delivered a baby with birth defects (clef lip, palate, anencephaly, spina bifida etc. and history of cord prolapsed), 3% in each had history of more than one foetuses develop simultaneously in the womb and less amount of amniotic fluid, 4% had history if instrumental delivery (forceps and vacuum), 18% had history of delivery of large baby (weight 3.5kg or more), 5% had history of delivery of dead fetus, only 1% had history of neonatal death (within 28 das), 7% had history of delivery of baby before term (before 37weeks of gestation), 11% had history of delivery of baby after term (beyond 42 weeks of gestation) 14% had previous delivery by untrained dais and 10% had history of caesarean section.

c. Frequency and percentage distribution of high-risk gynaecological factors of pregnancy among 100 married women, high-risk gynaecological factors of pregnancy: in this study, it was found that 1% of women had incompetent cervix,none of them had contracted pelvis, pelvic inflammatory diseases, uterine malformations and syphilis. 2% of women had polycystic ovarian disease and uterine prolapse, respectively. Around 12% of women had a bladder infection, and 3%

of women had fibroid uterus.

d. Frequency and percentage distribution of family history with high-risk factors of pregnancy among 100 married women; in this study, 20% of the women had family history of diabetes. 29% had family history of high blood pressure. 2% of family history of more than one fetus developed simultaneously in the womb in previous pregnancy/pregnancies, and 11% of married women had a family history of abortion (maternal side)

Note: The findings of the study in relation to percentage distributions of married women according to their level of high-risk factors of pregnancyshows that out of 100 married women, 7% of the married women had no risk, 93% married women had low risk, and none of the married women was having high risk and very high-risk factors of pregnancy.

Conclusion

The descriptive study showed that the mean and SD of high-risk factors of pregnancy was 6.91 and ± 4.50 and these results were interpreted with 100 married women assessed underhigh-risk medical factors, high-risk obstetrical factors, high-risk factors gynaecological, family history high-risk factors. The overall risk stood at low risk among married women. The study also showed a path to assess various risk factors affecting married women.

Discussion

Frequency, percentage, mean, standard deviation and association of demographic variables depict that the obtained F value of the demographic variable,i.e. a number of pregnancy ($F=3.22$) at $p<0.05$ level were higher than the table value indicating a significant association between the high-risk factors of pregnancy.

Anthropometric and bio-physiological measurement represented by frequency and percentage distribution of high-risk physical factors of pregnancy among married women depicts that among all he married women having high-risk physical factors of pregnancy, 4% respondents had height less than 145cm, 11% had BMI more than 29, 48% married women had Hb level less than 10 gm%, none of them had Rh incompatibility and age less than 17 ear and 5% respondents had aged more than 35 years.

Structured interview scheduled results of medical risk factors:reveals that among the married women having medical high-risk factors of pregnancy, 11% of the married women had high blood pressure, 7% in each had diabetes mellitus and kidney diseases, none of them had Convulsions, Tuberculosis, HIV/AIDS, Endocrinal disorder and took drugs like phenobarbital, streptomycin and folic acid antagonists etc., 4% had lung diseases, 2% in each had Thyroid disease and Cardiopulmonary diseases, only 1% had Hepatitis and 32% of the married women took excessive amount of caffeine.

Structured interview scheduled results ofobstetrical high risk factors: reveals that among he married women having obstetrical history high risk factors of pregnancy, 30% of the respondents had history of abortions, 8% in each had history of high blood pressure and history of amniotic sac rupture before completing 37weeks, 2% in each had history of convulsions and history of pregnancy outside the normal uterine cavity (fallopian tubes, ovary, abdomen, cervical canal etc., 24% had history of anaemia, 6% in each had history of excessive bleeding immediately after delivery, history of abnormal fetal presentation (breech, face, brow, compound etc.) and history of puerperal fever and sepsis, none of them had history of excessive bleeding within 6 weeks after delivery, history of excessive bleeding (from 24h week to term), delivered more than five times, excess amount of amniotic fluid, delivered a baby with birth defects (clef lip, palate, anencephaly, spina bifida etc. and history of cord prolapsed), 3% in each had history of more than one foetuses develop simultaneously in the womb and less amount of amniotic fluid, 4% had history if instrumental delivery (forceps and vacuum), 18% had history of delivery of large baby (weight 3.5kg or more), 5% had history of delivery of dead fetus, only 1% had history of neonatal death (within 28 das), 7% had history of delivery of baby before term (before 37weeks of gestation), 11% had history of delivery of baby after term (beyond 42 weeks of gestation) 14% had previous delivery by untrained dais and 10% had history of caesarean section.

Structured interview scheduled results ofGynaecological high-risk factorsdepicts that among the married women who have gynaecological high-risk factors of pregnancy: in this study, it was found that 1% of women had incompetent cervix. None of them had contracted pelvis, pelvic inflammatory diseases, uterine malformations and syphilis. 2% of women had polycystic ovarian disease and uterine prolapse, respectively. Around 12% of women had a bladder infection, and 3% of women had fibroid uterus.

Structured interview scheduled results offamily history high-risk factors:depicts that among the married women who have a family history of high-risk factors of pregnancy: in this study 20% of the women had a family history of diabetes. 29% had a family history of high blood pressure. 2% of a family history of more than one fetus developed simultaneously in the womb in previous pregnancy/pregnancies, and 11% of married women had a family history of abortion (maternal side)

Conflicts of Interest: there are no conflicts of interest

Ethical Clearance: taken from institutional research committee "Sri.Sukhmani College of Nursing, DeraBassi, Punjab."

Source of Funding: self-funded research.

References

1. Motherhood and Pregnancy Essay -- teenage pregnancy, fertility [Internet]. [cited 2019 Oct 20]. Available from: https://www.123helpme.com/motherhood-and-pregnancy-preview.asp?id=264757
2. Introduction to Pregnancy [Internet]. [cited 2019 Oct 20]. Available from: https://www.mentalhelp.net/pregnancy/
3. The Effects Of Pregnancy On Mothers ' During Pregnancy | Bartleby [Internet]. [cited 2019 Oct 20]. Available from: https://www.bartleby.com/essay/The-Effects-Of-Pregnancy-On-Mothers-During-F3CAYBWXG385
4. National Institute of Health. What is a high-risk pregnancy? [Internet]. Eunice Kennedy Shriver National Institute of Child Health and Human Development; 2017. Available from: https://www.nichd.nih.gov/health/topics/pregnancy/conditioninfo/high-risk
5. Risk Factors and Prevention for High-Risk Pregnancy [Internet]. Revere Health. 2018 [cited 2019 Oct 27]. Available from: https://reverehealth.com/live-better/high-risk-pregnancy-risk-factors-and-prevention/
6. High-Risk Pregnancies: Risk Factors & Preventing Complications [Internet]. [cited 2019 Oct 27]. Available from: https://www.webmd.com/baby/managing-a-high-risk-pregnancy#1
7. Prevention of High-Risk Pregnancy | Pregnancy Factors | Apollo Cradle Hospital [Internet]. Apollo Cradle. [cited 2019 Oct 27]. Available from: https://www.apollocradle.com/specialities/high-risk-pregnancy/prevention/
8. High-Risk Pregnancy Management Stamford CT [Internet]. [cited 2019 Oct 27]. Available from: http://www.maternalfetalcarepc.com/services/high-risk-pregnancy-management

Effect of Plyometric Training on Jumping Performance and Agility in Badminton Players

Neha Bhosale [1], Ujwal Yeole[2], Manasi Chavarkar[3]

[1]Assistant Professor, [2]Principal, [3]Student, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune

Abstract

Background: Badminton is a popular worldwide sport that requires fast and powerful shots and agile footwork. It is one of the fastest racket sports in the world. [1]The agility and vertical jump are important motor skills to hit a shuttlecock at different positions around the court. **Objectives:** To see the effect of plyometric training on jumping performance and agilityin badminton players.**Methodology:** 30 participants, both male and female were included in this study. All participants were tested for agility and vertical jump before and after 6-weeks plyometric training period. Agility performance was assessed using Agility T-Test and vertical jump height was assessed using vertical jump test. The participants performed plyometric training thrice a week, for 6 weeks.**Results:**The data was collected and statistically analysed using paired t test.The study concluded that there was an increase in vertical jump height(40.37±7.690cm) and agility (11.74±1.366sec) post plyometric training with significant p value (<0.0001).**Conclusion:**Our results show that six weeks plyometric training improved jumping performance and agility in badminton players.

Key words:*Agility, vertical jump height, plyometric training, badminton players, sports physiotherapy.*

Introduction

Badminton is a worldwide popular sport that requires fast and powerful shots and agile footwork. In the world it is considered asone of the fastest racket sports; the speed of badminton smashes can be as high as 30m/s.[1]

Badminton is a racket sport in which two or four people can participate, with a temporal structure characterized by actions of short duration and high intensity.Players require their maximum limits of speed, agility, flexibility, endurance and strength.The game consists of combination of high-intensity short rallies (anaerobic system) and longer, moderate or high-intensity rallies (aerobic system). [2]The game involves most of the body parts and majority of large muscle groups.[3]

Corresponding Author:
Dr. Neha Bhosale (PT)
Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Gultekdi, Pune 37 Mobile No. 9561990027
Email id: neha.cb20@gmail.com

Badminton players have toreact to the moving shuttlecock and adjust their body position rapidly and continuously throughout the game. Players have to maintain their centre of gravity within the base of support while performing very rapid and asymmetrical upper limb movements[1] and it also requires extremely volatile movements to be carried out over a small court area. Changes in direction are necessary after each shot and all movements must be completed quickly with high-quality technique and good control. Vertical and lateral jumps are more common in all aspects of the game. [4]

Few authors reported that acute injuries are common during training and badminton game. Lower limb injuries were commonly reported. It is assumed that repeated jumping and the deviations in jumping and landing technique during the games are the primary causes of injury in lower limbs.[5]

The higher the player hits the shuttlecock the higher the height of the jump – the steeper the trajectory and the shorter the path of the shuttlecock.The height of the hitting point depends on jump ability, spatiotemporal perception, flight behaviour of the incoming shuttlecock, as well as the temporal interconnection of sub-segments. [6]

The vertical jump test is a physical fitness test. The main goal of this test is to measure how high an athlete can jump which is based on their explosive lower body power. Hence this was taken as outcome measure to assess vertical jump height in badminton players in current study.[7]

Second outcome measure of this study was Agility T test which is described as a 4-directional agility and body control that evaluates the ability to change directions quickly while maintaining balance without loss of speed. The test is relatively simple to manage, because it requires minimal equipment and preparation. The T-test is a reliable and valid measure of agility, leg power and leg speed to test the performance. [8]

Agility was related to physical performance during a badminton match. Defined as a rapid whole-body movement with change of direction and/or velocity in response to a stimulus. Agility is one of the most important aspects that should be developed and usually implemented in strength and conditioning programs for team sports athletes. [9]

Plyometrics is a known form of 'ballistic training', designed to improve jumping performance capabilities. Plyometrics are used to improve power output and increase explosiveness by training the muscles to work more in a shorter amount of time, it also helps to improve landing mechanics (reduce valgus stress and strain), eccentric muscle control, and increase knee flexion and hamstrings activity, which in turn reduce landing forces and reduces the risk of non-contact injuries.It has been shown to be an effective method for improving strength, running economy, agility and sprint ability.[10]

To our knowledge, there are limited number of studies investigating the effects of plyometric training on athletic performance in badminton players hence the aim of this study was to find out the effects of plyometric training on jumping performance and agility in badminton players.

Method

Study Design: Experimental

Selection of subjects: The participants selected for the study were 30 badminton players with age group 18-25 years and year of experience more than 1 year in sports club. The players were selected according to the inclusion criteria exclusion criteria. Inclusion criteria were both males and females, and the players willing to participate. Exclusion criteria were any recent fracture or musculoskeletal injuries to lower limb.

Materials used are measuring tape, cones, stopwatch, measuring tape, chalk, data collection sheet, consent form pen, pencil.

Procedure:

Ethical clearance was taken from the Institutional Ethical Committee and informed consents were taken from each participant. Participations were selected according to inclusion and exclusion criteria. The aim, objectives and method of study was explained to the participants. Consent was taken on the consent form. The Vertical jump test and Agility T test was conducted using standardized procedure. The participants performed plyometric exercises thrice a week for 6 weeks period. The plyometric training program included progressive exercises similar to the protocol of miller et al, with few modification.[11]

Plyometric training program:

Week	Exercise	Sets X rep
1	Side to side ankle hops Standing jump and reach Front cones hops Push up plus	2X15 2X15 5X6 2X15
2	Side to side ankle hops Standing long jump Lateral jump over barrier Double leg hops Scapular squeeze	2X15 5X6 2X15 5X6

Cont ... **Plyometric training program:**

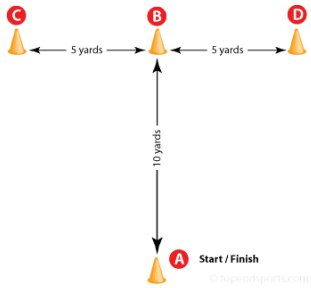
3	Side to side ankle hops Standing long jump Lateral jump over barrier Double leg hops Hand walk for 1min	2X15 5X6 2X15 5X6 2X20
4	Lateral jump over barrier Single leg bounding Lateral jump single leg Diagonal cone hops Cone hops with 180 degree turn Push up	2X15 4X7 4X6 4X8 4X5 2X20
5	Lateral jump over barrier Single leg bounding Lateral jump single leg Diagonal cone hops Cone hops with 180 degree turn Wall scapular push ups	2X15 4X7 4X6 4X8 4X5 3 X10
6	Diagonal cone hops Hexagon drills Cone hops with 180 degree turn Double leg hops Lateral jump single leg Ceiling punches	2X15 2X12 4X6 4X8 4X6 2X15

Procedure of Vertical jump test:

The athletes have to stand side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked with the chalk. This is called the standing reach height. The athlete then stands one step away from the wall, and jump vertically as high as possible using both arms and legs, attempting to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is recorded.[7]

Procedure of Agility T test: 3 cones were placed at each corner (B, C, and D) in an attempt to monitor accuracy of test. Subjects began with both feet behind the starting point A. At their own discretion, each subject sprinted forward 9.14 m (10 yd) to point B touches at the

base of a cone with the right hand. They then shuffled to the left 4.57 m (5 yd) and touched the base of a cone (C) with the left hand. Subjects then shuffled to the right 9.14 m and touched at the base of a cone (D) with the right hand. They then shuffled to the left 4.57 m back to point B and touched with the left hand. Subjects then ran backward; passing the finishing line at point A. Time is measured using stop watch. [8]

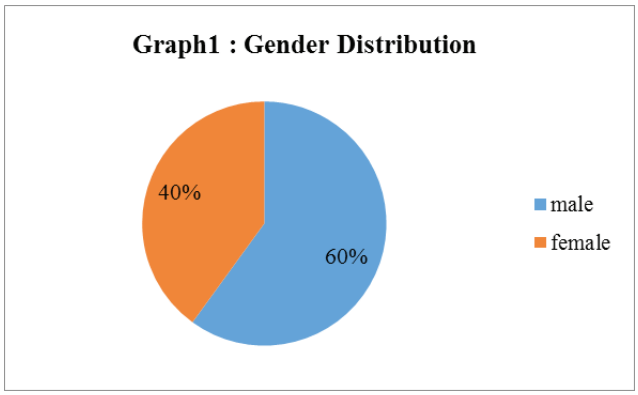


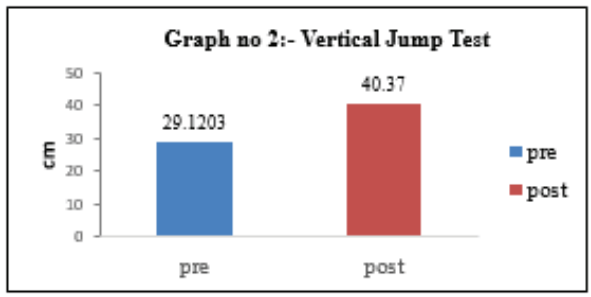
Statistical Analysis

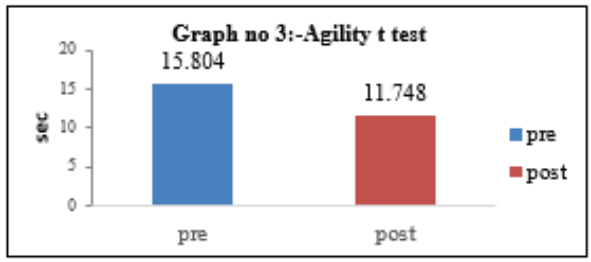
The data was statistically analyzed and passed all the Normality tests. Results of the pre- and post-tests were compared using the two tailed Paired t test. Statistical significance was set at $p \leq 0.05$.

Results

As shown in graph no 1, out of 30 samples 18(60%) were males and 12(40%) were females. Graph 2 shows mean values of pre and post intervention of vertical jump test. Mean values of pre intervention were 29.12±7.104 cm and post intervention were40.37±7.690with extremely significant p value (<0.0001).Graph 3 shows mean value of pre intervention were 15.804±2.410 and post intervention were 11.74±1.366 with significant p value (<0.0001).







Discussion

Besides table tennis and tennis, badminton is one of the fastest Olympic racket and net sports in the world. Included continuous change between accelerated and decelerated movements, Badminton-specific running paths, jumps, and lunges[4]

It is appropriate for all ages, women and men and even disabled persons. Beginners can start playing badminton early since the basics are learned quickly.[6]

The aim of this study was to find the effect of plyometric training on jumping performance and agility in badminton players. The sample size was taken from sports academies. Every individual's consent was taken by filling up the consent form. Men and women both were included for the study. 30 samples were taken according to the inclusion and exclusion criteria out of which 18(60%) were males and 12(40%) were females as shown in table no 1 and graph no 1.Participants with any musculoskeletal injury were excluded from study.

In current study there was increase in post intervention of vertical jump height with mean value of post intervention 40.37±7.690 as compared to mean value of pre intervention 29.12±7.104 with significant p value (<0.0001) . This may be result of production of muscle force and power coupled with smaller increase in isometric contraction which activates the stretch shortening cycle of the muscle. These physiological adaptations facilitated increases in vertical jump height.[12]Systematic review and meta-analysis done

by EmilijaStojanovicet al, confirms longer plyometric training durations (≥10 weeks) provide larger improvements in vertical jump performance in female athletes.[9]Paul E. Luebbers et al included2 equal volume plyometric training programs of both 4-week and 7-week durations, resulted in significantly increases in vertical jump height, vertical jump power and anaerobic power in physically active young men.[13]

Another result of the present study as shown in table no 3 and graph no 3 was that 6 weeks of plyometric training improves agility time with post intervention 11.74±1.366sec as compared to pre intervention 15.804±2.410sec with significant p value (<0.0001). Agility training is re-enforcement of motor programming through neuromuscular conditioning and neural adaptation of muscle spindles, golgi-tendon organs, and joint proprioceptors by enhancing balance and control of body positions during movement.[11]

Previous studies have been reported that plyometric training was effective in improving muscle strength, vertical jump, speed, and agility in all types of sports. Plyometric drills typically involve stopping, starting, and changing directions in an explosive manner. These movements are important components that can assist in developing agility.[13]TarikOzmen et al, observed that 6 weeks plyometric training improved agility and vertical jump in adolescent badminton players.[14] Kevin Thomas et al, compared the effects of two plyometric training methods on power and agility in youth soccer players. After six weeks, they found significant decrease in agility times and improvement in sports performance. [12]

Plyometric exercises involve explosive lower extremity movements and fast muscle contractions [12] when the active muscle switches from a rapid eccentric muscle action (deceleration) to a rapid concentric muscle action (acceleration, it creates a stretch reflex that produces a more forceful concentric muscle action. The faster the muscle is stretched, the greater the force produced, and the more powerful muscle movement [13] it also facilitate peripheral and central neural adaptations that increase joint proprioception and kinesthetic awareness.

Overall our study shows improvement in both jumping performance and agility. However, this study was pre-post experimental design, so it cannot be concluded that improvement showed was only because of our training programme hence further study can be done.

Conclusion

Study concluded that 6 weeks of plyometric training showed improvement in jumping performance and agility in badminton Players.

Acknowledgement: All authors and participants contributed equally to the conception and design of the study. We are grateful to Badminton academy for the support of this study.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Wong TK, Ma AW, Liu KP, Chung LM, Bae YH, Fong SS, Ganesan B, Wang HK. Balance control, agility, eye–hand coordination, and sport performance of amateur badminton players: A cross-sectional study. Medicine. 2019 Jan;98(2).
2. Phomsoupha M, Laffaye G. The science of badminton: game characteristics, anthropometry, physiology, visual fitness and biomechanics. Sports medicine. 2015 Apr 1;45(4):473-95.
3. Bańkosz Z, Nawara H, Ociepa M. Assessment of simple reaction time in badminton players.
4. Yuksel MF, Cengiz A, Zorba E, Gokdemir K. Effects of badminton training on physical parameters of players. The Anthropologist. 2015 Sep 1;21(3):542-7.
5. Wan AB, Rambely AS. Research on Badminton Games: Past and Present. In4th Kuala Lumpur International Conference on Biomedical Engineering 2008 2008 (pp. 22-26). Springer, Berlin, Heidelberg.
6. Fröhlich M, Felder H, Reuter M. Training effects of plyometric training on jump parameters in D-and D/C-squad badminton players. Journal of Sports Research. 2014;1(2):22-33.
7. Hidalgo M, NogerayS,Leleka D, the vertical jump test (Sargent JUMP test)
8. Pauole K, Madole K, Garhammer J, Lacourse M, Rozenek R. Reliability and validity of the T-test as a measure of agility, leg power, and leg speed in college-aged men and women. The Journal of Strength & Conditioning Research. 2000 Nov

1;14(4):443-50.

9. Negra Y, Chaabene H, Hammami M, Amara S, Sammoud S, Mkaouer B, Hachana Y. Agility in Young Athletes: Is It a Different Ability From Speed and Power?. Journal of strength and conditioning research. 2017 Mar 1;31(3):727-35.
10. EmilijaStojanovic,VladimirRisticDaniel Travis McMaster,ZoranMilanovic, Effect of Plyometric Training on Vertical Jump Performance in Female Athletes: A Systematic Review and Meta-Analysis, Sports Med DOI 10.1007/s40279-016-0634-6
11. Miller MG, Herniman JJ, Ricard MD, Cheatham CC, Michael TJ. The effects of a 6-week plyometric training program on agility. Journal of sports science & medicine. 2006 Sep;5(3):459.
12. Thomas K, French D, Hayes PR. The effect of two plyometric training techniques on muscular power and agility in youth soccer players. The Journal of Strength & Conditioning Research. 2009 Jan 1;23(1):332-5.
13. Luebbers PE, Potteiger JA, Hulver MW, Thyfault JP, Carper MJ, Lockwood RH. Effects of plyometric training and recovery on vertical jump performance and anaerobic power. The Journal of strength & conditioning research. 2003 Nov 1;17(4):704-9.
14. OZMEN T, AYDOGMUS M. Effect of plyometric training on jumping performance and agility in adolescent badminton players. Turkish Journal of Sport and Exercise. 2017;19(2):222-7.

Effect of Physiotherapeutic Exercises on Fatigue and Quality of Life in Cancer Patients

Nilesh Maharudra Andhare[1], Ujwal Laxman Yeole[2], Forum Varde[3]

[1]Assistant Professor, [2]Associate Professor and Principal, [3]Intern BPT, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune

Abstract

Background: Cancer patients undergone chemotherapy or radiotherapy reports cancer-related fatigue(CRF), which impairs their aerobic capacity and quality of life (QOL). **Aim**: To study the effect of physiotherapeutic exercises on fatigue and quality of life in cancer patients. **Setting and Design**: Ethical approval was obtained from Institutional ethical committee. The cancer patients visiting affiliated cancer rehabilitation centers at Alandi were assessed by oncologist and referred for physiotherapy. The patients were evaluated for fatigue and quality of life (Total 64 patients). Patient satisfying inclusion criteria and who willing to participate in study were recruited and further randomly allotted in two groups using Random sampling method. **Methods and Material**: Experimental group (Group A, n=25) received home based aerobic exercise program for 3 days/week for 4 weeks whereas control group (Group B, n=25) received the individually tailored walking program. Pre and post treatment analysis was recorded using Modified Fatigue Impact Scale and SF-36 Questionnaire. **Statistical Analysis**: The Analysed Data showed normal distribution using Shapro-Wilk test, hence parametric Whitney Rank Sum Test was performed to analyse the data within the groups. **Result**: Total 50 patients participated in study. Between group comparisons; group A (n=25, mean age= 44.40±9.92) showed extremely significant ($p<0.0001$), improvement in Modified Fatigue Impact Scale (MFIS) in pre (44.56 ± 9.36) to post intervention (35.16±7.526) than group B(n=25, mean age=51.76±13.47) in pre (44.24 ±8.57) to post intervention (50.68±7.034).As well Quality of life of cancer patients underwent treatment has been significantly improved ($p<0.0001$) in group A (pre= 62 to post=67.52) than group B (pre=.63.94 to post=63.08). **Conclusion**: It is concluded that aerobic training showed greater impact on fatigue and quality of life in cancer patients.

Keywords*: Aerobic Exercises, Cancer, Fatigue, Quality of Life.*

Introduction

Cancer is a term used to describe more than 100 different diseases with the common characteristic of uncontrolled malignant cell growth[1]. The word 'cancer' means crab, thus reflecting true character since 'it sticks to the part stubbornly like a crab'[1]. New growth is termed as 'neoplasia' and is called as 'neoplasm' or 'tumour'[1].

Corresponding Author*:*
Dr.Nilesh Andhare (PT),
Assistant Professor, Department of Physiotherapy,
Tilak Maharashtra Vidyapeeth, Pune - 411037. Contact No- 9730186962,
Email Id- nileshandhare88@gmail.com

Chemotherapy is a type of cancer treatment that uses one or more anti-cancer drugs (chemotherapeutic agents) as part of a standardized chemotherapy regimen. Chemotherapy may be given with a curative intent (which almost always involves combinations of drugs), or it may aim to prolong life or to reduce symptoms (palliative chemotherapy).[2]

Chemotherapy is a well organised toxicity of taxanes, usually resulting to modification of dose and change in treatment plan. A mass of tissue formed because of excessive, uncoordinated, autonomous, abnormal and purposeless proliferation of cells even after cessation of stimulus for growth which caused it.[2]

Chemotherapy may be given with a curative intent which almost always involves combinations of drugs, or

it may aim to prolong life or to reduce symptoms[2]. During radiation therapy, cancer patients may report cancer-related fatigue, which impairs aerobic capacity, strength, muscle mass, and ultimately, quality of life[2]. Cancer related fatigue can be a significant disability following the treatment of many types of cancer, including breast, colorectal, haematological malignancies and testicular, and have an impact on quality of life. There is a critical need to understand pathophysiological mechanisms, optimize clinical assessment, and develop neuroprotective strategies to prevent neuropathy.[2]

Cancer Related Fatigue on patient's quality of life particularly in relation to perform daily activities and in relation to patient's quality of life is profound and pervasive. Cancer related Fatigue is also associated with considerable psychological distress and can impose a significant financial burden by limiting a patient's ability to work. These effects can extend to caregivers and family members, who may also have to reduce their working capacity in order to provide additional care to the patient having other problems too[4].

Hence there is need to study about impact of physiotherapeutic exercises over cancer related fatigue and quality of life.

Method:

Permission was obtained from the institutional ethical committee. Different cancer rehabilitation centers were approached and permission was obtained prior to the study. 64 patients were evaluated for symptoms using Modified fatigue impact scale and SF 36 Questionnaire. Patients satisfying inclusion and exclusion criteria and who are willing to participate in study were recruited (total 50 patients) and were further randomly allotted in two groups using Random sample technique. Patients with Stage III and IV cancer, critically ill patients, and patients with neurological deficite were excluded from the study. The patients were divided into 2 groups (A and B). Group A (n=25) was given aerobic exercises and Group B (n=25) was given individual tailored walking at home. The Group A patients performed Aerobic exercises for 30 minutes, and Group B performed individual tailored walking for 30 minutes thrice in a week for 4 week.

Protocol: The patients were given 10 minutes of warm up exercises in sitting and standing position which included upper limb and lower limb mobility exercises. For aerobic training the group A was given mild to moderate intensity aerobic activities like Forward Walk, Backward Walk, Side Walk, Step Up and Down, Marching, Lunges while group B was given individually tailored walking. Cool down involved deep breathing and stretching for both groups.

Statistical Analysis: The Analysed Data showed normal distribution using Shapro-Wilk test, hence parametric Whitney Rank Sum Test was performed to analyse the data within the groups.

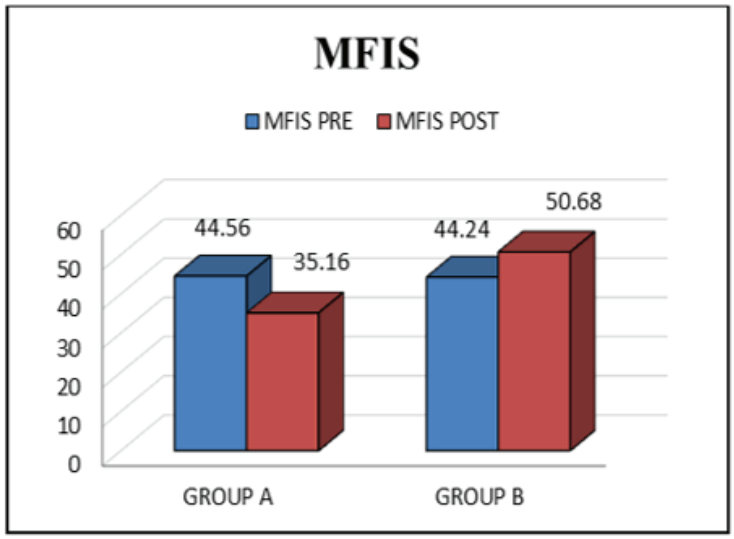
Result

Parameters		Experimental group (n=25)	Control group (n=25)
Age		44.40±9.92	51.76±13.47
Gender	Male	12	7
	Female	13	18
MFIS	Pre	44.56 ± 9.36	44.24 ±8.57
	Post	35.16 ± 7.52	50.68 ± 7.03
	p value	<0.0001	<0.0001
SF36	Pre	62	63.94
	Post	67.52	63.08
	p value	<0.0001	<0.032

*MFIS – Modified fatigue impact scale

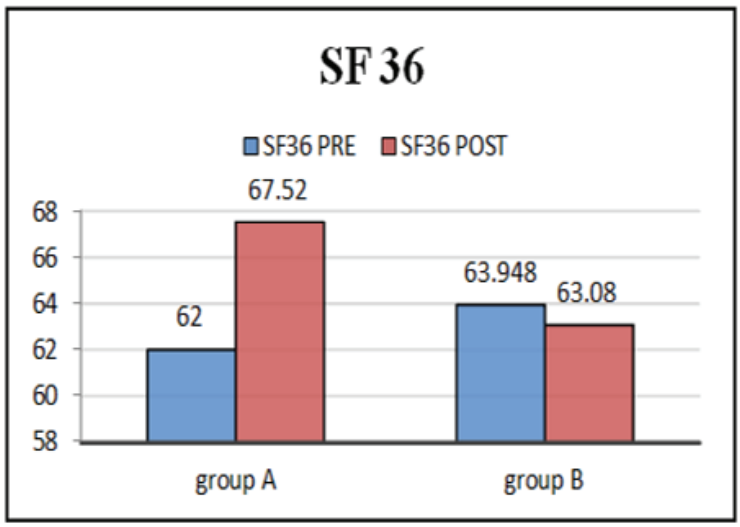
* SF36 – Short form 36

Graph 1: Distribution of patients according to Modified fatigue impact scale



Interpretation: Modified Fatigue Impact Scale shown significant improvements ($p<0.0001$) in fatigue resistance in experimental group (pre- 44.56 ± 9.36 to post- 35.16 ± 7.52) than control group
(Pre-44.24 ±8.57 to post- 50.68 ± 7.03).

Graph 2: Distribution of patients according to Short form 36



Interpretation: Short form 36 questionnaire shown significant improvements ($p<0.0001$) in quality of life in experimental group (pre- 62 to post- 67.52) than control group
(Pre-63.94 to post- 63.08).

Discussion

Cancer related fatigue(CRF) is a physiologic state and a multifaceted subject characterized by persistent, overwhelming exhaustion and a decreased capacity of physical and mental work which does not go with rest.[2]This clinical study provide preliminary support suggesting the combination of home based aerobic training and walking. The present study focusing on effect of programmed aerobic versus individually trailered walking on fatigue and quality of life in cancer patients after 4 weeks of training.

In 2018, Sunil Rajpal and colleague; were mentioned in their study about economic burden of cancer in India is estimated about 83 per 100,000 persons in which more prevalence is observed in females than male[8]. As present study also mentioned about increased incidence of cancer in females than males.

Karen M. et al studied 'A 4week home based aerobic and resistance exercise program during radiation therapy' which provided positive evidence that exercise during radiation therapy may be beneficial for cancer patients[4]. The importance of combing aerobic and resistance exercise was for health related benefits which was well documented in healthy individuals and chronically ill populations, and this combination of exercise modes possessed great potential as an intervention for optimizing recovery during radiation therapy for prostate and breast cancers.Similarly; in present study aerobic training improved fatigue resistance and quality of life in patients who diagnosed with cancer. In 1999, Portenoy Rk and colleague stated that Physical fatigue frequently results from alterations in the muscular energetic systems caused by cancer treatment. The muscle cells obtain energy for work via two metabolic pathways. In the first one, carbohydrates and fats are completely oxidated to water and carbon dioxide in the mitochondria; the energy obtained is stored in the cells as adenosine triphosphate (ATP). This process can only be carried out in the presence of oxygen and is therefore called aerobic. When the oxygen supply is reduced, the cells produce energy through the second metabolic pathway, called anaerobic glycolysis. In this process, glucose is incompletely metabolized, resulting in the production of ATP and lactic acid[8]. Roanne J. et.al studied 'Randomized controlled trial of resistance or aerobic exercise in men receiving radiation therapy for prostate cancer concluded that resistance and aerobic exercises mitigated fatigue and improved the quality of life in cancer patients[5].

Conclusions

The study concludes that physiotherapeutic aerobic training affects fatigue and quality of life in cancer patients.

Acknowledgment: It is a great pleasure in sharing this project. Also I wish to express my sincere gratitude towards oncologist from affiliated hospitals to help me with the study.

Source of Funding: Self

Conflict of Interest: None

References

1. Harsh Mohan, from textbook of pathology seventh edition, Chapter 7: Neoplasia, page no. 184. New Delhi the Health science publishers, 2015
2. Nilesh A et al; Effect of proprioceptive training on balance in cancer patients with chemotherapy induced peripheral neuropathy. Int J Physiother Res 2019, Vol 7 (1): 2976-79.
3. Portenoy RK et al; Cancer related fatigue: Guidelines for evaluation and management. The Oncologist 1999, 1;4 (1):1-0.
4. Karen M. Mustian; et.al; A 4-Week Home-Based Aerobic and Resistance Exercise Program During Radiation Therapy: A Pilot Randomized Clinical Trial.Published in final edited form as: J Support Oncol 2009; 7(5): 158–167
5. Robin Grant et al; Incidence, prevalence, and predictors of chemotherapy induced peripheral neuropathy: A systemic review and Meta-analysis: Accepted 16 September 2014. Pain. 2014 Dec;155(12):2461-70.
6. Roanne J.et.al; studied 'Randomized controlled trial of resistance or aerobic exercise in men receiving radiation therapy for prostate cancer. Journal of Clinical Onco 2009, Vol 27 (3):344-51
7. Rita Wickham et al; Study of chemotherapy induced peripheral neuropathy. A review and implications for oncology nursing practice. Clinical Journal of Oncology Nursing 2009.Vol 11 (3): 361-376.
8. Rajpal S et.al (2018); Economic burden of cancer in India: Evidence from cross-sectional nationally representative household survey, 2014. PLoS ONE 13(2): 1-17.

9. James K. et al; the study of a focused exercise regimen improves clinical measures of balance in patients with peripheral neuropathy: Arch Phys Med Rehabil 2001, Vol 82 (2):205-9

10. Rosemary C. et al; Study of chemotherapy evoked painful peripheral neuropathy 2001: Vol 2(1): 8-14.

A Study to Find Out the Effect of Upright Sitting and Forward Lean Sitting Position on Lung Functions in Stable COPD Patients A Comparative Study

Nitin Ishwarchandra Agrawal[1], Divya Khare[2]

[1]Mpt (cardio-thoracic), Rajkot, Gujarat, India, [2]Mpt Guide, Ayushman College, Barakatullah University, Bhopal, India

Abstract

Back Ground: Chronic Obstructive Pulmonary Disease (COPD) is a major cause of health care burden worldwide and the only leading cause of death that is increasing in prevalence. Patients with Chronic obstructive pulmonary disease (COPD) are severely limited in the ability to carry out activities of daily living due to dyspnoea and breathlessness, this is due to reduction in lung functions. The purpose of the study was to find out the effect on lung functions in forward lean sitting position and upright sitting position in COPD patient.

Aim/Purpose: To find out the effects of Upright sitting position on pulmonary functions in patients with stable COPD.

To find out the effects of forward lean sitting position on pulmonary functions in patients with stable COPD.

Objectives: To compare the change in FEV1, FVC, FEV1/FVC in patient with COPD in the Upright sitting and Forward lean sitting positions.

Methodology: 60 COPD patients were participated in the study. All subjects had undergone spirometry in 2 different positions i.e. position A: Upright sitting position and position B: Forward lean sitting position. FEV1, FVC, FEV1/FVC of subjects were recorded. Same measures were taken for 7 consecutive days. Mean of all 7 days was taken for all measures and used for statistical analysis.

Outcome Measure: FEV, FVC, FEV1/FVC

Results: The results of the above study shows that there are Significant Improvements of Forward Lean Sitting on FEV1, FVC, FEV1/FVC compared to Upright Sitting.

Keywords: *COPD - Chronic obstructive pulmonary disease, FEV1 - Forced Expired Volume in One second, FVC - Forced Vital Capacity, PFTs - Pulmonary Function Tests, Upright Sitting & Forward Lean Sitting*

Introduction

- According to WHO chronic obstructive pulmonary disease (COPD) is a lung disease characterized by chronic obstruction of lung airflow that interferes with normal breathing and is not fully reversible.[1]
- Chronic obstructive pulmonary disease (COPD) is a major cause of health care burden worldwide and the only leading cause of death that is increasing in prevalence.[2]
- COPD is predominately a disease of men and only 40% of cases in India occur in women.

Corresponding author:
Nitin Ishwarchandra Agrawal
Mpt (cardio-thoracic), Rajkot, Gujarat, India.
Mo. No. +91 7878192961
Email address: nitinphysio14@gmail.com

Prevalence rate of COPD in India is 5% in males and 3.5% in females. [11] Its prevalence is more in cigarette smoking and bidi. [12]

- In COPD there is increased use of expiratory muscle during normal expiration due to reduced elastic recoiling of the lung tissue, and dynamic hyperinflation.[3]
- There is considerable variability in the relationship between the FEV_1 and other physiologic abnormalities in COPD.
- Studies have confirmed that various postures affect pulmonary function.[4,5]
- However, studies done on specific sitting positions, mainly slumped and upright, to determine a change in pulmonary function.[6]
- The position did not affect forced vital capacity (FVC), respiratory rate (RR), or forced expiratory volume in 1 second (FEV_1).
- Previous research to this point has not examined the relationship between an upright sitting and forward lean sitting posture in a population of patients diagnosed with COPD
- Therefore, the purpose of the present study was to explore population of adults with COPD to investigate whether a forward lean sitting posture, relative to an upright sitting posture, would result in increased respiratory function in patients diagnosed with COPD.

Method

Study Design : A Comparative Study

Duration Of Study 1 Month

Sample Size: 60

Study Sampling : Purposive Sampling

Inclusion Criteria:

1. Age 30-80 years.
2. Both sexes.
3. Physician Diagnosed COPD patients as per GOLD classification
4. No acute exacerbation in past 3 months.
5. Willing to participate in study

EXCLUSION CRITERIA:

1. People with severe cardio vascular, vestibular, musculo-skeletal disease major psychiatric illness, acute metabolic diseases, neurological diseases, tumour.
2. People unable to sit, walk and change the position. And dependent on every ADL activity
3. Patient younger than 30 years and older than 80 years.
4. Unconscious patient
5. Patient with Diabetes and Hyper tension
6. Pregnant women
7. Patient with recent thoracic or abdominal surgeries
8. Uncooperative patients.

MATERIALS USED:

- Examination table and stool, plinth
- Consent form and assessment chart
- Pencil, papers and recording sheet
- Weighing machine, measure tape,
- Spirometer Figure 3: Spirometer

OUTCOME MEASURES:

FEV1:

FEV1 is defined as forced expiratory volume in 1st second during forceful expiration.

It is very helpful measure in assessing COPD its value mostly decrease in COPD and correlate with progression of the diseases.

FEV1 that is reproducible, objective and allows a measurement of the severity of the disease to be categorised. COPD is classified as mild, moderate or severe.

FVC:

FVC is defined as a forced vital capacity. It is the amount of air coming out of the lung forcefully after deep inspiration.

FEV1/FVC:

It is the ratio of FEV1 and FVC expressed in percentage.

FEV1/FVC*100= FEV1/FVC ratio.

Methodology:

Those who fulfilled the inclusion criteria were taken up for the study. The procedure of the study was explained to the subjects. A written informed consent of the subject was taken prior to the study. All subjects were assessed as per assessment form.

60 COPD patients were recruited. All the patients were underwent spirometric measurement in 2 different positions. ***Upright sitting position, forward lean sitting position.***

Assessment:

On the first visit patient was explained about the study measures. Patient who is willing to participate in the study were included in the study. Exclusion criteria and contraindication were checked.

Preparation of the Patient:

Prior to the test, patient was instructed about spirometry and all the procedure.

Patient is instructed to avoid following things before test.

- Smoking for 24 hours
- Drinking alcohol for at least 4 hours
- Eating a large meal at least 2 hours before the test
- Taking short-acting bronchodilators for 6 hours
- Taking long-acting beta-2-agonist inhalers for 12 hours
- Taking any slow-release medications that affect respiratory function and
- Theophylline-based drugs for 24 hours
- Vigorous exercise for at least 30 minutes
- Wearing any tight clothing
- Patient is instructed to empty the bladder prior to test.

PROCEDURE:

After obtaining informed consent, subjects were placed in either a forward lean or upright seated posture, which was determined by the flip of a coin.

Postural position was then counter balanced for the remaining subjects so that an equal number of subjects started with each position.

Position A (FIGURE 1) was defined as an **UPRIGHT SEATED** posture.

Instructions for assuming this posture included the following:

1. Sitting on stool or chair without arm support
2. Head in position assumed normally by the patient
3. Rib cage lifted upward to elongate the spine comfortably with support (a standard lumbar role was placed in the small of the back and the patient was instructed to maintain contact with it.)
4. Scapula retracted to decrease kyphosis of the thoracic spine
5. Ankles and knees at 90

Position B (FIGURE 2) was defined as a **FORWARD LEAN SITTING** posture.

Instructions for assuming this posture included the following:

1. Sitting on stool or chair
2. Head in position assumed normally by the patient.
3. Spine/upper body inclined forward.
4. Elbows and forearm supported on the plinth.
5. Ankles and knees at 90.

A person is allowed to spend as much time as he/she wants to become comfortable.

The patient should be instructed to take a full inspiration through the mouth and to place the mouthpiece in the mouth, ensuring the lips and teeth are securely around the mouthpiece to form a tight seal.

The patient is instructed to blow out, forcibly, as hard and as fast as possible, until there is nothing left to expel. Patients will require some encouragement to keep blowing to provide a complete blow.

Maximum 3 attempts were taken and best among them is chosen.

Same is repeated for 7 consecutive days. Then mean of all 7 days readings is taken for all 3 outcome measures.

Result

Statstics : Values of FEV1,FVC,FEV1/FVC (%pred) of position A and position B are analysed by Z test at 5% level of significance.

Summary of mean & SD of FVC, FEV1, FEV1/FVC (%Pred) values of position A & position B and the result of the Z-test.

Table 1: shows MEAN and SD of the all outcome measures in both groups, difference between two means and their p values, degree of freedom and comments which suggests that differences are significant or not.

Outcome Measures	Position "A" Mean±Sd	Position "B" Mean±Sd	Difference Between The Means	Z – Value	P - Value	Result
FEV1	55.63 ± 4.26	61.87 ± 4.99	6.233	10.886	<0.05	Significant
FVC	49.56 ± 9.01	52.40 ± 8.71	2.833	12.350	<0.05	Significant
FEV1/FVC	58.37 ± 4.46	63.98 ± 4.04	5.613	26.571	<0.05	Significant

Figure 1:- Straight Sitting.

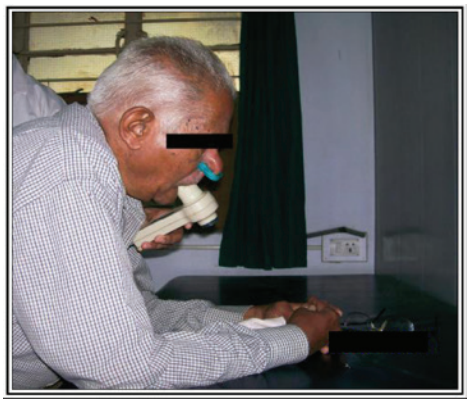


Figure 2 : Forward Lean Sitting

Figure 3: Spirometer

List of Abbreviations

COPD: Chronic obstructive pulmonary disease

FEV1 : Forced Expired Volume in One second

FVC : Forced Vital Capacity

FEV1/FVC: The ratio of FEV1 to FVC expressed as a percentage.

MV Minute Ventilation

RR	- Respiratory Rate
SaO2	- Oxygen Saturation
MIP	- Mean Inspiratory Pressure
MEP	- Mean Expiratory Pressure
PFTs	- Pulmonary Function Tests
FRC	- Functional Residual Capacity

Discussion

This study has found FEV_1, FVC, FEV_1/FVC are improved in forward lean sitting position than in upright sitting.

The forward-lean position for dyspnea relief has been reported as a posture that improves diaphragmatic function by reducing abdominal muscle tension.[7,8]

Kera and Maruyamamention that pectoralis major and minor and serratus anterior are easily activated when arms are supported.[9]

So study shows that Cephaled displacement of short flattened diaphragm in forward lean position could lead to stretching and greater tension generation and hence improve diaphragmatic function.[10]

Limitations

1. Sample size was small

2. We have compared only 2 positions i.e. Upright sitting and Forward lean sitting, so the effects of other positions were not signified.

3. We have compared effects on only 3 parameters i.e. FEV1, FVC, FEV1/FVC. Other parameters can also be considered.

Clinical Implication

As this study suggest significant improvement in the spirometric measures (FEV1, FVC and FEV1/FVC) in Forward lean sitting position, Forward lean sitting position will be the position of choice during breathlessness while exercises, and during exacerbation. And physiotherapist should encourage the forward lean sitting in patients with COPD.

Ethical Clearance- Taken from Ayushman college committee, Bhopal

Source of Funding- Self

Conflict of Interest- Nil

References

1) WHO www.who.int/respiratory/copd/definition/en/index.html)

2) Hurd S. The impact of COPD in lung health worldwide: Epidemiology and incidence. Chest 2000

3) Schans CPVD et al. Effects of positive expiratory pressure breathing during exercise in patient with COPD. Chest. 1994;105: 782-89

4) Appel M, Childs A, Healey E, Markowitz S, Wong S, Mead J. Effect of posture on vital capacity. J Appl Physiol. 1986;61:1882Y1884.

5) Manning F, Dean E, Ross J, Abboud RT. Effects of side lying on lung function in older individuals. Phys Ther. 1999;79:456Y466.

6) Landers MR, McWhorter JW, Filibeck D, et al. Does sitting posture in chronic obstructive pulmonary disease really matter? An analysis of 2 sitting postures and their effect on pulmonary function. J Cardiopulm Rehabil 2006;26:405–9.

7) Probst VS, Troosters T, Coosemans I, Spruit MA, Pitta Fde, Decramer M, et al. Mechanisms of improvement in exercise capacity using a rollator in patients with COPD. Chest. 2004;126:1102-7.

8) Alvan L, Barach MD. Chronic obstructive lung disease: postural relief of dyspnea. Arch Phys Med Rehabil. 1974;55: 494-504.

9) Kera T, Maruyama H. The effect of posture on respiratory activity of the abdominal muscles. J Physiol Anthropol Appl Human Sci. 2005;24(4):259-65.

10) E. KANNER RICHARD et al Lower Respiratory Illnesses Promote FEV1 Decline in Current Smokers But Not Ex-Smokers with Mild Chronic Obstructive Pulmonary Disease. Am. J. Respir. Crit. Care Med. August 1, 2001 vol. 164 no. 3 358-364

11) Market research reports related to the "Epidemiology: COPD in India", 2010.

12) Murray CJL, Lopez AD. Alternative projection of mortality and disability by cause 1990-2020: Global burden of disease study. Lancet 1997

Review Article

Changes in Oral Mucosa during Pregnancy

Nivedha Srinivasan, Arvina Rajasekar

[1]Graduate Student, [2]Senior Lecturer, Department of Periodontics, Saveetha Dental College, SIMTS, Chennai, India

Abstract

The main aim of this review is to understand the changes in oral mucosa during pregnancy. This review highlights the major oral complication during pregnancy. Changes in the gingiva and physiological structure of the tooth take place in addition to hormonal, immunologic, dietary and behavioural changes. Characteristics of pregnancy gingivitis are that it gets swollen, smooth and tends to bleed easily. Enlargement of gingiva may occur but it tends to resolves within few months after delivery. Due to the increase in salivary microorganisms, there may be a decrease in salivary pH and impairment of buffer effect. This may also lead to dental caries or erosion during lactation period.

The dental management of pregnant patients requires special attention. Dentists, for example, may delay certain elective procedures so that they coincide with the periods of pregnancy which are devoted to maturation versus organogenesis. At other times, the dental care professionals need to alter their normal pharmacological armamentarium to address the patients' needs versus the foetal demands. Applying the basics of preventive dentistry at the primary level will broaden the scope of the prenatal care. Dentists should encourage all the patients of the childbearing ages to seek oral health counselling and examinations as soon as they learn that they are pregnant

Keywords: *Pregnancy, Oral mucosa, Gingivitis, Oral Cavity, Pregnancy Granuloma*

Introduction

During pregnancy, women may experience systemic disorders such as respiratory alterations: dyspnoea (in 60-70% of all the pregnant women), hyperventilation, snoring, an upper ribcage breathing pattern and chest widening and rhinitis; hemodynamic alterations: elevation of the coagulation factors V, VII, VIII, X and XII, and reduction of the factors XI and XIII, with an increased fibrinolytic activity to compensate for the increased clotting tendency; gastrointestinal alterations: an increased intragastric pressure and a reduction in the lower oesophageal sphincter tone which is secondary to inhibition of the production of the motilin peptide hormone due to a rise in progesterone concentrations which are observed in this period — which give rise to heartburn (acidity) in 30-70% of all the pregnant women and an almost two-fold prolongation of the gastric emptying time as compared to those in non-pregnant women [17,18]. Nausea and vomiting are experienced by 66% of all the pregnant women, starting approximately 5 weeks after the last menstrual period, and reaching a maximum prevalence after 8-12 weeks. In this context, the morning dental appointments are to be avoided by pregnant women with an increased vomiting tendency due to pregnancy; renal alterations: an increased renal perfusion, particularly during the second half of the pregnancy, which gives rise to an increased drug excretion in the urine.

Oral mucosa is known to be the mirror of the digestive system. During pregnancy changes in the oral mucosa are drastic.

Changes in hormonal levels, such as those that occur during pregnancy, puberty and menopause have varying effects on oral cavity [1]. Many researchers have proposed a direct link between changing hormonal status among female.

Some observations on the sex hormones have been made in the development of pathologic changes role of sex hormone in gingiva. It has been known that sex hormones contribute to the vascular changes in the gingiva during pregnancy. Evidence suggests that due to the alterations in the sex hormones, changes would be present in the normal sub gingival fossa and the

immune response in the oral cavity, resulting in intense (pregnancy granuloma) and frequent gingivitis in pregnant women[2].

If the stage of growth and the extent of dental trial are considered, then normal pregnancy does not essentially contraindicate dental treatment. The patient must be counselled about these transient changes, treatment plan, reassured accordingly. Nausea and vomiting are experienced by 66% of all the pregnant women, starting approximately 5 weeks after the last menstrual period, and reaching a maximum prevalence after 8-12 weeks. In this context, the morning dental appointments are to be avoided by pregnant women with an increased vomiting tendency due to pregnancy; renal alterations: an increased renal perfusion, particularly during the second half of the pregnancy, which gives rise to an increased drug excretion in the urine. Many oral conditions were reported to occur during pregnancy such as gingivitis and periodontal diseases [16].

Other problems that seem to appear in the oral cavity during pregnancy are discussed later. The special treatment and prevention needs dental patients during pregnancy are also discussed along with the discrete pathologic results that include periodontitis and dental caries. Hormonal changes in pregnancy combined with neglected oral hygiene tend to increase the incidence of oral diseases like gingivitis. Gingival bleeding on probing and visible dental plaque is usually seen at sites per tooth for all teeth. Patient with severe gingivitis may require professional cleaning and need to use mouth rinses such as chlorohexidine. Gingival inflammatory changes are generally observed in the second and third month of pregnancy, persist or increase during the second trimester, and then decrease in the last month of pregnancy [8]. Eventually regressing after parturition. To summarize the increased levels of sex hormones found in pregnancy help depress the immune response, compromise the local defence mechanism necessary for good health, and reduce the natural protection of the gingival environment. These changes, combined with a microbial shift favouring an anaerobic flora dominated by P intermedia, are partly responsible for the exaggerated response to bacterial plaque in pregnancy [9]. Moreover, periodontal therapy can be effective in reducing signs of periodontal disease and the level of periodontal pathogens. Thus, periodontal care is very important and should not be ignored o postponed.

Advances in technology have made dental X-rays much safer. Digital X-rays use much less radiation than older systems that use dental film. Studies have shown that using a lead apron will protect you and your foetus from radiation. X-rays are taken in the first trimester only if they are needed for diagnosis or treatment that cannot wait until after the baby is born. After the first trimester, there is even less chance of any negative results from an X-ray[3,16].

Physicians are responsible to address the maternal oral problems and prevent changes in the oral cavity without any further delay.

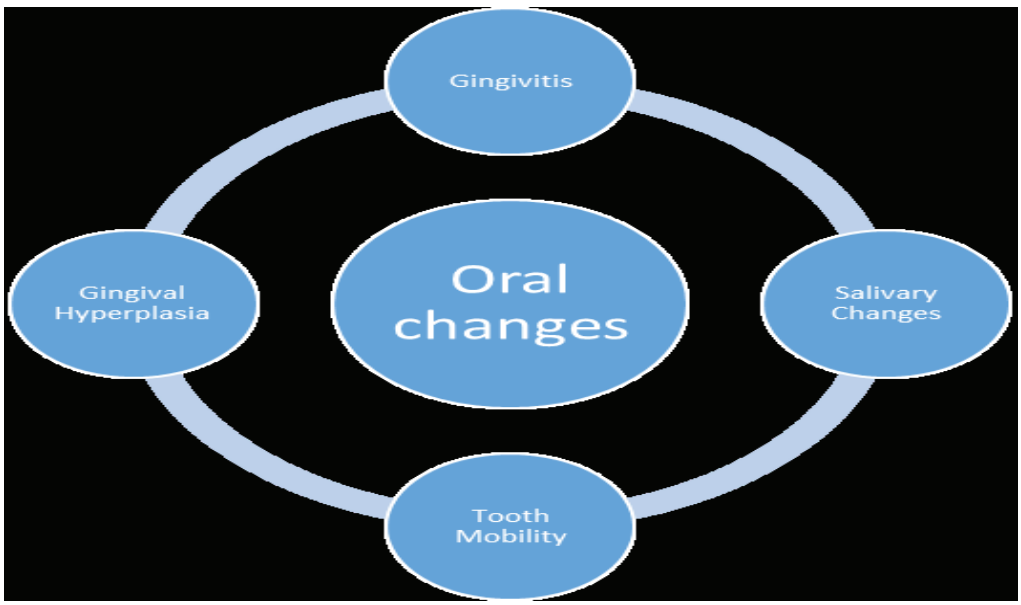


Fig 1 Key Features in the oral cavity during Pregnancy

Tooth mobility

Increased tooth mobility has been detected as it is mainly associated with the presence of relaxin that is released for preparation of the birth passage way [4, 16]. There is normally not any tooth loss unless other complication is present.

Oral tumour

Pregnancy oral tumour occurs in up to 5% of pregnancies. The tongue, palate, or buccal mucosa may also be involved. This is very rarely to be observed unless the tumours bleed, due to which it tends to interfere with mastication. This vascular lesion is caused due to progesterone [5]. The colour tends to vary from purplish red to deep blue, depending on the vascularity of the lesions. In some situations the lesion may need to be excised during pregnancy, such as when it causes discomfort for the patient, disturbs the alignment of the teeth, or bleeds easily on mastication. The patient should be advised, however, that a pregnancy granuloma excised before term may recur. In general, the pregnancy granuloma will regress postpartum; however, surgical excision may be required for complete resolution.

Caries

Pregnancy causes food cravings, and if cariogenic it causes excessive caries [6]. It is an infectious disease caused by bacteria. Prevention can be made by plaque removal, fluoride, and sealant application. Initially appears as white spots. These spots may progress until they result in cavity. Changes in salivary composition in late pregnancy and during lactation may temporarily predispose to erosion as well as dental caries [7]. There are no convincing data, however, to show that the incidence of dental caries increases during pregnancy or in the immediate postpartum period, although existing untreated caries will likely progress.

Gingivitis

Gingivitis is the most common oral disease in pregnancy. It is inflammation of the superficial gum tissue. During pregnancy, gingivitis is aggravated by fluctuations in estrogens and progesterone levels due to decreased immune response. Gingival inflammatory changes are generally observed in the second and third month of pregnancy, persist or increase during the second trimester, and then decrease in the last month of pregnancy [8]. Eventually regressing after parturition. To summarize the increased levels of sex hormones found in pregnancy help depress the immune response, compromise the local defence mechanism necessary for good health, and reduce the natural protection of the gingival environment. These changes, combined with a microbial shift favouring an anaerobic flora dominated by P intermedia, are partly responsible for the exaggerated response to bacterial plaque in pregnancy [9]. Moreover, periodontal therapy can be effective in reducing signs of periodontal disease and the level of periodontal pathogens. Thus, periodontal care is very important and should not be ignored o postponed.

Periodontitis

Periodontits is a destructive inflammation of the periodontium affect about 30% of pregnant women. Toxins produced by the bacteria stimulate a chronic inflammatory response, due to which periodontium is destroyed and hence creating pockets that becomes infected [11]. The symptoms involve red, swollen, or tender gums, bleeding while brushing, flossing or eating hard food, tooth sensitivity, receding gums, persistent bad breath etc. while research continuous into the patho-physiology of a cause and effect relation between oral health and pregnancy outcomes, it is prudent to keep pregnant patients periodontal system free of disease.[12]

Oral health Assessment

Pregnant women can be motivated to have a healthy behaviour. Dental and obstetric teams can be influential in helping women initiate and maintain oral health care during pregnancy to improve lifelong oral hygiene habits [13]. A simple approach can be done by asking questions such as;

1. When was your last dental visit?
2. Do you have swollen or bleeding gums?
3. Do you face any problem while eating or chewing food?
4. How long have you been facing this problem form?

Providing the patients with strict diet would help them. Patients usually require a reassurance that the prevention and treatment of oral conditions include dental x-rays (shielding abdomen and thyroid), are safe during pregnancy [14]. Conditions such as root canals,

restoration (amalgam or composite) or caries should be treated immediately if required. Delaying of such treatments may lead to further problems. A separate counselling session can be taken. It should include reinforcement of routine oral health maintenance, such as flossing daily, limiting carious food and drinks, brushing twice with fluoridated toothpaste, visiting the dentist twice a year.

Dental Management Guidelines during Pregnancy

For the first trimester (1-12 weeks)

During the first trimester, it is recommended that the patients be scheduled to assess their current dental health, to inform them of the changes that they should expect during their pregnancies, and to discuss on how to avoid maternal dental problems that may arise from these changes. It is not recommended that the procedures may be done at this time. The concern about doing procedures during the first trimester is twofold. First, the developing child is at a greatest risk which is posed by teratogens during organogenesis, and second, during the first trimester, it is known that as many as one in five pregnancies undergo spontaneous abortions. Dental procedures which are performed near the time of a spontaneous abortion may be assumed to be the cause, which lead to concerns for both the patient and the practitioner, as to whether this could have been avoided [16, 19].

For the second trimester (13-24 weeks)

By the second trimester, the organogenesis is complete, and the risk to the fetus is low. The mother has also had time to adjust to her pregnancy, and the fetus has not grown to a potentially uncomfortable size that would make it difficult for the mother to remain still for long periods. The positioning of the pregnant patients is important, especially during the third trimester. As the uterus expands with the growing fetus and the placenta, it comes to lie directly over the inferior vena cava, the femoral vessels, and the aorta. If the mother is positioned supine for the procedures, the weight of the gravid uterus could apply enough pressure to impede a blood flow through these major vessels and to cause a condition which is called supine hypotension. In this condition, the blood pressure drops secondary to the impeded blood flow, which causes an asyncopal or a near-syncopal episode. This situation is easily remedied by a proper positioning of the patient on her left side and elevating the head of the chair, to avoid compression of the major blood vessels. The dental practitioner should not hesitate to consult the patient's obstetrician, should any question arise about the safety of a procedure, particularly if there are special circumstances which are associated with the pregnancy [19, 20].

For the third trimester (25-40 weeks)

The fetal growth continues and the focus of the concern now is the risk to the upcoming birth process and the safety and comfort of the pregnant woman (e.g. the chair positioning and the avoidance of drugs that affect the bleeding time). It is safe to perform a routine dental treatment in the early part of the 3rd trimester, but from the middle of the 3rd trimester, routine dental treatments are avoided.

General Recommendations

§ For any women, treatment of oral disease during pregnancy is particularly important because health and dental health insurance may be available only during pregnancy or up to two months post pantrum.

§ Treatment for acute infection or sourced of sepsis should be provided at any stage of pregnancy. A number of antibiotics are safe foe use.

§ Scaling and root planning to periodontal disease can be undertaken safely. Avoid using metronidazole in the first trimester [15].

§ Advise women that oral health care improves a woman's general health through her life span and may also reduce the transmission of potentially caries-producing oral bacteria from mothers to infants [19].

§ Elective restorative and periodontal therapies during the second trimester may prevent any dental infections or other complications from occurring in third trimester [20].

Conclusion

Pregnancy is a condition involving complex physical and physiological changes. Oral care during pregnancy is very important. Pregnant patients should be educated about the importance of maintaining good oral health, expected changes in the oral cavity and routine dental visits. The changes seen during pregnancy are mainly attritubuted due to hormonal changes occurring during that period. Every pregnant woman should be advised to

seek medical and dental care. Failure to do both results in affecting the health of both mother and unborn child.

Ethical Clearance: Taken from Research Committee of Saveetha Dental College

Source of Funding: Self

Conflict of Interest: Nil.

References

1. Balkan U, Gonsalves N, Jose M, Girish KL, Symptomatic changes of oral mucosa during normal hormonal turnover in healthy young menstruating women,J Contemp Dent Pract.,2012 ,Mar 1;13(2):178-81
2. Eleni Markou,* Boura Eleana, Tsalikis Lazaros, and Konstantinides Antonios, The Influence of Sex Steroid Hormones on Gingiva of Women, Open Dent J. 2009; 3: 114–119.
3. Savithiri Ratnapalan, MD, Yedidia Bentur, MD, and Gideon Koren, MD, Review "Doctor, will that x-ray harm my unborn child?", CMAJ. 2008 Dec 2; 179(12): 1293–1296.
4. Judith A. Lothian, PhD, RN, LCCE, FACCE, How Do Women Who Plan Home Birth Prepare for Childbirth?., J Perinat Educ. 2010 Summer; 19(3): 62–67.
5. Robinson, P, Schmerman, M, Glob. libr. women's med., Influence of Pregnancy on the oral cavity, 2015; DOI 10.3843/GLOWM.10105.
6. Jane Ziegler and Connie C. Mobley,Pregnancy, Child Nutrition, and Oral Health, Springher, 2014,XXVI,420p.
7. Laine MA, Effect of pregnancy on periodontal and dental health., Acta Odontol Scand. 2002 Oct;60(5):257-64.
8. GM Ferris, Gingival inflammatory changes are generally observed in the second and third month of pregnancy, persist or increase during the second trimester, and then decrease in the last month of pregnancy.
9. Rishi Emmatty, Jayan Jacob Mathew, and Jacob Kuruvilla, Comparative evaluation of subgingival plaque microflora in pregnant and non-pregnant women: A clinical and microbiologic study,J Indian Soc Periodontol. 2013 Jan-Feb; 17(1): 47–51.
10. Hemalatha VT, Manigandan T, Sarumathi T, Aarthi Nisha V, and Amudhan A,Dental Considerations in Pregnancy-A Critical Review on the Oral Care,J Clin Diagn Res. 2013 May; 7(5): 948–953.
11. Ali Cekici, Alpdogan Kantarci, Hatice Hasturk, and Thomas E. Van Dyke, Inflammatory and immune pathways in the pathogenesis of periodontal disease,Periodontol 2000. 2014 Feb; 64(1): 57–80.
12. Gordon MC. Maternal physiology in pregnancy. In: Gabbe SG, Niebyl JR, Simpson J, editors. Obstetrics: normal and problem pregnancies. 4th ed. New York: Churchill Livingstone; 2002. p. 63–91.
13. Fitzsimons D, Dwyer JT, Palmer C, Boyd LD.,Nutrition and oral health guidelines for pregnant women, infants, and children., J Am Diet Assoc. 1998 Feb;98(2):182-6, 189
14. Megan K. Kloetzel, MD, MPH, Colleen E. Huebner, PhD, MPH, and Peter Milgrom, DDS, Referrals for Dental Care During Pregnancy, J Midwifery Womens Health. 2011 Mar; 56(2): 110–117.
15. Catherine A. Koss ,Dana C. Baras, Sandra D. Lane , Richard Aubry , Michele Marcus, Lauri E. Markowitz and Emilia H. Koumans, antimicrobial agents and chemotherapy. Investigation of Metronidazole Use during Pregnancy and Adverse Birth Outcomes
16. J. Chandrapooja B.D.S 1ST year, Saveetha Dental College, Oral Health during Pregnancy-A Systematic Review,JPSR, Vol. 8(8), 2016, 841-843
17. American Academy on Pediatric Dentistry Council on Clinical Affairs Committee on the adolescent. Guidelines on oral health care for the pregnant adolescent. Pediatr Dent. 2008-2009;30:102–06.
18. Turner M, Aziz SR. Management of the pregnant oral and maxillofacial surgery patient. J Oral Maxillofac Surg. 2002;60:1479–88.
19. Santosh R Patil, oral changes in preganant and non preganant women: A case-control study, 2013, vol 5(2), 118-122.
20. Chaveli Lopez B, Sarrion Perez MG, Jimenez Soriano Y. Dental considerations in pregnancy and menopause. J Clin Exp Dent. 2011;3(2):e135–44.

Research article

Effect of Radiotherapy on the Whole Mouth Salivary Flow Rate, Ph and Its Influence on Oral Hygiene Using Oral Hygiene Index

Nivedha Srinivasan[1], Arvina Rajasekar[2]

[1]Undergraduate Student, Saveetha Dental College, SIMTS, Chennai, India, [2]Senior Lecturer, Department of Periodontics, Saveetha Dental College, SIMTS, Chennai, India

Abstract

Aim: The aim is to understand the alteration in the salivary flow, pH, and oral hygiene in patients undergoing radiotherapy.

Objective: I) To compare the SFR in patient undergoing radiotherapy with normal controls

II) To determine the pH in the content of saliva

III) To assess oral hygiene using oral health index

Materials and Method: A cross-sectional study was conducted among patients undergoing radiotherapy in Dr.Raii Cancer Institute, Chennai, Tamil Nadu, India. A total convenience sample of 20 adults aged between 24 and 60 years were selected, out of which 10 adults were undergoing radiotherapy for head and neck cancer and 10 age and sex matched controls.

Conclusion: Hence this study evaluates the salivary flow rate, pH and oral hygiene of patients undergoing radiotherapy, which is important for dental professionals to familiarize with these complications of radiotherapy to treat patients effectively to improve their quality of life.

Key Words : *Oral hygiene index, salivary flow, xerostomia, radiotherapy, osteronecrosis*

Introduction

Saliva plays a major role in maintaining the oral health. This becomes apparent when the amount and the quality of the saliva is significantly reduced by medications, salivary gland neoplasm, disorders such as Sjogren's Syndrome, and especially ionizing radiation therapy for tumors of head and neck [1].

Saliva in the mouth is a biofluid produced by three pairs of major salivary glands--the submandibular, parotid and sublingual glands--along with secretions from many minor submucosal salivary glands. Salivary gland secretion is a nerve-mediated reflex and the volume of saliva secreted is dependent on the intensity and type of taste and on chemosensory, masticatory or tactile stimulation. Long periods of low (resting or unstimulated) flow are broken by short periods of high flow, which is stimulated by taste and mastication [2].

Radiotherapy is a treatment option for malign tumors whose therapeutic agent is ionizing radiation, which is said to be the type of radiation that promotes ionization in the area in which it is applied, making it electrically unstable. Ionizing radiations are divided into the corpuscular and electromagnetic ones. The corpuscular radiations are represented by electrons, neutrons and photons whereas the electromagnetic radiations are called photons, being represented by X rays and by gamma rays. In the clinical practice, most radiotherapy treatments are done through the use of photons [3].

Ionizing radiations act on the nuclear DNA due to which its reproducing ability is lost or destroyed. Due to the fact of being in a continuous multiplying process, malignant cells can suffer the radiation effects. However, the multiplying ability varies according to cell type. Thus, there is a radiosensitivity scale both for tumor and

normal cells. Embryonic malignancies and lymphomas are radiosensitive tumors, whereas carcinomas are moderately radiosensitive [4].

Radiation therapy for cancer of the head and neck can devastate the salivary glands and partially devitalize the mandible and maxilla. Tumors and elective nodal areas are often in close proximity to radiosensitive normal tissues, a factor due to which the success of radiotherapy is limited.

Acute radiation-induced adverse effects such as mucositis and skin reactions occur during the course of treatment. These effectes are reversible types and thus the patient tends to recover within 3-4 months. Late radiation reactions such as fibrosis and osteoradionecrosis occur more than 3 months after the treatment has been conducted. Such reactions are characterized by their gradual progression [5]. Xerostomia is the single most important factor leading to chronic loss of quality of life in head and neck cancer patients. As a result, the production of the saliva is drastically reduced and its quality is adversely affected.

Oral complication has hence been a common problem among patients undergoing radiotherapy for tumors of head and neck. Radiotherapy and Chemotherapy are known to slow or stop the growth of new cells. These therapies can cause changes in the epithelial lining of the mouth and the salivary glands. This can thus affect the salivary flow and the bacterial balance.

Adverse reactions to radiotherapy will depend on the volume and area being irradiated, on the total dose, on the fractioning, on the age, on the patient's clinical conditions and on the associated treatments. A small increase on tumor dosage is enough for a significant increase on the complications incidence. Acute reactions happen during the treatment and most of the time, they are reversible. Late complications are normally irreversible, leading to permanent incapability and to a worsening of quality of life [6], and they vary on intensity, being normally classified into mild, moderate and severe [7].

While radiation damage to salivary glands is well known in the clinic by its side effects, the mechanism of the ionizing radition causing destruction to the salivary glands is not known yet. Kowever, it is known that the serous acini are more radiosensitive than mucous acini [7]. The fibrous and glangular atrophy bein immediately after the treatment and they intensify until the treatment ends. There has been a debate regarding the complications associated with the radiation approximity. Some authors suggest that with only 20 Gy, 80% of the salivary function is lost but the complications remain reversible. And after 30 Gy the damage caused seems to be permanent [8].

On an average unstimulated salivary flow is 0.3-0.5mL/min and stimulated salivary flow is 1.1-3.0mL/min. This average rate tends to vary due to radiotherapy. The buffering capacity and microbial load of saliva is a very important for oral hygiene maintenance after radiotherapy.

This study aimed to explore the changes in salivary gland function in patients undergoing radiotherapy by performing individual functional performances and to plot the change tendency on every single patient examined.

Materials and Method

A cross-sectional study was conducted among patients undergoing radiotherapy in Dr.Raii Cancer Institute, Chennai, Tamil Nadu, India. A total convenience sample of 20 adults aged between 24 and 60 years were selected, out of which 10 adults were undergoing radiotherapy for head and neck cancer and 10 age and sex matched controls.

The study protocol was in compliance with the Helsinki Declaration and an approval was obtained from the institution's ethical committee. An oral informed consent was obtained from all participants prior to the study procedure. The intraoral examination was conducted by a single examiner under favorable lighting conditions using a sterile mouth mirror, diagnostic probe, and explorer. The clinical findings were recorded and the oral hygiene index was obtained to determine the prevalence of oral hygiene.

The saliva sample collection procedure was standardized prior to the study. The collection of unstimulated whole saliva was performed under resting conditions between 9.30 am and 11.30 am, 90 mins after their meal. The subjects were advised to rinse their mouth several times with (distilled) water and then relax for 5 min before the procedure. The subjects were asked to sit comfortably with head tilted slightly forward and expectorate the saliva accumulated in the floor of the mouth into disposable plastic containers for duration of 30 seconds. The salivary samples were quantified volumetrically using graduated measuring cylinder. The salivary flow

rate was expressed as ml/min. The collected fluid was also used to measure salivary pH using a pH strip. The oral hygiene index was taken into account after thorough examination of the oral cavity was done. The data obtained was subjected to statistical analysis using SPSS package.

Results

A total convenience sample of 20 adults aged between 24 and 60 years were selected, out of which 10 adults were undergoing radiotherapy for head and neck cancer and 10 age and sex matched controls. Their salivary flow, pH and oral hygiene index was examined. The collected results were as such;

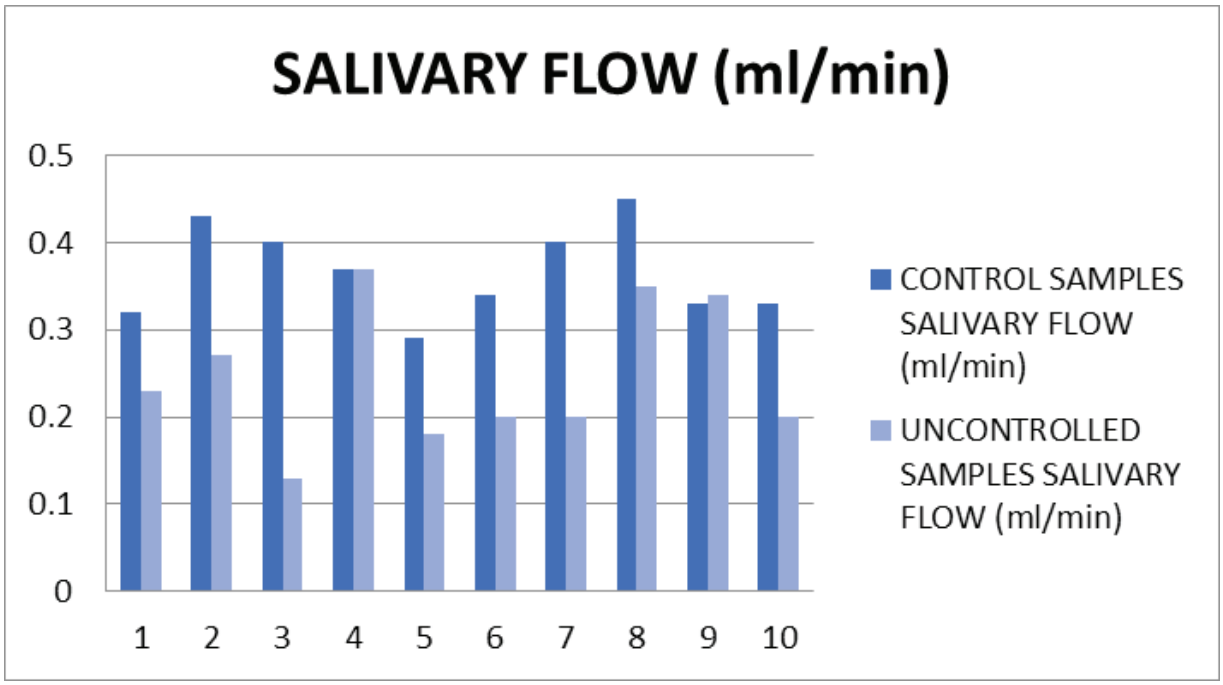
Table 1- Comparison in the salivary flow, pH, OHI-S in patients undergoing radiotherapy and clinically healthy patients.

S.No.	AGE	SEX	CONTROL SAMPLES			UNCONTROLLED SAMPLES		
	(years)		SALIVARY FLOW	Ph	OHI-S index	SALIVARY FLOW	Ph	OHI-S index
			(ml/min)			(ml/min)		
1	52	F	0.32	7	0.8	0.4	8	1.83
2	27	M	0.43	7	0.82	0.27	7	1.49
3	24	M	0.4	7	0.3	0.13	8	0.8
4	63	F	0.37	6	4.16	0.37	7	1
5	57	F	0.29	7	0.8	0.18	7	1.2
6	32	F	0.34	8	1.5	0.2	8	1.1
7	43	M	0.4	6	1.3	0.2	6	1.3
8	68	F	0.45	7	1.3	0.5	8	0.83
9	35	M	0.33	6	1.46	0.34	8	0.82
10	55	F	0.33	8	1.6	0.2	7	0.8
RESULTS								
MEAN			0.366	6.9	1.404	0.279	7.4	1.117
STANDARD DEVIATION			0.052323778	0.737865	1.051847053	0.118457681	0.699206	0.345351673

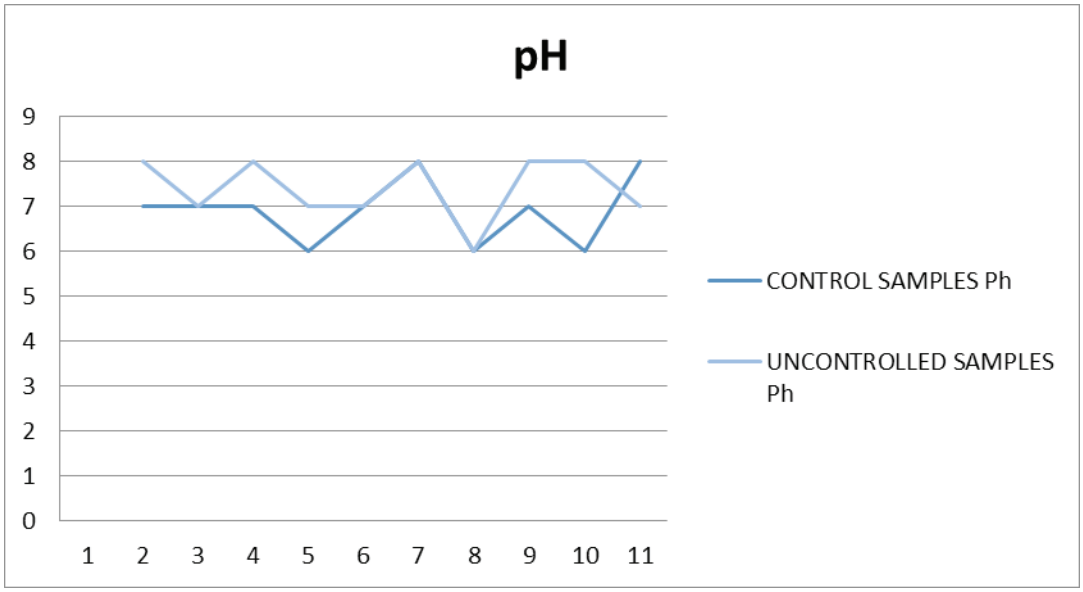
Table 2: Statistics associated with the alteration in the salivary flow, Ph and OHI-S.

SALIVARY FLOW		MEAN	STANDARD DEVIATION	T-SCALE STATISTICS
CONTROLLED SAMPLE		0.366	0.052323	0.0165
UNCONTROLLED SAMPLE		0.279	0.11845	0.0375
Ph				
CONTROLLED SAMPLE		6.9	0.73786	0.2333
UNCONTROLLED SAMPLE		7.4	0.699206	0.2211
OHI-S				
CONTROLLED SAMPLE		1.404	1.05184	0.3326
UNCONTROLLED SAMPLE		1.117	0.34535	0.1092

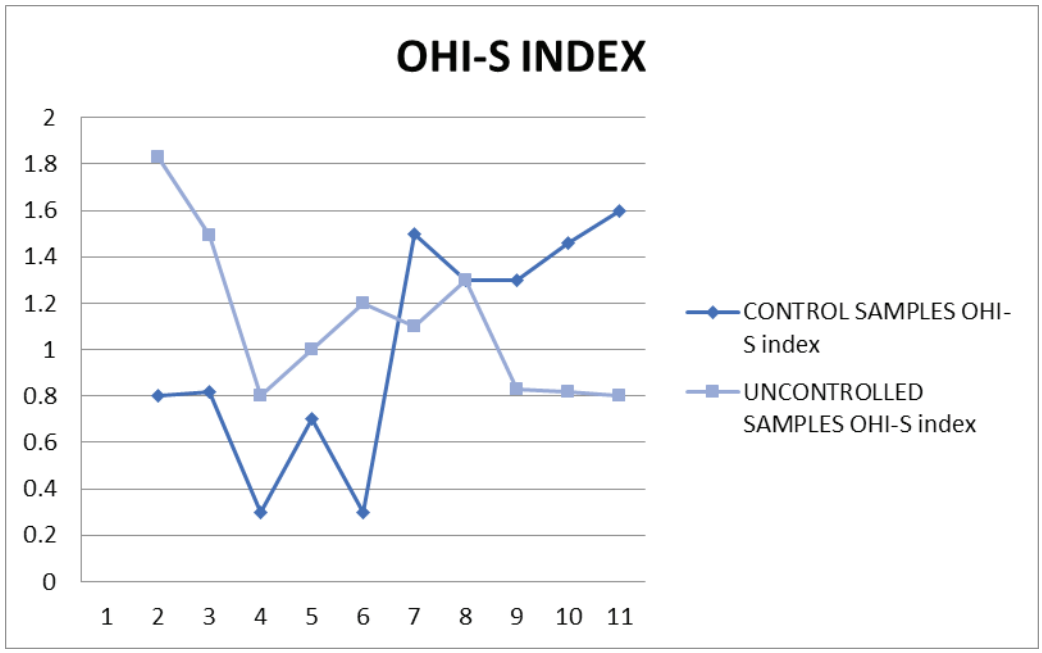
The alteration in the salivary flow seemed to have reduced in patients undergoing radiotherapy (0.279 ±0.11) (p=0.037). The ph had increased when compared with clinically healthy patients (7.4±0.699) (p=0.22). the oral hygiene index did not show any significant change (1.117±0.345) (p=0.109).



Graph 1: alteration in the salivary flow (ml/min).



Graph 2: Alteration in the pH.



Graph 3: Alteration in the OHI-S index.

Discussion

The salivary glands are externally found contrasted at most to the head and neck tumors, and therefore, the ionizing radiation needs to elapse through the salivary organs to viably treat the tumor [9]. Early radiation event to alter cell signal transduction and the late radiation exposure to damage acinar progenitor cells in stem cells niche [10]. Therefore we investigated salivary flow rate, ph and oral hygiene index changes of HCN patients in different age groups after radiotherapy.

One of the main problems resulting from tissue damage generated by radiotherapy is the reduction of salivary flow. The radiation level necessary to cause severe dysfunction to gland tissue is >52 Gy. Some articles [11] indicated that there were relatively large inter individual differences with respect to salivary flow changes. In our study the salivary flow rate reduced from 0.36 (ml/min) to 0.27 (ml/min) [table-2, graph-1]. It was also reported that salivary flow rate reduced 50-70% after radiotherapy.

The major reduction in salivation after radiotherapy is observed in the period from the onset of radiotherapy to 3 months after completion. Amid radiotherapy, the initial 10 days are the most noticeably awful ones as a massive decrease in salivary production takes place; particularly in the first week, it could decrease by 50%– 60% [12]. After this period, the flow rate is reduced by <10% of the initial conditions [13]. CHENG et coll. [14] It is found that when 100 per cent of the parotid glands' volume was irradiated, the parotid glands did not produce saliva at all, but when even a small portion (10 to 20 per cent) of the parotid gland was outside the radiation fields the glands could be stimulated to produce saliva. This fact should be kept in mind when radiation treatment is planned. . Besides, Moller et al [15] also reported that flow rate would slowly recover 4-months after radiotherapy but cannot return to the original level. From the results of the single measurement group, age, sex, and time-interval after radiotherapy were all not significant predictor factors for salivary flow rate. This outcome was similar in our study too. Most articles only reported the data of total saliva or stimulated parotid gland saliva [16]. Kwong et al [17] reported that the mean dose to the parotid glands could be as high as 32.0–46.1 Gy for early stage NPC patients treated with IMRT. Eneroth et al [18] found that radiation as low as 2 to 3 doses of 2 Gy could cause radiation-induced xerostomia.

To examine the salivary Ph, the acid base titrations, pH test strips, and handheld portable pH meters were mentioned.[19] whereas the Modified Ericsson method, Dentobuff method, and Strip method were mentioned for buffering capacity.[20] We used the pH test strips for its advantages of noninvasiveness, simplicity, and elegance. Chia-Yung Lin et al. demonstrated that the pH(P) was 6.60 before radiotherapy, and declined steadily to the lowest 6.00 (P Z 0.148) [21]. Thus it indicated that there was not considerable change in the pH, whereas in our study there was a significant increase in the pH when compared with clinically healthy patients (7.4±0.699) (p=0.22) [Table-2, Graph-2]. Mo¨ller et al indicated the buffering capacity and flow rate were irreversibly reduced after radiotherapy [22]. Edmond H. N. Pow et al. [23] came to a conclusion that eduction in stimulated saliva flow and salivary pH was accompanied by sustained changes in anionic composition. At 2 months following radiotherapy, there was a significant increase in chloride, sulphate, lactate and formate levels while significant reductions in nitrate and thiocyanate levels were found. No further changes in these anion levels were observed at 6 and 12 months. No significant changes were found in phosphate, acetate, or propionate levels throughout the study period.

Oral hygiene habits in patients undergoing radiotherapy and clinically healthy patients were evaluated by recording oral hygiene method, frequency, and the material used. Oral hygiene status of the patient was examined using OHIS index by Green and Vermillion. They were analyzed using paired t-test. The test showed a statistically insignificant correlation for OHIS controlled and uncontrolled samples. This may be due to hyposalivation and poor oral hygiene maintenance by patients during the course of radiotherapy.

Conclusion

The resulting salivary gland hypofunction and xerostomia arising from radiotherapy for HNC can cause a serious diseased condition [24].The stomatologic complications could depend on the type of cancer treatment and the cumulative radiation dose to the gland tissue. They can be reversible or irreversible, transient, or enduring. The best approach to manage the radiotherapeutic patient begins with a careful clinical assessment of the individual case, followed by preventive therapy aimed to reduce oral complications when possible. To minimize patient discomfort and morbidity, an understanding of the deleterious effects of radiotherapy is required. Introducing good oral home care and more frequent oral prophylaxis visits to the dentists before radiotherapy will allow for continuing care during and after therapy. Therefore, the clinician must keep this kind of patients under careful control in order to palliate the symptoms of xerostomia and improve their quality of life.

Ethical Clearance: Taken from Research Committee of Saveetha Dental College

Source of Funding: Self

Conflict of Interest: Nil

References

1. **RS Redman**, On approaches to the functional restoration of salivary glands damaged by radiation therapy for head and neck cancer, with a review of related aspects of salivary gland morphology and development, Biotech Histochem. 2008 Jun; 83(3): 103–130.
2. *Proctor GB, Carpenter GH.Monogr ,* Salivary

secretion: mechanism and neural regulation., *Oral Sci. 2014; 24:14-29. Epub 2014 May 23.*

3. Novaes PERS. Radioterapia. In: Brentani MM, Coelho FRG, Iyeyasu H, Kowalski LP, editores. Bases da oncologia. 1.ed. Sao Paulo: Ed. Marina; 1998.

4. Salvajoli JV, Souhami L, Faria SL. Radioterapia em oncologia. 1.ed. Rio de Janeiro: Ed. Médica e Científica Ltda.; 1999.

5. Dr. C.Harshitha, Effect of Radiotherapy on the Oral Cavity , J. Pharm. Sci. & Res. Vol. 9(12), 2017, 2332-2334.

6. Spetch L. Oral complications in the head and neck irradiated patient. Introduction and scope of the problem. Supp Care Dent 2002;10:36-9.

7. Murad AM, Katz A. Oncologia: bases clínicas do tratamento. 1.ed. Rio de Janeiro: Guanabara Koogan; 1996.

8. Sandra ribeiro, the effect of ionizing radiation on the oral cavity, the journal of contemporary dental practice 2015; 16(8);679-687

9. *Sreebny LM,* Saliva in health and disease: an appraisal and update. *Int Dent J. 2000 Jun; 50(3):140-61.*

10. Konings AW, Coppes RP, Vissink A. On the mechanism of salivary gland radiosensitivity. Int J Radiat Oncol Biol Phys 2005; 62:1187e94.

11. . Leslie MD, Dische S. Parotid gland function following accelerated and conventionally fractionated radiotherapy. Radiother Oncol 1991;22:133e9.

12. Franzén L, Funegård U, Ericson T, Henriksson R. Parotid gland function during and following radiotherapy of malignancies in the head and neck. A consecutive study of salivary flow and patient discomfort. Eur J Cancer. 1992;28:457–462.

13. Dreizen SA, Daly TE, Drane JB, Brown LR. Oral complications of cancer radiotherapy. Postgrad Med. 1977;61:85–92.

14. CHENG V.S.T., DOWNS J., HERBERT D.and ARAMANY M.: The function of the parotid gland following radiation therapy for head and neck cancer. Int. J. Radiat. Oncol. Biol. Phys. 7 (1981), 253.

15. . Mo¨ller P, Perrier M, Ozsahin M, Monnier P. A prospective study of salivary gland function in patients undergoing radiotherapy for squamous cell carcinoma of the oropharynx. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:173e89.

16. Marks JE, Davis CC, Gottsman VL, Purdy JE, Lee F. The effects of radiation of parotid salivary function. Int J Radiat Oncol Biol Phys 1981;7:1013e9.

17. Kwong DLW, Pow EHN, Sham JST, McMillan AS, Leung LH, Leung WK, et al. Intensity-modulated radiotherapy for early-stage nasopharyngeal carcinoma: a prospective study on disease control and preservation of salivary function. Cancer 2004;101:1584–93

18. Eneroth CM, Henrikson CO, Jakobsson PA. Effects of fractionated radiotherapy on salivary gland function. Cancer 1972;30:1147–53

19. Cogulu D, Sabah E, Kutukculer N, Ozkinay F. Evaluation of the relationship between caries indices and salivary secretory IgA, salivary pH, buffering capacity and flow rate in children with Down's syndrome. Arch Oral Biol 2006;51:23e8.

20. Wikner S, Nedlich U. A clinical evaluation of the ability of the Dentobuff method to estimate buffer capacity of saliva. Swed Dent J 1985;9:45e7.

21.

22.. Mo¨ller P, Perrier M, Ozsahin M, Monnier P. A prospective study of salivary gland function in patients undergoing radiotherapy for squamous cell carcinoma of the oropharynx. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:173e89

23. **Edmond H. N. Pow**, Salivary Anionic Changes after Radiotherapy for Nasopharyngeal Carcinoma: A 1-Year Prospective Study, **PLoS One**, 2016; 11(3): e0152817

24. Saraswathy, SALIVARY SUBSTITUTES IN PROSTHODONTICS, International Journal of Recent Advances in Multidisciplinary Research Vol. 03, Issue 03, pp.1350-1352, March, 2016

Sentiment analysis on Healthcare Tweets

P.Kamakshi[1]

[1]*Professor, Department of Information Technology, Kakatiya Institute of Technology and Science, Warangal, India*

Abstract

In today's world variety of posting on social media offer huge information about the health issues, remedies, food and medication. Twitter is an online social networking service in which users can post their opinions about various topics and also cooperate with each other with messages known as "tweets". Tweets are very helpful in sharing the health related issues, medicines, hospitals information. Twitter helps the people to know about the disease symptoms, services and details about the hospital before they go for consultation. *Sentiment* analysis is a metric commonly used to investigate the positive or negative opinion within these *messages*. *Sentiment* analysis methods can be used in *Twitter health* care research. The analysis will help the users to better understand the alternative available. Sentiment analysis can also facilitate the healthcare industry to use reliable data for their growth by taking necessary measures. Sentiment analysis applies software to analyze the patient's tweets regarding their healthcare experiences regarding medicine, doctor, hospitals..It helps users as well as many healthcare organizations to understand their customers opinion and to take necessary measure to rectify the gaps. Ultimately, as more attention is given to such opinion analysis the health standard in the society will improve. Main aim of this paper is to build an algorithm that can accurately classify Twitter messages as positive or negative.

Keywords : *Tweets, sentiment analysis Health care, Healthcare organiations*

Introduction

With more concern towards individual health, today everyone is using Internet to participate in medical forums to gather health-related information, to share experiences about drugs, treatments, diagnosis or to interact with other users with similar condition in communities. Monitoring social media platforms has recently fascinated medical natural language processing researchers to detect various medical abnormalities such as adverse drug reaction. In this paper, we present a benchmark setup for analyzing the sentiment with respect to users' medical condition considering the information, available in social medium called twitter. Twitter is an online social networking medium, where registered users share or post messages known as tweets. There are several unstructured, free-text tweets related to health care being shared on Twitter, which is becoming a popular area for health care research In this work we used this data to observe general users health Awareness towards sentiment analysis has been promising over the last few decades due to the huge popularity of social media. The extraordinary rise in sharing the information in social media is observed in health conscious people such as medical debates which are flooded by many users. Many of such users are likely to be patients who seek help for health-related information, want to share medical problems [4] and their experiences and also want to opt for informational support or opinions from the other users like patients, health-practitioners. These texts present a platform to glance into a user's opinions, sentiments and feelings in a very wide range.Sentiment is a metric normally used to explore the positive or negative judgment within these messages. Exploring the methods used for sentiment analysis in Twitter health care research may allow us to better understand the available options.

Sentiment Analysis estimate whether a part of text called tweet[2] is representing positive, negative or neutral. It is called as opinion mining as it derives the opinion or mind-set of a user who posted the tweet. The objective of this paper is to build an algorithm that can accurately classify Twitter messages as positive or negative, with respect to a query term. Our hypothesis is that we can

obtain high accuracy on classifying sentiment in Twitter messages using machine learning techniques.

Background

With advancement of Internet , its scope is becoming wider day by day. Social Media platforms like Twitter Facebook, plays a major role in disseminating the trendy topics , news at very fast speed. People give their opinion[1] and judgments in large and make the topic trendy. These topics in general are meant to bring consciousness or to promote movies, elections, celebrities. Many organizations take benefit from the people's feedback. They try to enhance their goods, services and also in improving promotion policies. Thus, there is a huge possibility to improve business driven applications by identifying and analyzing fascinating patterns from the huge data available in social media. In particular, the hypothesis try to categorize all the exchanged chat into the label of positive, negative or neutral. This sort of information develop a source for people to assess, rate about a particular movie, products etc.

Sentiment Analysis on Tweets

Twitter is a social networking service where users can send and read short 140-character messages called "tweets." One of the popular areas i.e. in healthcare several unstructured, free-text tweets relating to health care are shared on Twitter. It is becoming a popular area for health care research. Sentiment is a metric[6] commonly used to investigate the positive or negative opinion within these messages. Exploring the methods used for sentiment analysis in Twitter health care research may allow us to better understand the options available for future research in this growing field. Patients and citizens in general, are increasingly using the Internet for searching health information and support. Eurobarometer, which is a series of public opinion surveys reports that nearly 60% of European people had a glimpse on online health-related information and more 90% of them , reported that they will prefer to continue the use of Internet as a main resource in the future to access health-related information. It is found that nearly 80% of searches through search engine are related to health topics, symptoms, treatments. Some of the users show interest in reading others comments or experiences in Health communities and some of the users take online consultation for disease, drug or treatment. The use of online health communities is particularly popular among chronic patients. Surveys show that these patients significantly benefit from social interaction with peers and the sharing of knowledge, experiences and support. Information in online health forums and communities is also of great interest for researchers and professionals, as it allows for research in a very normal process and cannot be simulated in laboratory atmosphere. Some of the examples are the side effects of medicines, alternative treatments are some of the examples.

The health industry is one of the important stakeholders which monitor the people and patients[5] opinion regarding their products and services and the level of their satisfaction. However, the quantity of information is so gigantic that it is difficult for the users to find the information that is really needed. Opinion *mining* is the process which is used to classify a portion of text into positive, neutral or negative. Several unsupervised and supervised learning methods are[7] anticipated to achieve better result.

Process

The dataset about health care sentiment is expected to be from the peoples own opinion about the discussed matter. As the data collected form online resources don't follow any standard format. Such information or reviews are of little use to sentiment analysis and are therefore filtered off, in order to focus on the opinion rich content only. Subjective reviews may also contain some objective statements representing facts and figures which are filtered for the same purpose. Review documents produced by ordinary authors may contain all kind of inconsistencies like grammatical errors, spelling mistakes, over or under use of capitalization, word shortening, The order of tweets are also very important in such discussion as they lead towards common grounds. It not only express sentiment for healthcare problems but also support the opinion with strong reasons which make useful information to public.

Sentiment Analysis is the process of 'computationally' determining whether a piece of writing is positive, negative or neutral. It's also known as opinion mining, deriving the opinion or attitude of a speaker. In this module the sentiment analysis is done on the data i.e twitter tweets which is collected from the input given by the user and it will able to identify whether the given sentence is negative or positive by using natural language tool kit and able to produce whether it is positive or negative. The NLTK module is a massive tool kit, which performs everything from splitting sentences

from paragraphs, splitting up words, recognizing the part of speech of those words, highlighting the main subjects, and then even with helping user machine to understand what the text is all about. The live data coming in from the Twitter streaming API, can be represented by live graph that shows the sentiment trend. The Matplotlib. animation function helps in creating the live graph.

Result

The tweets in the form of texts are classified and sentiment analysis is done .The classified tweets in the form of negative and positive are shown on the screen by using the naïve bayes algorithm and the sentiment analysis modules in which the process of tokenizing, lemmatizing, chunking, tokenizing are done. The input given in the text formats i.e. either an word or sentence. After the sentiment analysis is done on the data which was generated by the twitter related to the input the data will be represented in the graphical form using matplotlib. The graph helps to know the accuracy percentages of individual classifiers[3] which helps in identifying the classifier which gives optimized solution.In the graph by matplotlib, the representation of the analysis of the tweets is in the form of the graph model. The X-axis represents the number of tweets which are generated directly and Y-axis represents the value of the sentiment analysis which is generated for each tweet .

After getting the output of the graph we checked the accuracy percentages of the Naïve Bayes Classifier and the other classifiers for 3000 tweets for the term cancer. The best classifier for 3000 tweets is SGDC Classifier with the accuracy percentage of 89.0.

Conclusion

One of the most popular application of Sentiment analysis which will be helpful for the user in better healthcare is to apply it on the information collected from social media. The workflow of analyzing healthcare content in the social media helps to overcome the limitations of large scale data analysis and manual analysis of user generated textual content in social media. This work can help the users to be updated with the effectiveness of the medicines and it can even suggest them with few better medications available. This project can provide feedback to the healthcare system organization and pharmaceutical companies for the available treatments and medicines. With the help of this project, pharmaceutical companies and healthcare providers can work on the feedback and try to come up with the improvised medicines and treatments. Users are provided with the resources of social media for the corresponding field of healthcare.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Not required

References

1. Doaa Mohey El-Din Mohamed Hussein. A survey on sentiment analysis challenges. Journal of King Saud University – Engineering Sciences. 2015Nov: 330-338.
2. Kumar P. K., Nandagopalan S.Insights to Problems, Research Trend and Progress in Techniques of Sentiment Analysis. International Journal of Electrical and Computer Engineering (IJECE) . 2017 Oct;7(5) :2818-2822.
3. Christiyana Arulselvi, A Sendhilkumar ,S Mahalakshmi S. Classification of Tweets for sentiment and Trend Analysis.International Conference on Intelligent Computing and Control Systems ICICCS .2017:566-573.
4. Shweta Yadav, Asif Ekbal, Sriparna Saha, Pushpak Bhattacharyya. Medical Sentiment Analysis using Social Media: Towards building a Patient Assisted System. In: LREC 2018.Proceedings of the Eleventh International Conference on Language Resources and Evaluation ;2018; Miyazaki, Japan: 2790-2797
5. Ranjitha Kashyap, Ani Nahapetian. Tweet Analysis for User Health Monitoring.In: International Conference on Wireless Mobile Communication and Healthcare;2014; MOBIHEALTH 2014, November 03-05, Athens, Greece:348-355.
6. Anna Jurek, Yaxin Bi, Maurice Mulvenna. Twitter Sentiment Analysis for Security-Related Information Gathering.In: IEEE Joint Intelligence and Security Informatics Conference:2014; The Hague, The Netherlands:48-55.
7. Shubham, Shashank Kumar, Sunanda Dixit. Classification of tweets into various categories using classification methods. International Journal of Advance Research, Ideas and Innovations in Technology.2018;4(3): 937-940.

A Cross Sectional Study on Prevalence of Anemia in Children Below 5 Years, Kuthambakkam Village, Tamil Nadu

D.Jayashri[1], B.Charumathi[1], Yamini[1], Timsi Jain[2], Ruma Dutta[3], Gomathy Parasuraman[4].

Post Graduate[1], Professor and Head[2], Professor[3], Associate Professor[4], Department of Community Medicine, Saveetha Medical College Hospital,Thandalam, Kanchipuram District

Abstract

Background: Anemia deficiency is a significant public health problem that occurs worldwide in both developed and developing countries. Iron deficiency anaemia in children has been linked to increased childhood morbidity and impaired cognitive development and school performance. Children between 5 and 12 years of age are at a critical stage of intellectual development, and optimization of their cognitive performance during this period could have life-long benefits. **Objectives:**To estimate the prevalence of anaemia among children below five years of age in Kuthambakkam village and to find the factors associated with anemia among study participants. **Material and Methods:** A Cross sectional study conducted among Children below 5 years of age in kuthambakkam area.A pre-tested questionnaire, clinical examination was done to find out anemia among study subjects.The sample size calculated was150.Dataanalysis:Proportions and chi-square was used for analysis. **Results:** The prevalence of anemia was found to be 37(25.17%). **Conclusion**: Measures for treating anaemia should also be strengthened; doses should be modified according to the current anaemia status of the children.

***Key words**: Anemia, Prevalence, children.*

Introduction

Anemia deficiency is a significant public health problem that occurs worldwide in both developed and developing countries. Approximately 300 million children globally had anemia in 2011[1] and 50% of anemia cases are caused by iron deficiency.[2]Anemia is defined as a condition in which the number of red blood cells or their oxygen carrying capacity is insufficient to meet physiological needs which vary by age, sex, altitude, smoking and pregnancy status(WHO). It is a common blood disorder and is one of the major disease in India that exists in all age groups especially seen among preschool children and pregnant women.[3]

Low oxygenation of brain tissues, a consequence of anemia, may lead to impaired cognitive function, growth and psychomotor development, especially in children.[4]Infants, under 5-year-old children and pregnant women have greater susceptibility to anemia because of their increased iron requirements due to rapid body growth and expansion of red blood cells.[5]

National Anaemia Prophylaxis Programme (NAPP) has been set up in all states, the benefits have not yet been appreciated in the target population due to constraints like lack of operational feasibility to estimate the haemoglobin level, orientation of field workers and acceptance of the programme by the beneficiaries. According to National Family Health Survey (NFHS)-4 shows prevalence of anemia among children between 6-59 months age is 59.4% and Tamil Nadu data shows prevalence of anemia 52.3 in rural area.[6]

Anemia is associated with socio-economic, biological, environmental and nutritional factors.The prevalence of anemia within interior parts of India is unknown and due to this lack of information its necessary to conduct a study, which will be helpful in directing the resources to deficit areas,thereby to reduce prevalence of anemia by 3 percent per year among

Corresponding Author:
Dr.D.Jayashri,
Post Graduate, Department Of Community Medicine, Saveetha Medical College. Email id: jayashri49@gmail.com, Phone no: 9943080711

children,adolescents and women of reproductive age group (15-49 years) between 2018-2022.[7]

Objectives

1.To estimate the prevalence of anaemia among children below five years of age in Kuthambakkam village.

2.To find the factors associated with anemia among study participants.

Methodology

A cross sectional study was conducted in Kuthambakkam village on July 2017 – September 2017. Children between 1-5 years of age were selected by using Simple Random Sampling method. The sample size of 150 children was estimated from the family folder survey details of our rural field practice area of Saveetha medical college. Using a pre-tested questionnaire socio-demographic details, and factors leading to anemia were collected by interviewing the mothers of under 5 year children. Clinical examination was done by looking for pallor at palpebral conjunctiva, nails, oral cavity and tongue to assess the prevalence of anemia in children. Children who were not present in the field at the time of data collection and those who are not willing to participate were excluded from the study. Data was entered in MS Excel.

Results

Cross-sectional study was conducted among 147 children below 5years of age group of whom 37(25.17%) were found to be anaemic. Among 95 males ,20(21.1%) were found to be anemic and among 52 females 17(32.7%) were found to be anemic.

However no significant association was found with sex, socio-economic status, IFA consumption history and history of deworming. One third of the children are not taking or taking irregularly iron folic acid supplementation.

Table 1- Distribution of anemia among study subjects

S.no	Characteristics	Anemia Present (%)	Anemia absent (%)	Total	Chi square	P value
1.	AGE					
	1-3 years	19 (19.6)	78 (80.4)	97	4.719	0.030 (S)
	4-5 years	18 (36.0)	32 (64.0)	50		
2.	Gender					
	Male	20 (21.1)	75(78.9)	95	2.417	0.120
	Female	17 (32.7)	35(67.3)	52		
3.	Socioeconomic status					
	Upper Middle	10 (27.8)	26 (72.2)	36	1.970	0.579
	Lower Middle	20 (28.2)	51 (71.8)	71		
	Upper Lower	6 (19.4)	25 (80.6)	31		
	Lower	1 (11.1)	8 (88.9)	9		

Discussion

In this Cross-sectional study out of 147 children, 37(25.17%) were found to be anaemic. A study done by Sudhagandhi et al in Kancheepuram district ,results showed that 75.2% of toddlers were anaemic.[8]

A study done by Verma et al, they found that the Prevalence of anemia among male and female pre-schoolers residing in a slum of Delhi was 82.4% and 73.0% respectively.[9]

Conclusion

The Overall Prevalence was found to be lower than the national and state average. Both boys and girls were found to be anaemic. Measures for treating anaemia should also be strengthened; doses should be modified according to the current anaemia status of the children. Mothers should be informed regarding importance of IFA and iron rich food diet for the children.

Limitation: The Hemoglobin level was not estimated in this study.

Conflict of Interest: Nil

Source Of Funding: Nil

Ethical Clearance: Ethical approval was obtained from the Institutional Review Board (IRB) and Institutional Ethics committee. Written informed consent was obtained from the parents of the study participants and information sheet regarding the study was given to all the participants.

References

1. Daily iron supplementation in children and adolescents 5–12 years of age. Available from URL:https://www.who.int/elena/titles/iron-children-5to12/en/.Accessed on 11 Nov 2019.
2. World Health Organization Iron deficiency anemia assessment, prevention and control. A guide for programme managers Geneva:WHO;2001. Available from URL: https://www.who.int/nutrition/publications/micronutrients/anaemia_iron_deficiency/WHO_NHD_01.3/en/. Accessed on 05 Nov 2019.
3. T Sahu, NC Sahani, L Patnaik.Childhood anaemia-a study in tribal area of Mohana block in Orissa . Indian Journal of Community Medicine. 2009 Aug; 32(1):43-45.
4. Walter T, de Andraca I, Chadud P, Perales CG. Iron deficiency anemia: adverse effects on infant psychomotor development. Pediatrics. 1989 Sep; 84(1): 7-17.
5. Silva DG,Franceschini SCC,Priore SE,Ribeiro smr,Szarfarc SC,Souzxa SB.Iron deficiency anemia in children aged 6 to 12 months treated at the public health system in the city of Viçosa, MG. Rev Nutr.2002;15(3):301-08.
6. National Family Health Survey Data-4(2015-16). Available from URL: http://rchiips.org/nfhs/factsheet_nfhs-4.shtml. Accessed on 11 Nov 2019.
7. Operational Guidelines Intensified National Iron Plus Initiative, April 2018. Available from URL: https:// www.google.com/search?q=Operational+Guidelines+Intensified+National+ Iron+Plus+Initiative%2C+April+2018&rlz=1C1DFOC_enIN643IN645&oq= Operational+ Guidelines+ Intensified+ National+Iron+ Plus+Initiative%2C+ April+2018&aqs= chrome.. 69i57.377j0j4& sourceid= chrome&ie= UTF-8 Accessed on 11 Nov 2019.
8. B.Sudhagandhi, A.Prema,S.Sundaresan, W.Ebenezer WilliamandG. Shivashekar. Anemia in Toddlers of Kattankulathur, Kancheepuram, International Journal of Pharma and Bio Sciences. 2012 Mar; 3(1):687-692.
9. Verma,S.K.,Pahwa,S., Sharda,A.K. and Toteja,G.S. Prevalence of anemia among preschooler residing in a slum of Delhi (India)–a pilot study.TheInd.J.Nutr. Dietet.2006;43:475.

Status of Health Literacy among Rural Women to Community Health Center of Sagar Region: A Survey

Gulab Devi[1], Shilpi Verma[2]

[1]Research Scholar, [2]Head & Professore, DLIS, BBAU, Lucknow

Abstract

The present study investigated Health literacy among rural women and management of health services also investigated the functions of the 10 Community Health Center (CHCs) of Sagar region in India. This article is part of a larger study on improving health information among rural women for Community Health. The method for the study is user survey method and tool for the data collection is structured questionnaire. Total questionnaire distributed 300 among rural women to select 10 Community Health Center of Sagar regions. The purpose of this study is to determine the impact factors of health literacy target of rural women in rural areas. Health literacy was thought to impact women reproductive health; yet no inclusive systematic reviews have been conducted on the topic. Our objective was to systematically identify, investigate, and summarize research on the relationship between health literacy and women reproductive health knowledge, behaviors, and outcomes.

Keywords: *Health Literacy, contraception ,Community Health Center, PHCs, Rural Women, Sagar, MP.*

Introduction

Whereas many studies examined the relationship between health literacy and health outcomes,less awareness has been particularly focused on the effects of health literacy on reproductive health of women.[1] Health Literacy refers to the personal characteristics and social resources that people and community need to access, understand, evaluate and use information and services to make health decisions. Limited access to a variety of health care services has also been recognized by rural women. of Sagar region .[2] Although some general works on utilisation of health services in Sagar resion have been attempted, not much work has been done on the utilization of health services by women, especially by rural women. Rural women are fundamental to improvement in Indian country as they play diversified roles in growth. They contribute to the family and wage activities keep in marketing and the allocation of cooking, and like the wives and mothers to make certain the survival of the family and (as a group) the society.[3] Their household activities critically contribute to the maintenance of the local economy to improve sustainable development. Observation on some rural women in Sagar , all sub-district . Community Community Healthcare is a subdivision of the Health community that is categorized into Primary health, Secondary healthcare. Government and health professional organized these services.[4] The goal of community health services is to provide quality care and free mental health treatment for rural women' of Sagar District.

Profile of Sagar District

Madhya Pradesh, located in central India, has a total population of 7.2 crores in 52 districts and 342 blocks (Census, 2011). The district of Sagar is located 180 km from the state capital Bhopal and serves a population of 24 lakhs, 3.5 of whom live in Sagar city.5 The Sagar Health Community division is made up of five bundelkhand districts in M.P. One of which is the district of Sagar.

Sagar District

CHCs of Sub-district/ Blocks of Sagar

S. No	Name of CHCs/ Block/ Rural Population (2011)	CHC/ Beds	District/Nagar Panchayat	Population (In Lakh)
1.	Banda	30	Nagar Panchayat	30,923
2.	Gadakota	30	Municipality	32,726
3.	Devori	30	Municipality	25,632
4.	Jaisinagarnagarnagar	30	Nagar Panchayat	7,392
5.	Kesli	30	Tehsil	116686
6.	Khurai	100	Municipality	51,108
7.	Malthone	30	Tehsil	15,2631
8.	Rahatgarh	30	Nagar Panchayat	31,537
9.	Shahgarh	30	Nagar Panchayat	16,300
10.	Surkhi	30	Nagar Panchayat	1081

Objective of the study

1. To identify the health issue of rural women

2. To find out health information literacy level in different community members;

3. To know about health community center working condition of Sagar district;

4. To find the habits of the health rural area using community health resources;

5. to evaluate the availability and sufficiency of medical, para-medical and supportive staff in CHCs;

Challenges faced

1. Social and Cultural stereotype

2. Poor women participation

3. insufficient Financial support

4. Political interference (local establishment)

Method for data collection

Secondary Data was collected for the structured questionnaire format from the Sagar region and their 10 sub-district. Primary data was collected for the qualitative responses in the questionnaire through interactions with the rural women during the visits to the health facilities.[6] The reference point for assessment of issues and status was all Community Health Center for all selected facilities.

Table 1. Education level of rural women

Options	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surkhi	Total	%
Illiterate	13	10	7	8	8	7	11	12	9	7	92	35.24
Primary	12	3	16	7	7	18	2	6	11	8	90	34.48
Secondary	5	9	6	6	6	5	1	4	5	8	55	21.07
Higher Secondary	0	2	1	5	1	0	4	0	1	0	14	5.36
Graduate	0	1	0	4	2	0	2	0	0	1	10	3.83
Total	30 (11.49)	25 (9.58)	30 (11.49)	30 (11.49)	20 (9.20)	30 (11.49)	20 (7.66)	22 (9.96)	26 (8.43)	24 (9.20)	261 (100)	100%

The table no.1 shows the education level of rural women in which 35.24 rural women are illiterate, 34.48 rural women have primary education, and 21.07 of rural women have secondary education level and 5.36 rural women have higher secondary education and 3.83 percentage of rural women are graduate.

Table 2. Occupation of rural women husband

Options	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surkhi	Total Res.	%
Agriculture	17	12	20	18	12	14	17	8	10	12	140	53.84
Govt. Employee	0	0	0	0	1	0	0	0	0	0	1	0.38
No Employment	3	2	2	4	4	0	1	8	2	10	36	13.84
Farm Worker	0	0	0	2	1	5	0	0	0	1	9	3.46
Private	10	11	5	6	3	5	2	8	10	0	60	23.07
Driver	0	0	0	0	3	0	0	0	0	0	2	0.76
Business	0	0	3	0	0	2	0	2	0	1	8	3.07
Others	0	0	0	0	0	4	0	0	0	0	4	1.53
Total	**30 (11.49)**	**25 (9.58)**	**30 (11.49)**	**30 (11.49)**	**24 (9.20)**	**30 (11.49)**	**20 (7.66)**	**26 (9.96)**	**22 (8.43)**	**24 (9.20)**	**261**	**100%**

According to table no.2 described that if women are married than their husband occupation 140 (53.84%) worked in agriculture, 1(0.38%) worked in Govt. Employee, 36 (13.84%) has no worked. 9 (3.46%) worked in Farm Worker, 60 (23.07) worked in Private, 2 (0.76%) were worked Driver, 8 (1.53%) are worked in Business, 4 (1.53%) others(according to season wise work.)

Table 3. Awareness about health literacy

Option	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surakhi	Total	%
Yes	20	8	17	18	8	17	12	10	18	13	141	54.02
No	10	17	13	12	16	13	8	12	8	11	120	45.97
Total	**30 (11.49)**	**25 (9.58)**	**30 (11.49)**	**30 (11.49)**	**24 (9.20)**	**30 (11.49)**	**20 (7.66)**	**22 (9.96)**	**26 (8.43)**	**24 (9.20)**	**261**	**100%**

The table and fig.3 shows that the awareness of health literacy among rural women was low. It was found that 54.02 of women were aware of health literacy, whereas 45.97 of women were unaware of health literacy.

Table 4. receiving health information by rural women

Option	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surakhi	Total Res.	%
In CHC	30	18	28	30	18	19	16	17	23	20	219	36.5
Sub-Center	0	5	6	8	8	5	6	4	8	7	57	9.5
At home	0	0	0	2	0	0	0	0	9	5	16	2.66
In ASHA	12	13	29	28	22	19	20	20	25	26	214	35.66
At PHP			7	10	5	3	3	5	8	3	44	7.33
District hospital	2	2	9	5	6	6	7	3	5	5	50	8.33
Any other please specify	0	0	0	0	0	0	0	0	0	0	0	0
Total	**44 (7.33)**	**38 (6.33)**	**79 (13.17)**	**83 (13.83)**	**59 (9.83)**	**52 (8.67)**	**52 (8.67)**	**49 (8.17)**	**78 (13)**	**66 (66)**	**600 (100)**	**100%**

The above table 4 shows that the receiving health information by rural women. It was found that the highest 36.5 percentage of rural women received from CHC, followed by 35.66 from AASHA, followed by 8.33 district hospital, Sub- health center 9.5 rural women has received health information from CHC.

Table 5. Awareness about contraception

Option	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surkhi	Total	%
Yes	16	21	28	26	18	24	8	18	19	11	189	72.41
No	14	4	2	4	6	6	12	4	7	13	72	27.58
Total	**30**	**25**	**30**	**30**	**24**	**30**	**20**	**22**	**26**	**24**	**261**	**100%**

The table no.5 shows that awareness about contraception among rural women. It was found that the percentage of awareness about contraception was 72.41 in total rural women of all CHC. Whereas 27.58 of rural women was not aware about contraception.

Table 6. Reason for not use contraception by rural women

Options	Banda	Gadakota	Devori	Jaisinagar	Kesli	Khurai	Malthone	Rahatgarh	Shahgarh	Surkhi	Total	%
Lack of information	10	6	9	15	8	14	8	12	9	10	101	38.69
Not agree Husband's	6	13	10	8	9	9	6	8	8	6	83	31.80
Side effect	14	6	11	7	7	7	6	2	9	8	77	29.50
Total	30 (11.49)	25 (9.58)	30 (11.49)	30 (9.20)	24 (11.49)	30 (11.49)	20 (7.66)	22 (9.96)	26 (8.43)	24 (9.20)	261	100%

The table no.6 shows that the reason for not using concentration by rural women. It was found the highest 38.69 percentage of rural women was not use contraception because of lake of information, ans 31.80 percentage of rural women's husband not agree husband, side effect is 29.50.

Finding of the study

1. To develop the health facilities for women and children. Investing in programmes for mothers which

increase access to maternal-child health care will pay direct the economic dividends to the nation by growing their capability as producers.

2. For women farmers, improved productivity is necessary. Productivity can be enhanced through access to land, credit, appropriate technology, production inputs, addition services and markets.
3. Employment establishment beyond agriculture is very essential for the representation of rural women. Programmes
4. For investing in agro-industries, cottage industries and other non-agricultural .
5. To develop health exhibition and health orientation programme should be encouraged.
6. This can be expert by improving communications such as water, roads and electricity, and access to labour saving equipment to reduce the burden of improved work, in particular on housework.
7. Proper facilities for blood storage is lacking at Community health center, which needs instant attention.Substitute sources of electricity and voltage stabilization must be gauranteed with instant achieve to ensure continuous supply of blood for deliveries of women.

Conclusions

Health literacy plays an significant role in reproductive knowledge and may impact behaviors and outcomes. While further research is necessary, healthcare providers should exploit health literacy best practices now to encourage high-quality care for rural women.

Ethical Clearance- Taken from BBAU (1% plagiarism) committee

Source of Funding- Self

Conflict of Interest -Nill

References

1. Indian T, Charter H. THE INDIAN WOMEN ' S HEALTH Women of Age Women with Disabilities Women Living in Custody of State Institutions. 2007;(March):1–41.
2. Care H, Reviews C, Sa T. Health Care : Current Reviews Health Reform as Political Instrument : Achieving Universal Health Coverage. 2019;7(1):1–5.
3. iMedPub Journals Assessment of Health Status and Monitoring of Healthcare Systems in Rural Areas of Gwalior District , Madhya Pradesh , India Abstract. 2018;1–5.
4. Manoharan S. Health Status of the Indian Women - A Brief Report. MOJ Proteomics Bioinforma. 2017;5(3):109–11.
5. Ahn J, Abnet CC, Cross AJ, Sinha R. Dietary intake and nutritional status. IARC Sci Publ. 2011;2(163):189–98.
6. Hendrix, Abernethy, Sloane, Misuraca & M. 基因的改变NIH Public Access. Bone. 2013;23(1):1–7.

Periods, Perceptions and Practice- A Study of Menstrual Awareness among Adolescent Girls in a Tribal District of Odisha, India

Pallavi Mishra

Assistant Professor in Zoology, Department of Zoology, Govt. Autonomous College, Plulbani-762001, Odisha, India

Abstract

Menstruation is a normal biological phenomenon. Still it is associated with misperceptions, malpractices and challenges especially among female adolescents of low socioeconomic settings. The present study was conducted to investigate the knowledge about menstruation, determinants of menstrual hygiene management and the consequences of menstruation on college absenteeism in a tribal dominated backward district of Odisha, India. A college based cross-sectional questionnaire-based study was undertaken among randomly selected 740 female students who were attending 12th grade and undergraduate courses. About 64 % of girls had inappropriate knowledge about menstruation and MHM. Only 38 % girls used disposable sanitary napkins during menstruation. Almost 59 % of the respondents reported remaining absent from college during periods. High educational status of mother was found to be strong predictor of appropriate knowledge about menstruation among the adolescents. Economic constraint was found to be the major factor for not using disposable sanitary napkins which in turn is one of the major causes of college absenteeism. Girls also reported inability to change menstrual absorbents in college due to absence of proper disposal system.

Key Words: *Menstruation, Knowledge, Absenteeism, Hygiene, Adolescent.*

Introduction

The period of adolescence for a girl is a crucial period of reproductive development where physical and psychological preparation starts for motherhood. Adolescent girls enter puberty unwary, frightened and anxious about menstruation with limited information making it a taboo subject to raise. Inadequate education about puberty, poor menstrual health management (MHM) practice, insufficient water, sanitation and hygiene (WASH) facilities in educational institutes, cause school and college going girls to experience discomfort and humiliation during menstruation especially in low- and middle-income countries. [1] Although, the importance of puberty education is universally recognised, still the question of who should educate the young girls is debatable. Many countries resolve this issue by introducing appropriate reproductive health education in the school curricula, to familiarise young adolescents with puberty changes. India's National Health Mission programme has involved the female community health worker for this purpose with variable results. [2]

Menstruation can cause significant hindrance in the way of girls' access to health, education and future prospects if they are not equipped with good MHM. Estimates of the prevalence of methods of MHM like use of menstrual absorbents (cloth, toilet tissue, rags, leaves etc.), washing and drying practices, hygiene of genital parts, storing of absorbents and disposal of used absorbents vary greatly across countries. [3-4] Unhealthy menstrual practices are found to be particularly acute in rural areas and amongst women and girls of lower socio-economic groups. Improper MHM may result in urinary and reproductive tracts infections which are attributed to reuse of unhygienic sanitary absorbents. [5] World Bank statistics indicated that students remain absent in classes from one to four days every month during their menstrual cycle. [6] Several studies documented that girls face difficulty in managing menstruation in educational institutes due to lack of sanitary facilities and proper waste disposal system. Moreover, students had difficulty in attending class and performing in exams

due to menstrual related problems like blood leakage or staining as they did not use proper menstrual absorbents. This affects their academic performance.

There are scarce studies on perception on menstruation and practice of menstrual hygiene among tribal students in India. This study is therefore conducted with the aim of assessing the prevailing knowledge about menstruation and MHM and investigating the consequences of menstruation on college absenteeism among adolescent girls in this tribal dominated backward district of Odisha, India.

Materials and Method

Study design and setting

A college based cross-sectional study involving quantitative method was undertaken among randomly selected adolescent female students who were attending 12th grade and undergraduate courses during the time of data collection. This study was conducted in two undergraduate colleges in district Kandhamal, Odisha, India, during the period of August 2017 to February 2018. A total 740 students from two colleges were selected by doing systematic sampling.

Data collection procedure

After approval from the institutional ethical review committee, principal investigator and other team members of the project explained the nature and purpose of the study to all randomly selected students and written informed consent was taken from them. A structured pre-tested, close-ended questionnaire was developed and data was collected through face to face interviews. The questionnaire was divided into four sections comprising of variables on socio-demographic characteristics, knowledge about menstruation and MHM, practice of menstrual hygiene and reasons for college absenteeism during menstruation.

Data quality management and analysis

The data collected was compiled and imported to SPSS 19.0 (Statistical Package for Social Sciences). Descriptive statistics was used to determine mean and standard deviation for continuous variables like age while frequency and percentage for qualitative variables (caste, college, class year, place of residence). Multiple regressions were used to examine the effect of two or more independent variables on a single dependent variable to test the statistical significance at 95% confidence level. P-value of < 0.05 was considered as significant.

Results

Socio-demographic characteristics of participants

Seven hundred forty female students participated in the study. The mean age of the study participants was found to be 19 ± 1.2. About 339 (45.8 %) participants were below 18 years of age. Most of them resided in rural areas (n=397, 53.6%). About 43 % (n=319) belonged to reserved category (SC and ST). Mothers of most girls had below high school education (n=412, 62.5%) and were unemployed (n=564, 76 %). About a quarter of the girls (n=190) were from low socioeconomic settings (family income < Rs 10, 000).

Knowledge about menstruation and MHM

Only 36 % (n=268) respondents had appropriate knowledge; about menstruation and MHM. According to multivariate analysis students studying in final year (AOR (95 % C.I) 1.9 (1.6-2.3)) with monthly family income > Rs 10,000 [AOR (95 % C.I) 1.7 (1.2-2.5)] and whose mother had attended high school [AOR (95 % C.I) 3.7 (2.1-5.9)] had better knowledge than their counterparts (Table 1).

Practice of menstrual hygiene

Most of the respondents used homemade cloth (n=457, 62 %) and economic constraints 213 (75 %) seemed to be the main reason (Figure 1). Only 67 % (498) respondents disposed used absorbents whereas 242 (33 %) washed and reused them (Figure 2). Only 165 (22 %) students changed adsorbents at school.

Absenteeism during menstruation

As many as 439 (59 %) reported absence from college during menstruation. The major reason for college absenteeism was heavy bleeding and fear of staining their clothes (76 %) (Figure 3). Almost half the respondents felt uncomfortable being in school during menstruation because inability to change menstrual absorbent due to dirty toilets and lack of disposal facilities. Multivariate analysis showed that students who didn't use of disposable sanitary pads were associated with increase in absenteeism and vice versa [AOR (95%) 2.1 (1.8-3.2)] (Table 2).

Table 1: Comparison of knowledge level about menstruation and MHM by socio-demographic characteristics among study participants. (n=740)

Variables	Total Frequency (Percentage)	Appropriate Frequency (Percentage)	Inappropriate Frequency (Percentage)	COR (95%)	AOR (95%)
Educational status					
Higher secondary	292 (39.4)	62 (21.2)	230 (78.8)	1.6	1.9
Undergraduate	448 (61.6)	206 (46)	242 (54)	(1.4-1.8)*	(1.6-2.3)*
Place of residence					
Rural	397 (53.6)	94 (23.6)	303 (76.3)	2.0	
Urban	343 (46.3)	174 (50.7)	169 (49.2)	(1.5-2.8)*	
Caste					
General	421 (56.8)	179 (42.5)	242 (57.4)	2.4	
Reserved	319 (43.1)	94 (27.9)	230 (72.1)	(1.8-3.4)*	
Living arrangement					
Hostel	334 (45.1)	165 (49.4)	169 (50.5)	2.7	
Family	406 (54.8)	103 (25.3)	303 (74.6)	(2-3.7)*	
Mothers' educational status					
≥ high school	328 (44.3)	175 (53.3)	153 (46.6)	3.4	3.7
< high school	412 (55.6)	93 (22.5)	319 (77.4)	(2.6-5.5)*	(2.1-5.9)*
Family monthly income (in Rs)					
<10,000	190 (26.6)	53 (27.9)	137 (72.1)	2.4	1.7
≥10,000	550 (73.4)	215 (39)	335 (61)	(1.9-3.1)*	(1.2-2.5)*

Knowledge score ≥ 7 is appropriate and <7 is inappropriate.

***Statistically significant at p< 0.05.**

Table 2. Comparison of factors associated with college absenteeism during menstruation among study participants. (n=740)

Variables	Total Frequency (Percentage)	College Absenteeism Frequency (Percentage) Yes	No	COR (95%)	AOR 95%)
Educational status Higher secondary Undergraduate	292 (39.4) 448 (61.6)	184 (63) 255 (57)	108 (37) 193 (43)	0.86 (0.45-2.43)	
Place of residence Rural Urban	397 (53.6) 343 (46.3)	234 (59) 205 (59.8)	163 (41) 138 (40.2)	0.58 (0.32-1.22)*	
Caste General Reserved	421 (56.8) 319 (43.1)	256 (60.8) 183 (57.3)	165 (39.2) 136 (42.7)	1.32 (0.76-3.11)	
Living arrangement Hostel Family	334 (45.1) 406 (54.8)	194 (58) 245 (60.3)	140 (42) 161 (39.7)	0.47 (0.11-3.78)	
Mothers' educational status ≥ high school < high school	328 (44.3) 412 (55.6)	186 (56.7) 253 (61.4)	142 (43.3) 159 (38.6)	0.95 (0.40-2.45)	
Family monthly income (in Rs) <10,000 ≥10,000	190 (26.6) 550 (73.4)	132 (69.5) 307 (55.8)	58 (30.5) 243 (44.2)	0.42 (0.22-0.82)*	
Use of disposable pads Yes No	283 (38.2) 457 (61.8)	108 (38.2) 331 (72.4)	175 (61.8) 126 (27.6)	1.96 (1.08-3.40)*	2.14 (1.8-3.28)*

*Statistically significant at $p< 0.05$.

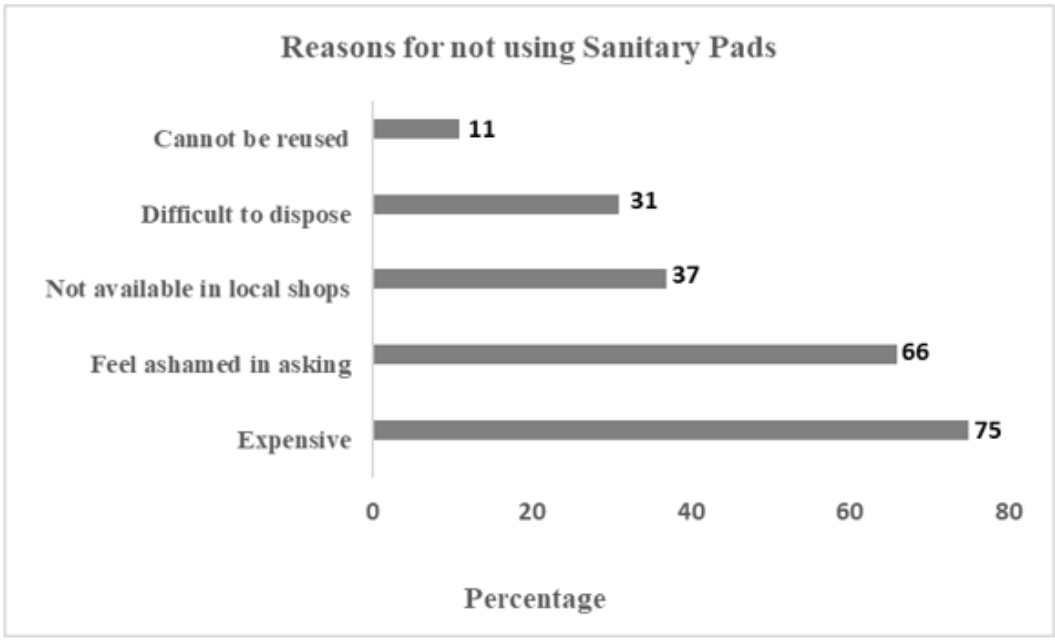


Figure 1

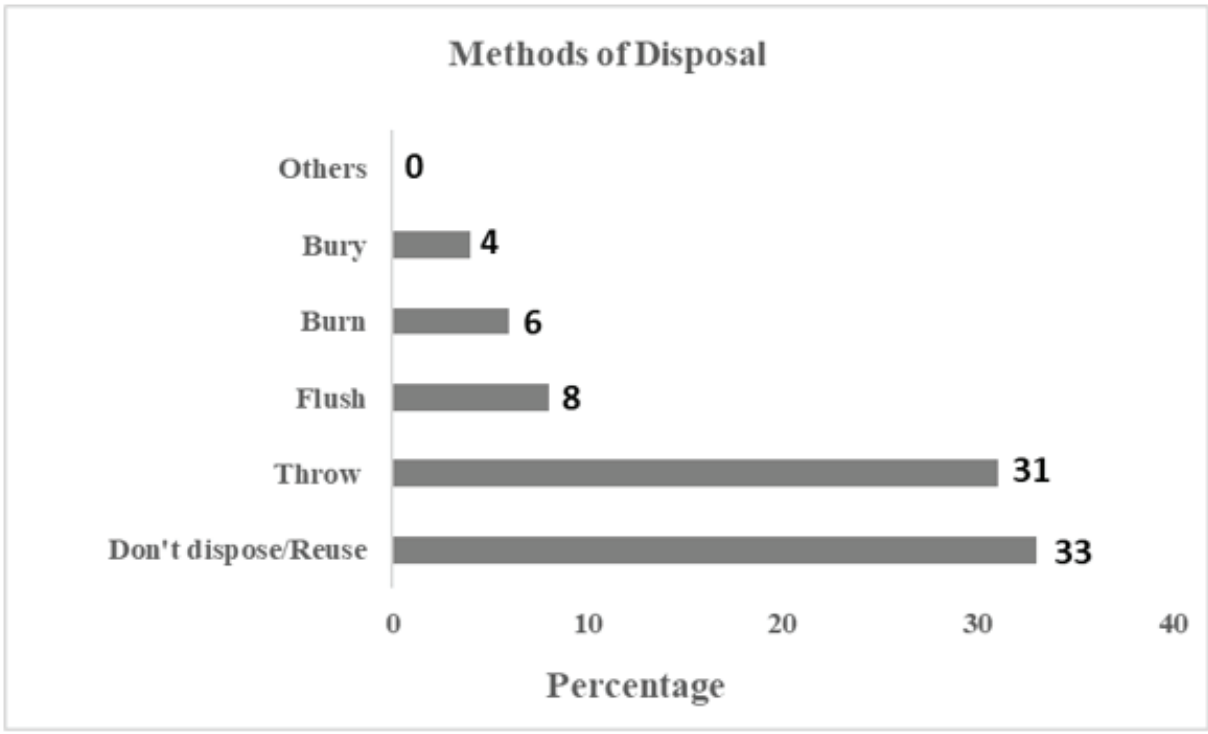


Figure 2

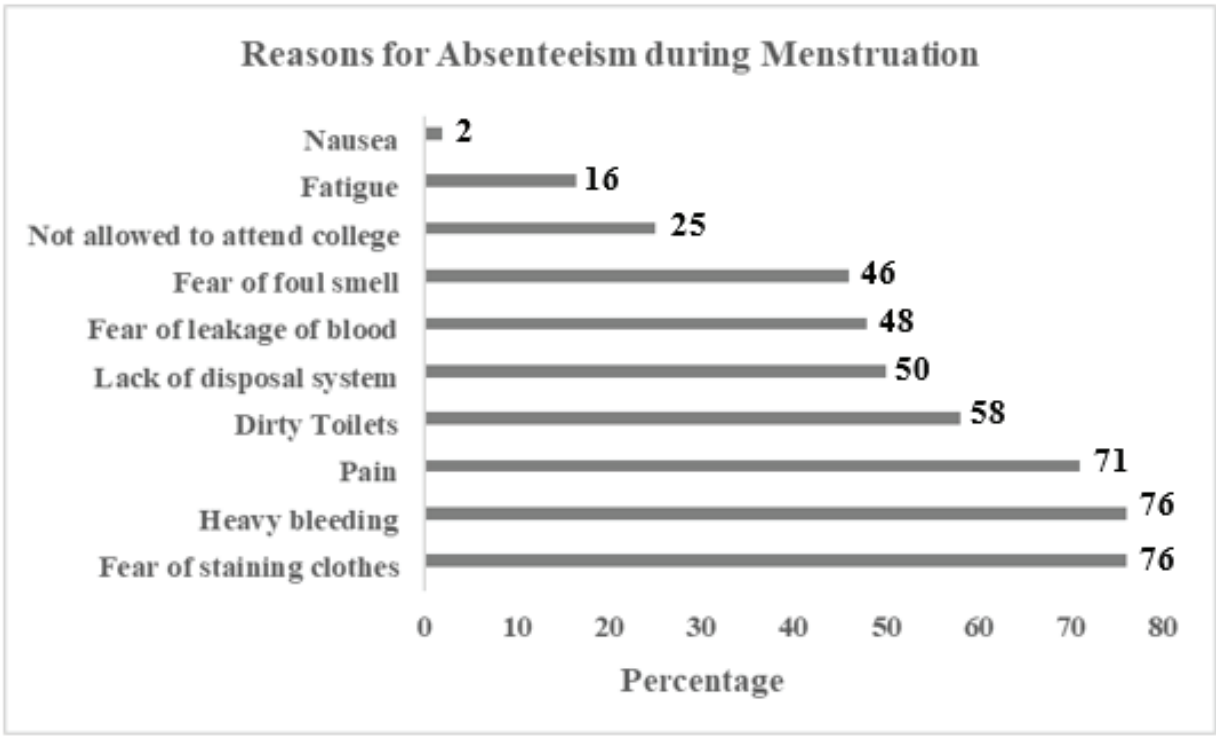


Figure 3

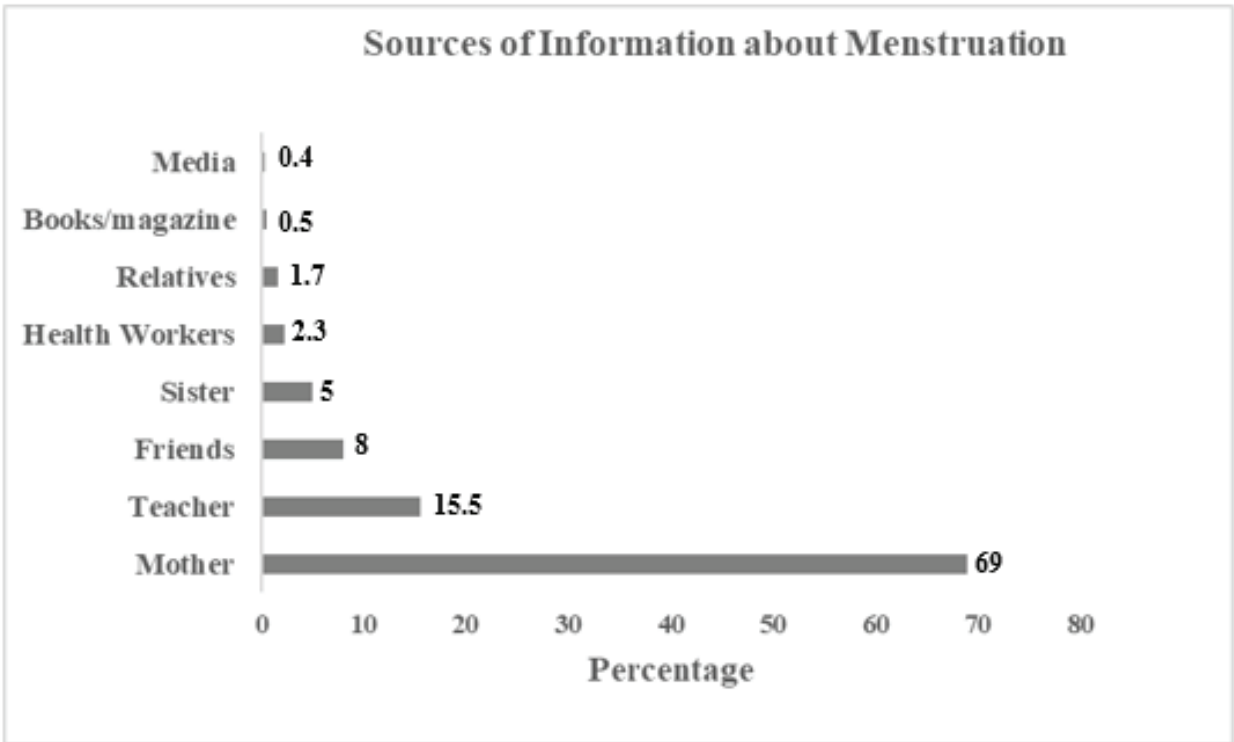


Figure 4

Discussion

There is lack of awareness among the socially underdeveloped communities about the various measures needed for protection of health and dignity of young adolescent girls during menstruation.

In this study, we observed that most of the adolescent girls started menarche unaware of its biological cause. Majority of the girls had different misperceptions towards menstruation and faced different psychological trauma due to lack of any prior knowledge and unpreparedness during periods. These negative reactions like shame, irritation, tension, fear and guilt were also found in other studies. [7] Learning about menstrual cycle is important for adolescents for the purpose of avoiding unexpected menstrual bleeding and knowing about fertile periods and contraception. This lack of knowledge may be related to absence of reproductive education in schools and fewer parents to child communication about menstruation and MHM. These finding are closely related to other studies**.** **[8]** Ideally, school teachers or health workers should be the first source of information so that right knowledge about menstruation can be imparted to the young adolescents. We found mother to be the major source of information and higher educational status of adolescent's mothers to be an important predictor of knowledge about menstruation and MHM (Table 1, Figure 4). [9] The explanation for this can be attributed to the fact that educated women possess better knowledge and perception towards MHM and have access to various healthcare services information. The present study revealed that final years undergraduate students had better knowledge than those studying in first year and 12th grade. This suggests that increase in educational status of students clears the various doubts and misconceptions related to menstruation and makes them more aware.

Different types of menstrual absorbent materials were used which is dependent on the diversity of socio-economic settings of the girls. About 38% of the girls used cloth during menstruation instead of sanitary pads which was comparable to a study from Ethiopia. [10] Despite the discomfort being felt due to use of cloth, it still remains the preferred means for them, due to its easy availability, low cost and reusability which is in agreement with other studies. [11] Majority of the girls did not wash their genital area with soap or antiseptics, unaware of the importance of maintaining cleanliness in the genital area during menstruation as reported elsewhere. [12] Out of 740 respondents, only 29 % girls changed their menstrual absorbent more than twice and 71 % only once a day similar to another study. [13] A few girls reported itchiness, burning, and rashes in their genital areas which may be due to improper cleaning and drying (lack of exposure to sunlight) of the menstrual soak-up cloth similar to study from Nagpur. [14] Most of the girls avoided bathing during their periods due to lack of separate enclosed bathing space at their homes, scarcity of water or lack of privacy. The lack of toilets at home is of great concern with regard to safety, privacy and dignity, as reported repeatedly by women in India. [15] Only a quarter of the girls changed their menstrual absorbents at college, comparable to findings from other studies. [16] The major reason accounted was absence of proper disposal system at college. The girls who reported changing pads had to bring the soiled absorbent back home or throw it in open spaces. We observed that the urban girls disposed the used absorbents in routine household waste by wrapping them in sheets of papers and polythene related to findings from other studies. [3] However, in rural areas a range of options used for disposing of menstrual materials includes burning, burying, throwing in the waste bin, pit latrine or flushing. Inadequate disposal methods at times cause problems like clogging of toilet and polluting the local streams in villages. [17] Disposal of commercial pads is a matter of concern because of their high content of non-biodegradable components. [18]

In present study menstruation-related college absenteeism rate of 42% observed here was also consistent with previous reports. [19] Menstruating girls from socially deprived backgrounds especially residing in rural areas are more likely to miss college as they use cloths instead of sanitary pads. Even if girls manage to attend college during menstruation, the fear of staining their clothes or being humiliated for foul smell of menstrual absorbent reduces their concentration and makes them hesitant to participate in class activities. This concern has been raised in other studies. [10] Further due to absence of a proper waste disposal system, most girls end up carrying the used material back home or throwing them in open. This reveals the need for clean toilets combined with the establishment of proper waste disposal systems in educational institutes.

Conclusion

The results from the present study suggests negligence of adolescent girl's reproductive health

needs in these tribal areas. Lack of sanitized menstrual absorbents and sanitary facilities in educational institutes seriously jeopardizes academic performance in adolescent girls. In order to improve gender equality in educational institutes of these backward poor districts, emphasis should be given to adolescent girl's menstrual needs by providing them free or subsidized sanitary napkins. Further installation of incinerators in colleges can not only solve the pad disposal problem but also reduce environmental pollution due to throwing or burning of disposable sanitary pads. Hence, government should give special attention towards making educational institutes a comfortable place for girls.

Conflict of Interest: Nil

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethical Clearance: From institutional ethical Committee**.**

References

1. Mahon T, Fernandes M. Menstrual hygiene in South Asia: a neglected issue for WASH (water, sanitation and hygiene) programmes. Gend Dev 2010; 18: 99–113.
2. National Rural Health Mission, Ministry of Health and Family Welfare, Government of India. Operational guidelines: promotion of menstrual hygiene among adolescent girls (10–19 years) in rural areas. New Delhi, India: National Rural Health Mission, 2010.
3. Dasgupta A, Sarkar M. Menstrual hygiene. How hygienic is the adolescent girl. Ind J Comm Med 2008; 33(2): 77–80.
4. Dhingra R, Kumar A, Kour M. Knowledge and practices related to menstruation among tribal (Gujjar) adolescent girls. Ethno-Med 2009; 3 (1), 43–48. 8328862824
5. Thakur H, Aronsson A, Bansode S, et al. Knowledge, practices, and restrictions related to menstruation among young women from low socioeconomic community in Mumbai, India. Front Public Health. 2014; 2:72.
6. United Nations, educational, scientific and cultural organization (UNESCO) (2014) Puberty education and menstrual hygiene management. Available: Age of Menarche and Knowledge about Menstrual Hygiene Management. Plos one 2014; 9.e108644.
7. Abhay B, Naveeta K. A cross-sectional study on awareness regarding safe and hygienic practices amongst school going adolescent girls in rural area of wardha district, India. Global J Health Sci 2010; 2(2): 225–31.
8. Oche M, Umar A, Gana G, Ango J. Menstrual health: the unmet needs of adolescent girls' in Sokoto, Nigeria. Sci Res Essays 2012; 7(3): 410–418.
9. El-Gilany A, Badawi K, El-Fedawy S. Menstrual hygiene among adolescent school girls in Mansoura, Egypt. Reproductive Health Matters 2005; 13(26):147-52.
10. Tegegne TK, Sisay MM. Menstrual hygiene management and school absenteeism among female adolescent students in Northeast Ethiopia. BMC public health 2014; 14; 1118.
11. Abioye-Kuteyi EA. Menstrual knowledge and practices amongst secondary school girls in Ile-lfe, Nigeria. The journal of royal society for the promotion of health 2000; 120(1): 23–6.
12. Narayan KA, Srinivasa DK, Pelto PJ, Veeramal S. Puberty rituals, reproductive knowledge and health of adolescent schoolgirls in South India. Asia Pacific Population J 2001; 16(2): 225-38.
13. Shanbag D, Shilpa R, D'Souza N, et al. Perceptions regarding menstruation and practices during menstrual cycles among high school going adolescent girls in resource limited settings around Bangalore City, Karnataka, India. Int J Collab Res Int Med Public Health 2012; 4:1353-62.
14. Subhash, B, Thakre S, et al. Menstrual Hygiene: Knowledge and Practice among Adolescent School Girls of Saoner, Nagpur District. Journal of Clinical and Diagnostic Research 2011; 5(5): 1027-33.
15. Nallari A. "All we want are toilets inside our homes!" The critical role of sanitation in the lives of urban poor adolescent girls in Bengaluru, India. Environ Urban 2015; 27:73–88.
16. Omidwar S, Begum K. Factors which influence the hygienic practices during menses among girls from south India: A cross sectional study. Int J of Coll Res Int Med Pub Health 2010; 2:411-23.
17. WaterAid. Is Menstrual Hygiene Management an Issue for School Girls? WaterAid, Nepal 2009.

18. Jamwal N. Why are we pretending that there isn't a growing mountain of menstrual waste we need to deal with? 2015.

19. Grant MJ, Lloyd CB, Mensch BS. Menstruation and school Absenteeism: evidence from Rural Malawi. Comp Edu Rev 2013; 57: 260–84.

Myofascial Release Technique with Virtual Reality Biofeedback in Lateral Epicondylitis – A Case Report

Parth Trivedi[1], R.Arunachalam[2], Ruchir Patel[3], K. Vaittianadane[4]

[1]Ph.D. Scholar, Department of Physiotherapy, Madhav University, Abu Road, Rajasthan & , Lecturer, C.M. Patel College of Physiotherapy, Gandhinagar, Gujarat, [2]Professor& HOD, Department of Physiotherapy, Madhav University, Abu Road, Rajasthan, [3]Tutor, C.M. Patel College of Physiotherapy, Gandhinagar, Gujarat, [4]Principal, C.M. Patel College of Physiotherapy, Gandhinagar, Gujarat

Abstract

Background & Aim: Lateral Epicondylitis (LE) also known as Tennis Elbow is a lesion due to chronic overuse injury of wrist extensors which causes damage to the wrist extensor tendons at their origin i.e. lateral epicondyle of the humerus. Thus, the aim of this case report is to report about the efficacy of virtual reality through EMG biofeedback and myofascial release technique in the case of lateral epicondylitis.

Methodology: This study reports the efficacy virtual reality through EMG biofeedback and myofascial release technique along with pulsed ultrasound therapy in 37 year old male non-diabetic patient diagnosed with chronic lateral epicondylitis. The main intervention in this case involved virtual reality through EMG biofeedback and myofascial release technique (MFR) along with pulsed ultrasound therapy for 4 weeks. The treatment goal was to reduce inflammation, pain and restore wrist extensor muscle strength to avoid recurrence. The treatment outcome for pain was measured by 11 point Numerical Pain Rating scale, hand grip strength by hand dynamometer & functional score by Patient Rated Tennis Elbow Evaluation. All the outcome measures were taken and analysed at baseline and after end of treatment.

Conclusion: Combination of virtual reality through EMG biofeedback and myofascial release technique along with pulsed ultrasound therapy had promising result in rehabilitation of lateral epicondylitis and thus allowing return to work and play as quickly as possible.

Keywords - *Lateral Epicondylitis, Surface EMG, Biofeedback, MFR, Pulsed Ultrasound.*

Introduction

In non-traumatic elbow disorders, lateral elbow pain is the commonest medical consultation and most frequent diagnosis is lateral epicondylitis which is also known as tennis elbow.[1]

In 1873 Runge first described lateral epicondylitis as chronic degenerative disorder affecting the common wrist extensor tendon origin at the lateral epicondyle of the humerus leading to pain over the lateral epicondyle of the humerus and decreased grip strength[2]. The most common muscle getting affected in lateral epicondylitis is extensor carpi radialis brevis but in some cases other wrist extensor muscles like extensor carpi radialis longus, extensor digitorum, extensor carpi ulnaris and muscles like supinator can also be involved.[3]

Lateral epicondylitis is caused / aggravated by doing repeated wrist extension movement like due heavy labour work, playing tennis or typing. In addition to this factors like smoking and obesity are also identified as significant risk factors. Thus, lateral epicondylitis which occurs because of symptomatic degenerative process of extensor tendons of the wrist, many authors claim it tendinosis rather than tendinitis because of lack of inflammatory cells[4].

With the repetitive activities there is increase in shear force at tendon-bone junction causing extensor

Corresponding Author:
Parth Trivedi
E-mail: drparthtrivedi@live.in

muscles enthesis ultimately reducing the strength of the tendon. [5]

It is assumed that lateral epicondylitis affects around 1% to 3% of the population in middle aged individuals with ratio being similar in male and females each year. In United States every year around 1 million people have new onset of lateral epicondylitis[4] and this ultimately causes heavy socioeconomic burden because of lost workdays for several weeks[4].

In current medical practice there are various treatment options available for the treatment of lateral epicondylitis but with less evidence. The treatment options comprises of both conservative and surgical methods.

In physical therapy there are number of therapeutic modalities and technique available but none of them have proven significant and long lasting effect on lateral epicondylitis. Majority of the treatment will include progressive resisted exercises, ultrasound therapy, low level LASER therapy, soft tissue release technquie, manual mobilisation[6].

Soft tissue release technique like myofascial release technique basic principal is to release the fascial restriction by applying low load long duration stretch to myofascial system which thereby decreases the pain and imporves the function.By reducing the facial tightness, pressure over the strutures below fascial like nerves, blood vessels is releived and thus pain and functional performance is improved[7].

Nowadays, Virtual rehab is an emerging trend in physical therapy which is used in different populations. It is the rehab which is done using computerized stimulation in two dimension or three dimension which is in real time and interactive. Thus, this aids rehabilitation of the individual by giving feedback to the individual based on individual's condition.

Till this date there is no evidence regarding the combine use of myofascial release technique and virtual realtity biofeedback in the rehabilitation of lateral epicondylitis[8].

Thus, the main aim of this paper is to find the efficacy of Myofascial Release Technique with Virtual Reality Biofeedback in Lateral Epicondylitis in lateral epicondylitis.

This paper gives insight to the case report of one patient diagnosed with lateral epicondylitis with detailed examination, pathology and treatment given with its improvement.

Case Report

A 37- year old male patient, right hand dominant working in central armed police force with main work of doing clerical work which involved computer work and recreational tennis player predominately had chief complaints of pain over right epicondyle that had lasted for over 4 weeks. The patient complaint of increase in pain gradually after patient played tennis before 4 weeks and later hand grip strength was also affected. For few days patient ignored the pain and applied local ayurvedic ointments but that didn't reduce the pain. Patient than consulted an orthopaedic surgeon at Gandhinagar, Gujarat where patient was prescribed with aceclofenac (analgesic) and paracetamol (anti-inflammatory) medications and local topical analgesic spray for two weeks. After two weeks of allopathic treatment the patient was referred for physiotherapy.

At physiotherapy department detail assessment of the patient was undertaken in SOAP format (Subjective, Objective, Assessment and Planning) which included demographic details of the patient and history and examination of the patient.

The patient had no other systemic illness or never had undergone any major surgery in past. The patient was the only earning member in his family which comprised of his wife and two children. Patient was in this occupation since last 12 years.

On examination of tenderness; patient had grade 3 tenderness over right lateral epicondyle region. No ecchymosis was there but localized swelling was present when compared with opposite side. The active and passive range of motion assessment of right shoulder, elbow and wrist joint were full in all movements of the concerned joint apart from right wrist extension which was reduced by 4 degrees. The end feel examination of the right elbow was also normal but right wrist extension had empty end feel as patient felt pain in terminal range of wrist extension.

The patient was also tested for resisted isometric testing of right wrist extensors which was weak and painful. At last special test cozen's test was performed to confirm the diagnosis, which was positive. Thus, the

patient was diagnosed with right lateral epicondylitis affecting the right extensor carpi radialis brevis muscle.

The patient than was explained about the treatment procedure which included surface emg biofeedback through virtual reality and myofascial release technique including pulsed ultrasound therapy as mentioned. The treatment protocol was designed for 4 weeks with 3 sessions per week.

The patient agreed for the treatment and then the outcome measures of the patient were collected at the baseline. All the outcome measures were collected at the baseline and at the end of treatment i.e. 4th week.

The patient was assessed with the outcome measures mainly being pain, hand grip strength, functional performance and surface electromyography at baseline. Pain which was characterized as dull ache rated 6 out of 10 on 11 point numerical pain rating scale in which zero being no pain and 10 being the worst pain ever. The hand grip strength was measured by Jamar Hand Dynamometer which was 28lb. on average of 3 trials. The functional score of the patient was taken through Patient rated tennis elbow evaluation which was 64 out 100 in which higher score indicates more pain and more functional disability. The patient was also assessed with amplitude in surface EMG which was 120 µV.

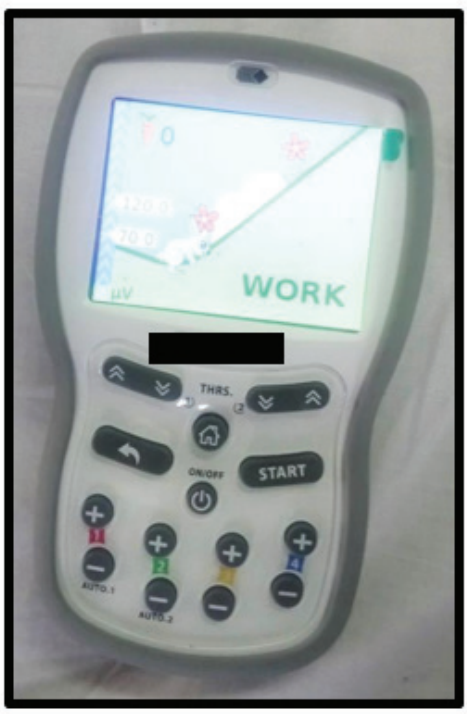


Figure 1: Surface EMG biofeedback Virtual Game

Figure 1 shows the bunny game which was used as virtual reality through surface emg biofeedback. The game was into two segment which was comprised of rest and work phase.

Treatment Given:

1. Pulsed Ultrasound Therapy[7]: **Site:** Tenoperiosteal junction of the extensor carpi radialis brevis, At 1:4 Pulse Ratio, **Frequency:** 1MHz, **Intensity:** 1.5 W/cm2, **Duration:** 5 minutes.

2. Myofascial Release Technique[7]: Patient position was supine lying with affected side shoulder rotate internally, elbow flexion to around 15° and pronation, palm resting flat on table.

Procedure 1: This procedure involved treatment through common extensor tendon to extensor retinaculum of wrist which began through humerus, just proximal to lateral epicondyle. Fingertips were used to engage the periosteum from inferior of common extensor tendon and this was carried forward till extensor retinaculum of the wrist (5min, 2 repetitions). Then, the patient slowly flexed and extended the elbow within range of 5° to 10° during this procedure.

Procedure 2: This procedure involved treatment through periosteum of ulna, using the knuckles of hand (5min, 2 repetitions). Then the patient performed alternating ulnar and radial deviation of wrist.

Procedure 3: This treatment involved spreading of the radius from ulna, head of ulna with finger pads of one hand and dorsal tubercle of radius with the pads of other were treated after proper contact. The therapist engaged through to the periosteum and put a line of tension in a lateral and distal direction. It was carried for just a few centimeters with a firm intent to spread the bones (5min, 2 repetitions).

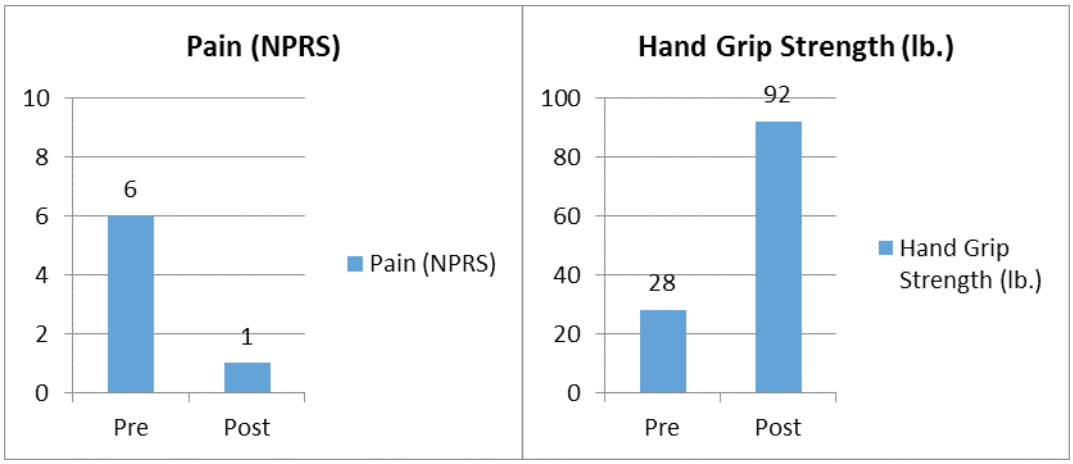
3. Surface EMG– Virtual Reality Biofeedback[8]: Patient Lying Supine.

Patient's motor unit action potential of wrist extensors was measured through surface EMG amplitude analysis. Than upper limit and lower limit was than identified and set. The Patient was than given virtual biofeedback in form of bunny game in which on appropriate contraction of wrist muscles as per the set upper and lower limit of the motor unit action potential causes bunny to move ahead and collect carrot.

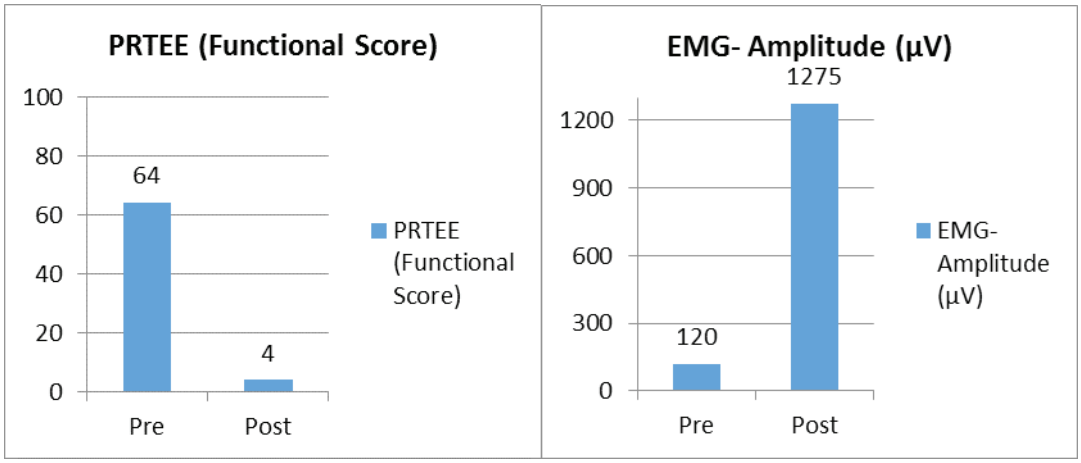
After the first treatment session patient reported to feel 40 percent better. All the outcome measures; pain (11point NPRS)[9], Hand Grip Strength (Hand Dynamometer)[7], Functional Score (PRTEE)[7] and Surface EMG amplitude[10] were taken at the end of treatment i.e. 4th week. Comparison of the same is mentioned in table 1 and outcome parameter wise comparison in shown as graphical representations in graph 1 & 2 respectively.

Table 1: Comparison of Pre and Post Outcome Measures

Outcome	**Pre**	**Post**
Pain	6	1
Hand Grip Strength (lb.)	28	92
PRTEE	64	4
EMG- Amplitude (µV)	120	1275



Graph 1: Pre & Post Comparison of Pain and Hand Grip Strength



Graph 2: Pre & Post Comparison of PRTEE and EMG

Patient was also recommended to purchase a light, non-vibrational professional racquet with moderate string tension and was also taught proper stroke techniques to avoid anuy recurrences after treatment session.

Discussion

Any rehabilitation protocol in orthopaedic injuries which is designed has the main aim to reduce pain and increase muscle function. Looking into this our main aim to present this case report was to find out an effective rehabilitation protocol which not only has its effect on reducing pain but also improves muscle function and thereby reducing the chances of recurrence.

In lateral epicondylitis extensor carpi radialis brevis muscle is the most injured muscle increased wrist movement which cause increase in tension leading to repetitive stress on the extensor carpi radialis brevis muscle. This ultimately results into pain over lateral epicondyle of the humerus which is the origin of common extensor of the wrist.[7] It is postulated that repetitive muscle contraction leads to angiofibroblastic degneration because of continous micro trauma resulting into failure of natural healing process.[3,5]

Thus understanding the biomechanics of the wrist and elbow is at most important as the tension and stress which is produced because of the repetitive injuries needs to be addressed.[3]

In lateral epicondylitis previous studies have reported that over 90% of cases responded well to conservative treatments but one of the meta analysis done by Labelle etal in 1992 concluded that there is no sufficeint evidence of any single treatment in lateral epicondylitis.[7.]

The same phenomenon is supported by Bisset et al which states that there are no long term benefits of physical therapy intervention in lateral epicondylitis.[7]

As this study focused on improving the pain and function of the pateint with lateral epicondylitis, MFR was given to the patient with the aim to release the fascia and thereby aligining the collagen fibres which imporves the tensile strength of the muscle and thereby reducing the pain, improving grip strength and functional performance as the fascia returns to the normal length. The reduction in pain due to MFR is mainly because of stimulation of afferent pathways and excitation of afferent A delta fibres which leads to segmental pain supression and activation of descending pain inhibiting pathway.[7]

Addition of virtual reality assisted surface emg biofeedback had an additive advantage as the accuracy of muscle strengthening was based on motor unit action potential graph. This not only helped the therapist in increasing the resistance of the strengthening program but also actively involved the patient as it had game component in it. Virtual reality through the phenomenon of task oriented training and repetition intensity helps in regaining the strength of the muscle and thereby reduces chances of reccurence. [8]

Ultrasound has proven effects on reducing the inflammation and improving the tissue healing; this would indeed improve muscle strength and power.[7]

As mentioned in table 1, at the end of 4 weeks of treatment there was significant improvement in all the outcome parameters. Even the amplitude analysis was in favour of the treatment.

Conclusion

We conclude that there are positive and promising result of using surface EMG biofeedback in terms of virtual reality in combination of myofascial release technique in lateral epicondylitis.

Throug this case report we recommend that the same protocol should be studied under larger group of people.

Conflict of Interest: We declare there was no conflict of interest in the entire journey of this case report.

Funding Source: All the required assistance regarding the treatment of the patient was given by C.M. Patel College of Physiotherapy, Gandhinagar, Gujarat.

Ethical Cleareance: Prior to the treatment of the patient; due ethical clearance was taken from the institutional ethical committee of C.M. Patel College of Physiotherapy, Gandhinagar, Gujarat.

References

1. Antuña S, Barco R. Essentials In Elbow Surgery-A Comprehensive Approach to Common Elbow Disorders. London: Springer London; 2014.
2. Runge F. Zur Genese und Behandlung des schreibe Kranfes. Bed Klin Worchenschr 1873;10:245-248. (In German)
3. Eygendaal D, Rahussen F, Diercks R. Biomechanics of the elbow joint in tennis players and relation to pathology. British Journal of Sports Medicine. 2007;41(11):820-823.
4. Shiri R, Viikari-Juntura E, Varonen H, Heliovaara M. Prevalence and Determinants of Lateral and Medial Epicondylitis: A Population

Study. American Journal of Epidemiology. 2006;164(11):1065-1074.

5. Doran A, Gresham GA, Rushton N, Watson C. Tennis elbow. A clinicopathologic study of 22 cases followed for 2 years. Acta Orthopaedica Scandinavica 1990;61:535-538
6. Parth Trivedi, R. Arunachalam. Rehabilitation of Chronic Lateral Epicondylitis-An Evidence Based Approach. International Journal of Physical Education and Sports Sciences 2019;14(1):41-46
7. Khuman PR, Trivedi P, Devi S et al. Myofascial release technique in chronic lateral epicondylitis: a randomized controlled study. International Journal of Health Sciences and Research.2013; 3(7):45-52.
8. Pimentel, K., & Teixeira, K. (1995). Virtual Reality: Through the New Looking Glass. New York: McGraw-Hill.
9. Amelia Williamson, Birmingham Hoggart, Pain: a review of three commonly used pain rating scales, 2005 Blackwell Publishing Ltd, Journal of Clinical Nursing, 14, 798–804
10. Misra U. Clinical Neurophysiology. Elsevier Health Sciences APAC; 2014.

Awareness of Causes, Consequences and Preventive Measures of Thyroid Disorder among Women in Punjab

Pooja Kansra[1], Vedica Awasthi[2]

[1]Associate Professor and Corresponding Author, Mittal School of Business, Lovely Professional University, India,
[2]Research Scholar, Mittal School of Business, Lovely Professional University, India

Abstract

Background and Objective: Thyroid is very common disease now-a-days and women are more risk prone than men. Therefore, main objective of the present study is to examine the awareness of thyroid disorders among the women of Jalandhar, Punjab.

Method: Primary data was collected from 200 women of Jalandhar with the help of a well-structured questionnaire.

Result: The result of the study demonstrated that age and family history were the important factors which influence thyroid disorder among women. The study clearly depicted that majority of the respondents were not aware of the symptoms and preventive measures of Thyroid. Thyroid leads to a rise in goiter, stress and depression which requires prevention at the early stage.

Conclusion: The significant determinants of awareness of Thyroid were age, education, family history and its incidence. The study suggested that one should take prevention measures after observing the symptoms like sudden weight gain, excessive hair fall, voice change and sore throat.

Key words: *Thyroid Disorder, Hypothyroidism, Hyperthyroidism, Awareness, Incidence.*

Introduction

Thyroid hormone disorder (THD) is a major health problem and related to a large range of diseases (Sijapati et al., 2019)[1]. Thyroid hormones are significant to the growth and development of a number of body tissues, and anthropometric factors are affected by thyroid disorders, such as hypothyroidism and thyrotoxicosis. An enlarged risk of thyroid cancer is among women with higher body mass index (BMI) or who had sudden weight gain (Bosetti et al., 2002)[2]. The body mass index of females were directly associated with thyroid cancer risk but not in case of men. Furthermore, in one of those studies found that height was directly associated with thyroid cancer risk in men (Maso et al., 2000)[3]. According to Bagcchi (2014)[4] prevalence of hypothyroidism is 11 percent in India as compared to 2 percent in UK and 4-6 percent in USA. It is expected that approximately every third person in India will suffer from thyroid disorders viz. weight gain and hormonal changes (Economic Times, 2017)[5].

Thyroid dysfunction, especially hypothyroidism, is more common in women (Alterio et al., 2007; Jung et al., 2018)[6,7]. Women who did not sense stress disorder signs were more expected to be elevated somatotype than women who sensed it (Jung et al., 2018)[7]. Skin is one of the organ which helps in observing a large number of the clinical symptoms. Hyperthyroidism symptoms which can be seen on skin includes warm,

Corresponding Author,
Pooja Kansra
Associate Professor and Mittal School of Business,
Lovely Professional University, India
Email: pkansra@gmail.com

moist skin, palmo-plantar hyperhidrosis, facial flushing, skin pigmentation, pretibial myxedema, onycholysis, plummers nail etc. According to Ross et al. (2016, p.1343)[8], "*described evidence based clinical guidelines for the management of thyrotoxicosis that would be useful to generalist and subspecialty physicians and others providing care for patients with this condition*". Hypothyroidism symptoms of skin include dry coarse skin, hair loss, pruritus, hypohydrosis, yellow skin, brittle nails, loss of cuticle, vertical striations (Sijapati et al., 2019)[1]. Hypothyroidism if remains untreated or inadequately treated in pregnant women can compromise fetal neurocognitive development (Bagcchi, 2014)[4].

Thyroid disorder has well-characterized deadly effects and can lead to severe on the cardiovascular system (Nyirenda, 2005; Jung et al., 2018)[9,7]. Iodine deficiency is one of the risk factor for goiter, thyroid nodularity and hyperthyroidism. Iodine-induced hyperthyroidism takes place more often in state of long-term iodine deficiency (Volzke et al., 2003; Zimmermann and Boelaert, 2015)[10,11]. Significant differences were found between both regions with a slight difference in iodine excretion (Knudsen et al., 2000)[12]. Usually, radioiodine has been used for the treatment of various forms of thyrotoxicosis like Graves' disease, toxic nodular goiter and solitary toxic nodule for so many years. Over the time it is confirmed as a safe, effective and relatively reasonably priced therapy and significant differences in several aspects of clinical practice relating to the use of radioiodine treatment for benign thyroid disorders in the UK (Vaidya et al., 2008)[13].

Thyroid has relation with diseases like depression and diabetes too. The relation between thyroid hormones and depression was brought up in the late 1960s in a clinical group (Ittermann et al., 2015)[14]. Thyroid diseases and diabetes mellitus are the two most common endocrine disorders came across in clinical practice. Diabetes and thyroid disorders have mutual influence on each other and relations between both conditions have long been reported (Hage et al., 2011)[15]. It is observed that if a person had goiter in past has more risk of thyroid cancer (Bosetti et al., 2002)[2]. According to Likhtarov et al., (2006)[16] the thyroid cancer frequency rate increased statistically significant with increasing screening rate. Cancer is the most common disease of the endocrine system and the eighth most common cancer among women (Ward et al., 2010)[17]. Thyroid generally remained undetected and untreated among the Indian masses impaired the performance and economic productivity in the country. Considering various consequences of Thyroid disorder, it is required to study the awareness of causes, consequences and preventive measures of Thyroid disorders among the women in Jalandhar.

The study was organized into five sections. Section I introduces the various risk factors of Thyroid. The research methodology was extensively discussed in Section II of the present study. Section III, analyzed the empirical findings of the study. Section IV, concludes the whole discussion along with policy implications.

Methodology

Study design

The present study is descriptive, cross-sectional study in nature and conducted in the North Indian state of Punjab, where responses were collected with the help of a structured questionnaire. The data was collected from April 2018 to August 2018.

Material and Method

In the study an attempt was made to examine the awareness of the preventive measures and risk factors of Thyroid. For the collection of data a structured questionnaire was drafted. A sample of 200 women was obtained from an urban city of Punjab, Jalandhar using convenience sampling approach. The analysis of the data was made with the descriptive statistics and Logit regression. The dependent variable was defined as "Aware of Thyroid" and measured as 1=aware of thyroid and 0 otherwise. However, independent variable consists of socio-economic variables.

Empirical Analysis

Table 1 demonstrated that respondents were mainly of 18 to 25 years of age which was followed by age group of 25 to 35 years and below 18 years. Half of the respondents were post graduated and others were graduated, only few had done diploma. Majority of the respondents fell under the income group of ₹1 lakh to ₹2 which was followed by the income group of ₹2 lakh to ₹3 lakh category and then by up to ₹1 lakh category. Majority of the respondents were single, only 12 percent were married.

Table: 1: Demographic Characteristics of the Respondents

Characteristics (N=200)	**N (%)**
Age	
Below 18 years	14 (7)
18- 25 years	114(57)
25-35 years	72 (36)
Total	200 (100)
Education	
Diploma	6(3)
Graduate	94(47)
Post Graduate	100(50)
Total	200 (100)
Income	
Up to ₹1,00,000	16 (8)
₹1,00,000- ₹2,00,000	120(60)
₹2,00,000- ₹3,00,000	48 (24)
₹3,00,000- ₹4,00,000	10 (5)
₹4,00,000- ₹5,00,000	6 (3)
Total	200 (100)
Marital Status	
Single	176 (88)
Married	24 (12)
Total	200 (100)

Source: Author's Calculation

Table 2 exhibited the awareness of respondents regarding the symptoms and risk factors of thyroid. It was observed that out of 200 respondents, 22 percent were aware of weight gain, only 3 percent of them were aware of irregular menstrual cycle; 52 percent were aware of hair fall; 61 percent were aware of sore throat, joint pain and voice change and 69 percent were aware of infertility; 77 percent were aware of puffy skin or dry skin and 79 percent were aware of goiter as various symptoms of thyroid. It was observed that respondents were aware for risk factors as: only 4 percent were aware for gender and pregnancy; 15 percent were aware for stress and 51 percent were aware for family history.

Table: 2: Awareness of Symptoms and Risk Factors of Thyroid

Awareness Regarding Symptoms		
Symptoms	Percent	
	Yes	No
Constipation/Diarrhea	12	88
Depression	11	89
Goiter (increased size of the thyroid)	79	21
Hair fall	52	48
Infertility	69	31
Irregular menstrual cycles	3	97
Skin problems	9	91
Sore throat, neck pain, joint pain	61	39
Thick puffy skin /or dry skin	77	23
Voice change	61	39
Weight gain	22	78
Awareness Regarding Risk Factors		
Variables	Percent	
	Yes	No
A diet low in iodine	25	75
Age	63	37
Family History	51	49
Gender	4	96
Not eating enough or eating certain vegetables	35	67
Obesity	48	52
Pregnancy	4	96
Smoking	15	85
Some foods that are high in goitrogens broccoli, cabbage, Brussels sprouts, cauliflower, radishes and turnips	69	31
Stress	35	65

Source: Author's Calculation

Table 3 demonstrated the incidence of thyroid disorder among the sampled respondents. Out of 200 respondents, 64 percent respondents had suffered from thyroid; 41 percent had family history of thyroid; and 52 percent did not know about the harmful effects of thyroid.

Table: 3: Incidence of Thyroid

Characteristics (N=200)	**N (%)**
Have you suffered from Thyroid?	
Yes	128 (64)
No	72 (36)
Total	200 (100)
Do you have family history of Thyroid?	
Yes	82 (41)
No	118 (59)
Total	200 (100)
Do you know about the harmful effects of Thyroid?	
Yes	96 (48)
No	104 (52)
Total	200 (100)

Source: Author's Calculation

Table 4, identified the various factors which influence the awareness of the women towards thyroid among the women with Logit regression. A significant association was observed between the age and awareness of thyroid among women. The regression coefficient clearly indicates that an inverse relationship was observed between the age and awareness. Thus, it can be concluded that younger respondents were more aware of thyroid. However, education of the respondent was directly related to the awareness. This clearly predicts that probability of awareness of thyroid increases with increase in education. The respondents with family history were more aware of thyroid as compared to others. It was observed that incidence of thyroid also significantly impacts its awareness.

Table: 4: Determinants of Awareness of Thyroid among Women

Variable	**Coefficient**	**Std. Error**	**Z-Statistic**	**Prob.**
Age	-0.612*	0.332	-1.839	0.065
Education	0.844*	0.467	1.804	0.071
Income	0.010	0.178	-0.060	0.951
Marital Status	0.210	0.178	-0.060	0.958
Income	0.044	0.340	-0.131	0.895
Family History of Thyroid	0.728***	0.294	-2.470	0.013

Cont... **Table: 4: Determinants of Awareness of Thyroid among Women**

Suffered from Thyroid	0.505**	0.821	0.614	0.030
Constant	4.196***	1.575	2.662	0.007
Model Summary				
No of observations	200			
McFadden R-squared	0.109			
Log likelihood	82.59			

Source: Author's Calculation

****** Significant at 1 percent, ** Significant at 5 percent, * Significant at 10 percent***

Table 5 demonstrates the division of respondents based on healthcare utilization and access to a health facility. Majority of respondents used healthcare facilities for the treatment, whereas 30 percent respondents never visited any of the facility. Out of the total 90 respondents, 58 percent individuals utilized allopathic treatment facility which was followed by homeopathic and ayurvedic treatment facility. People prefer private hospitals/clinics (63 percent) more than government ones (37 percent). 'No long queue' was the major determinant for which 38 percent respondents visited the private health facility. Also, the availability of specialized treatment and clean healthcare ambience were the prerequisites which intended individuals to choose the type of health facility. Free or low-cost treatment was the least opted reason for the choice of treatment facility amongst the individuals of Punjab.

Table 5: Prevalence of Thyroid among Sampled Respondents

Utilization Pattern	**N= 128(%)**
Utilized health care services	
Yes	90 (70)
No	38 (30)
Type of treatment you undertake (N=90)	
Allopathic	52 (58)
Homeopathic	21 (23)
Ayurvedic	14 (16)
Other	3 (3)
Type of health facility visited (N=90)	
Government Hospital	33 (37)
Private Hospital	22 (63)
Why this treatment? (N=90)	
Free or low cost treatment	4 (4)
Doctor was familiar	12 (13)
No long queues	34 (38)
Availability of specialized doctor/treatment	17 (19)
Cleanliness	23 (26)

Source: Author's Calculation

Conclusion

The above discussion clearly demonstrated that the sampled women had a low awareness towards the risk factors and prevention strategies of Thyroid. Awareness of Thyroid is the pre-requisite for its prevention. Thereby, awareness of the symptoms and its prevention strategies should be spread through mass camps in the country. Awareness of the symptoms and risk factors of thyroid among the common masses will help in the early diagnosis and prevention of the serious complications of thyroid. There is a need of policy intervention across multiple sectors, from high-level policy changes to individual-level behavioral changes. Continued surveillance of thyroid is necessary to monitor and evaluate its implications and to plan the appropriate strategies.

Ethical Clearance- Taken from N.A.

Source of funding- Self

Conflict of Interest - Nil

References

1. Sijapati KS, Rijal A, Agrawal S, Khadk, DK, Maskey R. Cutaneous Manifestations of Thyroid Hormone Disorder. Nepal Journal of Dermatology, Venereology and Leprology. 2019;17(1):42-48.
2. Bosetti C, Negri E, Kolonel L, Ron E, Franceschi S, Martin S, et al. A pooled analysis of case–control studies of thyroid cancer VII. Cruciferous and other vegetables (International). Cancer Causes & Control. 2002;13(8):765-775.
3. Maso L, Vecchia C, Franceschi S, Martin S, Ron E, Levi F et al. A pooled analysis of thyroid cancer studies. V. Anthropometric factors. Cancer Causes & Control. 2000;11(2):137-144.
4. Bagcchi S. Hypothyroidism in India: more to be done. Lancet Diabetes Endocrinol. 2014;2(10):778.
5. PTI. Alarming! Nearly every third Indian suffers from a thyroid disorder [internet]. Economic Times. Panache; 2017, May 25 [cited 2019, October 18] Available from: https://economictimes.indiatimes.com/magazines/panache/over-30-indians-suffering-from-thyroid-disorder-survey/articleshow/58840602.cms?from=mdr.
6. Alterio D, Jereczek BA, Franchi B, D'Onofrio A, Piazzi V, Rondi E et al. Thyroid disorders in patients treated with radiotherapy for head-and-neck cancer: A retrospective analysis of seventy-three patients. International Journal of Radiation Oncology Biology Physics. 2007;67(1):144-150.
7. Jung SJ, Kang JH, Roberts AL, Nishimi K, Chen Q, Sumner JA, et al. Posttraumatic stress disorder and incidence of thyroid dysfunction in women. Psychological medicine.2018;49(15)2551-2560.
8. Ross DS, Burch HB, Cooper DS, Greenlee MC, Laurberg P, Maia AL, et al. American Thyroid Association guidelines for diagnosis and management of hyperthyroidism and other causes of thyrotoxicosis. Thyroid. 2016;26(10):1343-1421.
9. Nyirenda MJ, Clark DN, Finlayson AR, Read J, Elders A, Bain M, et al. Thyroid disease and increased cardiovascular risk. Thyroid. 2005;15(7):718-724.
10. Volzke H, Ludemann J, Robinson DM, Spieker KW, Schwahn C, Kramer A, et al. The prevalence of undiagnosed thyroid disorders in a previously iodine-deficient area. Thyroid. 2003;13(8):803-810.
11. Zimmermann M, Boelaert K. Iodine deficiency and thyroid disorders. Lancet. 2015;8587(14):1-10.
12. Knudsen N, Bulow I, Jorgensen T, Laurberg P, Ovesen L, Perrild H. Comparative study of thyroid function and types of thyroid dysfunction in two areas in Denmark with slightly different iodine status. European Journal of Endocrinology. 2000;143(4):485-491.
13. Vaidya B, Williams GR, Abraham P, Pearce SH. Radioiodine treatment for benign thyroid disorders: Results of a nationwide survey of UK endocrinologists. Clinical endocrinology. 2008;68(5):814-820.
14. Ittermann T, Volzke H, Baumeister SE, Appel K, Grabe, HJ. Diagnosed thyroid disorders are associated with depression and anxiety. Social psychiatry and psychiatric epidemiology. 2015;50(9):1417-1425.
15. Hage M, Zantout MS, Azar ST. Thyroid disorders and diabetes mellitus. Journal of thyroid research.2011;2011(1):1-7.
16. Likhtarov I, Kovgan L, Vavilov S, Chepurny M, Ron E, Lubin, J, et al. Post-Chornobyl thyroid cancers

in Ukraine Report 2: Risk analysis. Radiation Research. 2006;166(2):375-386.

17. Ward MH, Kilfoy BA, Weyer PJ, Anderson KE, Folsom AR, Cerhan, JR. Nitrate intake and the risk of thyroid cancer and thyroid disease. Epidemiology. 2010;21(3):389-395.

Antioxidant and Cytotoxicity Profile of the Selected Alcoholic Beverages Widely Consumed in the Maharashtra State of India

Rahul A. More[1], Govind B. Sanap[2], Mahesh A. Karale[1], Yuvraj P. Sarnikar[3], Rajesh N. Gacche[4]

[1]Department of Microbiology, Dayanand Science College, Latur, (MS) India, [2]Head and Assistant Professor, Khare Dhere Bhosale Art's, Commerce and Science, Guhagar, (MS) India, [3]Head, Department of Chemistry, Dayanand Science College, Latur (MS) India, [4]Head and Professor, Department of Biotechnology, Savitribai Phule Pune University, Pune, (MS) India

Abstract

The health concern of the alcoholic beverages has remained a key issue to be addressed to the consumers. The aim of the present study was to assess the antioxidant activity and cytotoxicity of the selected 22 bottled commercial alcoholic brands widely consumed in the Maharashtra state of India. The result of the present study shows that the brands of wines followed by whiskies and rums were more effective as free radical scavenging agents, containing considerable amount of polyphenols. Overall, the vodaka brands were observed to be more cytotoxic as compared to other brands. With few exceptions, there exists a positive correlation in the amount of polyphenols and free radical scavenging activity, while the former was negatively correlated with cytotoxicity.

***Key words**: Antioxidant; Alcoholic Beverages; Cytotoxicity; Polyphenol*

Introduction

Drinking of alcoholic beverages (ABs) is a global habit of majority of human beings. The trend of alcohol drinking is increasing all over the world considering its role as a stress or pain killer. The health concern of the ABs has remained a key issue to be addressed to the consumers in the present situation of 'stress rich satisfaction poor' socioeconomic scenario. During the process of production of ABs, manufacturers add variety of additives in the form of preservatives, flavors, coloring agents etc. which ultimately accounts for the final quality of the finished brands. Several studies have shown the benefits as well as adverse effects of the consumption of alcoholic beverages in daily life. The adverse effects of ABs are usually attributed with the type of brand, consumption frequency, amount of dose and the overall physiological status of the consumer; however the health benefits of many ABs are linked with the presence of therapeutically important substances such as flavonoids, phenolic compounds, amino acids etc. and the aforesaid factors. Series of scientific evidences showed that the people who are moderate drinkers of alcoholic beverages have substantially reduced the risk of many degenerative human ailments like coronary heart disease, cancer [1] etc. It has been also described that the flavonoids and other polyphenolic compounds derived from the source material are implicated in free radicals scavenging mechanism[2].

In the present study, 22 different commercial bottled alcoholic brands belonging to wine, whiskey, rum, gin, vodaka, local brand which are commonly consumed in Maharashtra state in particular and other states of India in general, were evaluated for their free radical scavenging activity and cytotoxicity against normal Chang liver cell line.

Corresponding Author:
Dr. R. A. More
Head and Assistant Professor,
Department of Microbiology,
Dayanand Science College, Latur- 413 512,
Maharashtra, India. Tel.:+91-02382-222121
E-mail: rahulakmore@gmail.com

Materials and Method

Alcoholic Beverages

The selected Alcoholic beverages were purchased from the local market at Nanded city (MS). The details Alcoholic beverages are shown in Table 1.

Table 1. The details Alcoholic beverages with their percentage of alcohol and cytotoxicity.

Sr. no.	Type of beverage	Brand name	Percent of alcohol (%)v/v	Cytotoxicity (%)
1	Whisky	Bagpiper	42.8	5
2	Whisky	Imperial blue	42.8	ND
3	Whisky	Mc dowell no.1	42.8	2.3
4	Whisky	Royal stag	42.8	ND
5	Whisky	Royal challenge	42.8	15.7
6	Whisky	Signature	42.8	ND
7	Rum	Old monk	42.8	ND
8	Rum	Mc dowell	42.8	0.5
9	Rum	Bacardi	42.8	7.6
10	Vodka	Romanov	42.8	6.7
11	Vodka	White mischief	42.8	23.7
12	Vodka	Magic moments	42.8	13.9
13	Vodka	Shark tooth	42.8	2.59
14	Vodka	Fuel	42.8	18.4
15	Gin	Blue reband	42.8	7.2
16	Gin	Blue reband duet	42.8	6.7
17	Gin	American	37.14	2.3
18	Brandy	Honey bee	42.8	6.3
19	LocalBrand	Bhingri	56.2	ND
20	Wine	Figuria	18	ND
21	Wine	Madira	13	ND
22	Wine	Samara	14	ND
		H2O2		4.34

ND-not determined, H_2O_2- standard used for cytotoxicity

Antioxidant activities:

DPPH radical assay:

DPPH (1, 1-diphenyl-2-picryl hydrazine) radical scavenging assay was performed as per the earlier reported method[3]. The reaction cocktail was prepared by mixing individual sample of ABs with equal volume of DPPH radical (10^{-4} M in absolute ethanol) solution. After 20 min reaction time, the absorbance was recorded at 517 nm using UV-Visible spectrophotometer.

OH Radical scavenging activity

Hydroxyl radical (OH) scavenging activity was measured as per previously published protocol[4]. The reaction mixture contained 60 µl of 1mM, $Fecl_3$, 90 µl of 1mM 1, 10-phenanthroline, 2.4 ml of 0.2 M phosphate buffer (pH 7.8), 150 µl of 0.17 M H_2O_2 and 1.5 ml of individual brand. The reaction mixture was kept at room temperature for 5 minutes incubation and absorbance was recorded at 560 nm using UV-VIS spectrophotometer.

Superoxide anion scavenging activity

Superoxide anion radical (SOR) scavenging activity of the selected ABs was measured by generating them in a non enzymatic phenanzinemethosulfate- nicotinamide adenine dinucleotide (PMS-NADH) system though the reduction of nitro-bluetetrazolium (NBT)[5]. SORs were generated from the reaction mixture containing 3ml of tris-HCl buffer (100 mM, pH 7.4), 0.75 ml of NBT (300 mM), 0.75 ml of NADH and 0.3 ml of selected ABs.

Reducing Power activity

The reducing power (RP) of the selected brands was determined as per the previously described method[6]. The reaction cocktail contained 0.75 ml of individual alcoholic sample, 0.75 ml of phosphate buffer (0.2 N, pH 6.6) and 0.75 ml of potassium hexacyanoferrate ($K_3Fe(CN)_6$) (1% w/v). The mixture was incubated at 50^0 C in water bath for 20 min. The reaction was terminated by adding 0.75 ml of trichloroacetic acid (10%) and centrifuged for 10 minutes at 800 rpm. The supernatant (1.5 ml) of the individual reaction mixture was collected in different clean tubes and was mixed with 1.5 ml of distilled water followed by addition of 0.1ml of ferric chloride (0.1% w/v) and kept for 10 min. The absorbance of reaction mixture was measured at 700 nm.

Estimation of polyphenols:

The estimation of polyphenolic content from the selected ABs was determined by earlier reported method[7]. The phenolic compound undergoes reaction with an oxidizing agent phosphomolybdate present in the Folin-Ciocalteau reagent, the resultant reaction product is a blue coloured complex having maximum extinction at 660 nm. The amount of phenolics was calculated by using a standard curve using serial dilutions of catechol (500 µg/ml). The total amount of polyphenol was estimated as µg/ml of samples.

Evaluation of Cytotoxicity

The MTT cytotoxicity assay was performed as per the reported method[8]. Normal human Chang liver cell line was purchased from NCCS (National Center for Cell Science), Pune (MS). The cells were harvested and inoculated in 96 well (4×10^4 cells/well) microtiter plates. The cells were washed with phosphate buffered saline (PBS) and the cultured cells were then inoculated with and without the selected ABs. After 72 h incubation, the medium was aspirated followed by addition of 150 µL of MTT (3-(4, 5 dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide) solution (5 mg mL^{-1} In PBS, pH 7.2) to each well and the plates were incubated for 4 h at 37° C. After incubation, 800 µL of DMSO was added to the wells followed by gentle shaking to solubalize the formazan dye for 15 min. Absorbance was read at 540 nm and the cytotoxicity (%) was calculated.

The DPPH, OH and SOR radical scavenging activity, RP potential and cytoxicity (%) was calculated using the following formula and the results were compared with the respective reference compounds.

$$\text{Activity (\%)} = 1 - \frac{T}{C} \times 100$$

T= Absorbance of the test sample & C= Absorbance of the control sample

Results and Discussion

The results shows the efficacy of the selected brands of wines such as Madira (99.24%), Sumara (98.92%), Figuria (98.59%) and brands of rums like Mc Dowell (98.54%), Old Monk (98.54%) followed by whisky brands like Royal Challenge (96.47%), Signature (95.78%) and Royal Stag (95.56%) as excellent DPPH radical scavenging agents. The brandy, Honey Bee (99.24%) was also observed to possess excellent DPPH radical scavenging activity. While the remaining brands showed good DPPH radical scavenging activity in the range of 74.02 to 94.26 % as compared to ascorbic acid (95.31 %). DPPH radical is a stable free radical and it has been widely used to evaluate the free radical scavenging ability of different dietary antioxidants. The principle of the assay is that the antioxidant reacts with DPPH radical and converts into corresponding hydrazines. The fall in extinction is correlated with the potential of antioxidant to scavenge free radicals. Greater the DPPH reducing ability higher is the antioxidant potential[9].

Among the selected ABs, again the wine brands like Figuria (78.9%) and Samara (98.92%) followed by rums like Mc Dowell (77.3%) and Bacardi (73.6%) demonstrated significant OH radical scavenging activity, all other brands showed the activity in a range of 20.8-72.9 % as compared to reference compound α-Tocopherol (76.79 %). OH radicals are generated through Fenton reaction. These radicals are the most reactive radicals in the biological systems. The hyper reactivity of OH radicals paralyses variety of cellular functions by indiscriminate reactions with biologically important molecules like proteins, enzymes, nucleic acids etc. and excess production of OH radicals induces several degenerative diseases in humans [10].

The profile of the SOR scavenging activity indicates the effectiveness of wines like Madira (70.2%), Samara (69.5%) and Figuria (67.8%) as significant SOR scavenging agents. The other selected AB samples showed considerable SOR scavenging activity in the range of (48.71-65.5%) as compared to ascorbic acid (53.3 %). SORs are capable of damaging cellular membranes (through peroxidation reactions), protein and other macromolecules[11]. The cellular damage caused by SORs has been implicated in aging process and in initiation of numerous age related diseases such as cancer, heart disease, Parkinson's disease etc [12].

Once again the wine brands such as Figuria (88.6 %), Samara (79.7%) and Madira (78.26%) followed by rum, Mc Dowell (77.9%) have demonstrated good reducing ability. Remaining AB samples also showed considerable reducing activity in a range of 48.71-65.5%. In a general pharmacological notion compounds possessing reducing ability are considered good candidates for developing them as antioxidant agents. Higher reducing capability indicates greater antioxidant activity[13].

The maximum amount of polyphenols content was estimated in the wine brands like Figuria and Madira (2000 µg/ml), Samara (1596 µg/ml) followed by the rums such as Mc Dowell (1718 µg/ml) and Old Monk (1031 µg/ml). Other brands of the selected ABs were found to contain <370 µg/ml of polyphenols. ABs like wine has been reported to contain complex mixture of phenolic compounds possessing therapeutically important activities and free radical scavenging capabilities. The diverse biological activities of polyphenols are described to be health ameliorative and involved in preventing many degenerative diseases of humans [14]. It is this reputation of the polyphenols (especially in the wines) that minimizes the risk of heart disease and intake of wines in limited proportions acts as cardio protective agent[15]. Nevertheless many physicians recommend the intake of cardio protective wines to minimize the risk of cardio failure. In general it can be stated that the amount of polyphenol contents is positively correlated with antioxidant activity. To a greater extent this also holds true in case of the results of the present studies.

MTT colorimetric cell viability assay is one of the widely used methods to test the cytotoxicity of the different samples. Cell's survival is checked on the basis of the mitochondrial enzyme's ability to reduce the soluble yellow tetrazolium salt (MTT) to an insoluble formazan dye[16]. The selected ABs were evaluated for cytotoxicity against normal Chang liver cells.

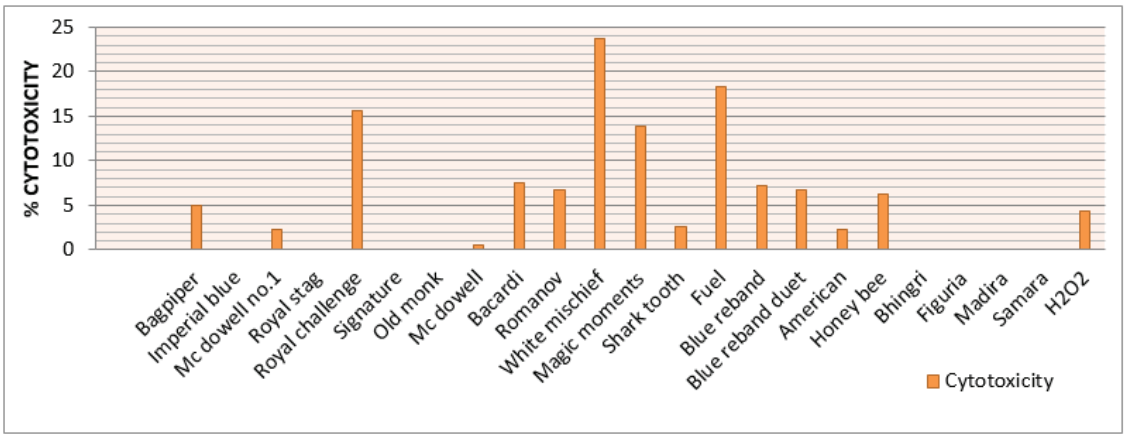


Figure 1. Profile of cytotoxicity (%) of the selected alcoholic beverages against human Chang liver cell line. The assay was performed using micro culture MTT method. The results are compared with hydrogen peroxide (20 mM). The results summarized are mean values of two parallel experiments.

The result summarized in Figure 1, indicates that all the vodaka brands (6.7-25.9 %) and Gins (6.7-18.4 %) have shown moderate cytotoxicity against Chang liver cells. Interestingly, wine brands were observed to be nontoxic towards Chang liver cells. No significant cytotoxicity was observed with whiskeys, rums and brandy. In general the cytotoxic effects of the ABs are linked with alcohol percentage and the types of additives used in the finished samples. Many times in *in vitro* cytotoxicity methods, it is difficult to ascertain the correct levels of toxicity of ABs due to volatilization of many toxic agents along with alcohol. One more important aspect of polyphenols especially flavonoids present in the ABs is linked with antitoxic, hepatoprotective, and cytoprotective effects. Moreover in several countries, plant flavonoids are widely used in the treatment of liver diseases and diseases associated with increased vascular permeability and capillary fragility[17]. The nontoxic nature of wines selected in the present study might be due to presence of the cytoprotective flavonoids derived from the source material.

It is concluded from the present study that the selected wines can be considered as effective antioxidant and free radical scavenging agents with no toxicity. The results of the present study may serve people a cursory ready reference for the health concerns of the selected ABs widely consumed in the Maharashtra state in particular and many other states of India in general. The results may also influence the manufacturers in reorienting their production strategies.

Acknowledgement: The authors are thankful to the Principle Dayanand Science College, Latur for providing necessary facilities. RNG thanks SPPU for DRDP and DST-PURSE grant.

Conflict of Interest: Authors declare no conflict of interest

Source of Funding: Self

Ethical Clearance: Nil

References

1. Fagrell, B., De Faire, U., Bondy, S., The effects of light to moderate drinking on cardiovascular diseases. *J. of Inter Med,* (1999), 246, 331-340
2. Esterbauer, H., Gebicki, J., Puhl, H., Jurgens, G., The role of lipid peroxidation and antioxidants in oxi-dative modification of LDL. *Free Radic Biol Med,* (1992), 13, 341- 390.
3. Blois, M. S., Antioxidant determinations by the use of a stable free radical. *Nature*, (1958), 26, 1199-1200.
4. Yu, W., Zhao, Y., Shu, B., The radical scavenging activities of *Radix puerariae* isoflavonoids: A chemiluminescence study. *Food Chem.,* (2004), 86, 525-529.
5. Liu, Q., Zhu, G., Huang, P., Anti-inflammatory and analgesic and sedative effects of *Leontice Kiangnanensis*. *Zhongguo Zhong yao Za Zhi.*, (1991), 161, 50-65.

6. Oyaizu, M., Studies on products of browning reactions: antioxidant activities of products of browning reaction prepared from glucose amine. *Jap. J. Nutri.,* (1986), 44, 307-315.
7. Sadasivum, S., Manickam, A., Biochemical methods (II ed.) New Age International, New Delhi, (1996), pp. 184.
8. Carmichale, J., De Graff, W.G., Gazdar, A.F., Mina, J.D., Mitchell, J.B., Evaluation of a tetrazolium based semiautomated colorimetric assay: Assessment of chemosensitivity testing. *Cancer Res.* (1987), 47, 936- 942.
9. Singh, R. P., Murthy, K. N. C., Jayaprakasha, G. K., Studies on the antioxidant activity of Pomegranate (*Punica granatum*) peel and seed extract using in vitro models. *J. Agri. Food Chem*. (2002), 50, 81-86.
10. Kinsella, J.E., Frankel, E., German, B., Kanner, J., Possible mechanism for the protective role of the antioxidant in wine and plant foods. *Food Tech,* (1993), 47; 58- 89.
11. Halliwell, B., Reactive oxygen species in living species, *Am. J. Med*, (1991), 91 , S14–S22.
12. Halliwell, B., Gutteridge, J., Free Radicals in Biology and Medicine, 3rd ed., Oxford University Press, Oxford , (1999).
13. Gacche, R. N., Dhole, N. A., Jadhav, A. D., Free radical scavenging activity, antioxidative ingredients and possible anti-inflammatory abilities of selected traditional medicinal plants from ayurveda. *J. Natu. Rem.* (2010), 64-73.
14. Miller, N. J., Rice-Evans, C.A., Antioxidant a ctivity of resvera-trol in red wine, *Clin. Chem*, (1995), 41, 1789.
15. Belleville, J., The French paradox: Possible involvement of ethanol in the protective effect against cardiovascular diseases, *Nutri*, (2002), 18, 173–177.
16. Mosmann, T., Rapid colorimetric assay for cellular growth and survivals: application to proliferation and cytotoxicity assays. *J Immunol. Meth.,* (1983), 65, 55-63.
17. Elliott Middleton, J. R., Chithan, K., Theoharis, C. T., The effect of Plant flavonoids on Mammalian Cells: Implications for Inflammation, Heart Disease and cancer. *Pharmacol Rev.*(2000), 52, 673-751.

Type of Manuscript : Original Research

Evaluation of Difference in Bacterial Contamination of Toothbrushes between Patients With Gingivitis And Patients with Healthy Gingiva-A Pilot Study

Madhumathi.D[1], Sri Sakthi[2]

[1]Intern, [2]Reader, Department of Public Health Dentistry, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India

Abstract

Aim: To Evaluate the difference in bacterial contamination of toothbrushes between patients with gingivitis and patients with healthy gingiva.

Objective: 1.To determine the bacterial contamination in terms of CFU/ml after brushing for a period of two weeks in patients with healthy gingiva.

2. To determine the bacterial contamination in terms of CFU/ml after brushing for a period of two weeks in patients with gingivitis.

3. To compare the difference in bacterial contamination in terms of CFU/ml between patients with healthy gingival and patients with gingivitis.

Background: The most commonly used method to maintain oral hygiene is toothbrush. Its main goal is to remove plaque, debris and stains which are responsible for gingivitis, periodontitis , tooth decay and halitosis. While removing, toothbrush becomes contaminated with blood, saliva, bacteria and soft debris. The toothbrush itself can act as a foci of infection and retard the disease prognosis and treatment outcomes.

***Keywords**: Toothbrush, Decontamination, bacterial colonization, brushing, gingivitis, healthy gingiva.*

Introduction

The human oral cavity is invaded by a more number of bacteria flora than any other anatomic area in the body .It has been found that more than 700 species of bacteria out of which 400 species were found in the periodontal pocket adjacent to teeth(1).Maintaining good health is very important for a good quality of life. The impact of oral health on general health has been proved time and again by many studies.(2,3,4,5,6) The mouth serves as a "window" to the rest of the body, providing signals of general health disorders. Bacteria from the mouth can cause infection in other parts of the body when the immune system has been compromised by disease or medical treatments (e.g., infective endocarditis). Systemic conditions and their treatment are also known to impact on oral health (e.g., reduced saliva flow, altered balance of oral microorganisms).Periodontal disease has an impact on cardiovascular system, this statement was proved by many stuides. In 2006, Holmlund et al., periodontal disease and number of remaining teeth related to a past history of heart attack and high blood pressure or hypertension .Other study showed that both periodontal disease and overall tooth loss from any cause are closely related to cardiovascular disease. Alman et al (2011) have shown a signicant positive association between loss of bone supporting teeth due to periodontal disease and CVD(25-28).Periodontal disease is often considered the 'sixth complication' of diabetes(29).

Oral Prophylaxis is a premise for oral health and daily plaque and debris removal is considered important

Corresponding Author:
Madhumathi D,
Intern, Saveetha Dental College and Hospitals,
Chennai - 600 077. Phone number 9942302151
E-mail address madhumathidevaraj@yahoo.com

for oral health. Improper maintenance of oral hygiene leads to the accumulation of plaque around the tooth which is a primary cause for gingivitis and periodontitis. Thus, removal of plaque plays a main key role in maintaining oral hygiene.

Tooth brushing is the most commonly used, easiest and effective method of oral hygiene practice performed around the world.(7) Toothbrush plays an important role in maintaining personal oral hygiene and it is effective tool for removing the plaque. Not only the proper selection but also care should be taken in maintaining the toothbrush which is essential for good oral hygiene because the toothbrush also gets contaminated by bacteria. Toothbrushes must have the following requirements to remove the plaque; stiff bristles which is enough to remove plaque without causing trauma to the teeth and gums and small head with soft bristles. Organisms are not only associated with oral cavity but also seen in tooth brush which includes Streptococcus mutans, Staphylococcus aureus, Pseudomonas, Lactobacillus, Klebsiella, Candida species(1).

Toothbrushes also has a significant role in disease transmission and increase the risk of infection since they can serve as a reservoir for microorganisms in healthy, oral-diseased and in immunocompromised people. Contamination is the state of retention and survival of infectious organisms that occur on animate or inanimate objects.(8) Contaminated toothbrushes may play a role in both systemic and localized diseases. This toothbrush contamination is associated with transmission of severe health problems which includes cardiovascular diseases, respiratory disorders, gastrointestinal diseases,arthritis, bacteremia ,renal problems and stroke.(7,8)

Toothbrushes can become contaminated from the oral cavity, environment, hands, aerosol contamination, and storage containers and the bacteria which attach to the toothbrush gets accumulated and survive on toothbrushes will helps in transmitting the diseases. In 1920 Cobb reported that toothbrush is the cause of repeated infections in the oral cavity (9). Contaminated tooth brush acts as an environment for microbial transport, retention and growth. Toothbrush heads between the bristle tufts is a favourable medium for the growth of microorganisms. This can be the cause of reinfection of a person with pathogenic bacteria (autoinoculation) or it can acts as a significant risk of dissemination of infection for certain patients such as immunosuppressed, cardiopathic ,organ transplant recipients(11).

So, the contamination of toothbrush can be prevented by immersing it in disinfectant solutions like 0.1% Chlorhexidine gluconate and 1% Sodium hypochlorite and replacing in a regular time period. So far many studies have evaluated the contamination risk of tooth brushes, within the bias of literature search, it was inferred that, none of the studies has focussed on the difference in contamination between a patient with gingivitis against health gingiva. This difference is studied and found to be true significance, it could help in patient education and help in better treatment outcomes. Hence this study was done to investigate and compare the bacterial load on toothbrushes used by patients with healthy gingiva and gingivitis.

Materials and Method

Study design: A non randomized clinical trial.

Study setting: Approximately 1000 patients are visiting saveetha dental college daily.

Among them, 90% of the patients are diagnosed with poor oral hygiene and they were given a demo of modified bass brushing method followed by health education to improve their oral health.

Study Population:18 to 45 years who visited the OP of saveetha dental college were selected based on the study criteria.

Eligibility Criteria:

Ø **Inclusion Criteria**:

· Patients with age group between 18-45 years ,

· Group-A(gingivitis)-Based on gingival index by Loe and Silness.

· Group-B(Healthy gingiva)- gingiva which is firm in consistency, with pink colour and scalloped margins were included in this study.

Ø **Exclusion Criteria:** Patients with a history of systemic disease(Myocardial infarction, ischaemic heart disease, COPD, Bronchial asthma, Hyperthyroidism, Hypothyroidism, Hypercholestrolemia, hypertension, diabetes mellitus, renal disorders, blood disorders, Parkinsons disease, cushing syndrome), patients who had periodontitis and who are not willing to participate were excluded from this study.

Informed consent:

· Prior to start the study written informed consent was obtained from all the participants.

· Institution ethical committe approval was also obtained prior to the study.

Sample size: Based on the study by Taji.et.al, the sample size of this present study was

10%.

Sampling: A non probability type of sampling was used. Selective /judgemental. Patients

visiting the OP was choosen based on the inclusion and exclusion criteria until

the sample size was achieved in each group.

Armamentarium:

The following equipments/materials were used for the study:

· Steriled mouth mirror

· Surgical gloves

· Steriled containers

· Normal saline

· Cuvettes

· Micropipette

· Petri dish

· Nutrient agar

· Spirit lamp

· Metal loop

· Incubator

Method

All the gingivitis patients were selected based on gingival index given by Loe H and Silness P (1963).For assessing the severity of gingivitis, and its location by examining qualitative changes of gingival tissues. The severity of gingivitis is scored on the selected index teeth(16,36,12,32,24,44) .Tissues surrounding each tooth divided into 4 gingival scoring units which are Disto-facial papilla, Facial margin, Mesio-facial papilla and Lingual gingival margin.

Grading of the gingivitis:

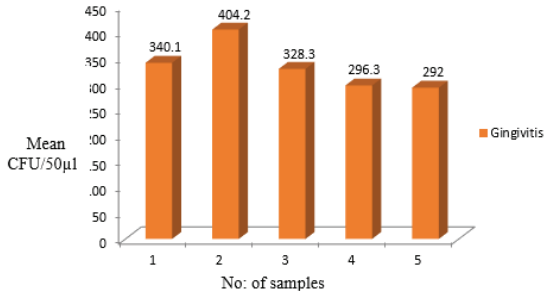
Score-0,gingival status is normal gingiva and the criteria is natural coral pink gingiva**;Score-1,gingival status is mild inflammation and the criteria is** slight changes in colour, slight edema. No bleeding on probing;Score-2 ,gingival status is moderate inflammation and the criteria is Redness, edema ,glazing and it bleeds on probing and score-3,gingival status is severe inflammation and the criteria is marked redness and edema/ ulceration/ tendency to bleed spontaneously.

All the examinees who met the criteria were informed about the study. Both were each given a new toothbrush with same brand of fluoridated tooth paste. Each subjects were given a demo of modified bass brushing method and they were requested to follow twice daily for a period of 2 weeks, since it is effecting in cleaning proximal and gingival sulcus. At the end of 2 weeks, brushes were collected in a sterile bag and processed.

Each toothbrush was then transferred into the container containing 10ml of steriled normal saline and mixed vigorously for 1 minute. After mixing,50µL of saline was transferred into the cuvette which is incubated at 37^0C for 1hr by placing in the incubator.

50µL of saline was then spread onto the plates of nutrient agar for the growth of an aerobic bacteria. Each sample was processed 3 times and incubated to minimise the manual and laboratory errors.The nutrient medium was incubated aerobically for 24hrs at 37^0C.Then total bacterial count was done. The results are tabulated which are as follows,

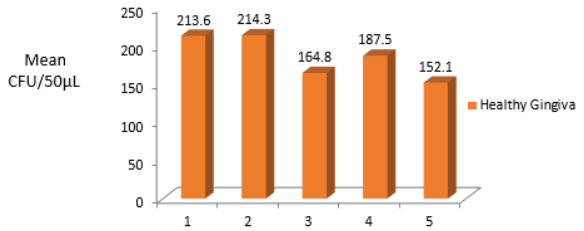
Result



Graph-1 shows the mean of bacterial colony counts of 5 samples in gingivitis patients.

Graph-1,depicts the mean of bacterial colony count in terms of CFU/50µL of all the 5 samples in gingivitis patients.Sample-1 has a mean of 340.1 cfu/50µL,sample-2 has a mean of 404.2 cfu/50µL, sample-3 has a mean of 328.3 cfu/50µL,sample-4 has a mean of 296.3cfu/50µL and sample-5 has a mean of 292cfu/50µL.

Figure-1 depicts the bacteria in agar plate of gingivitis patients.



Graph-2 shows the mean of bacterial colony counts of 5 samples in patients with healthy gingiva.

Graph-2,depicts the mean of bacterial colony count in terms of CFU/50µL of all the 5 samples in patients with healthy gingiva. Sample-1 has a mean of 213,6 cfu /50µL,sample-2 has a mean of 214,3cfu/50µL, sample-3 has a mean of 164.8 cfu/50µL,sample-4 has a mean of 187.5 cfu/50µL and sample-5 has a mean of 152.1 cfu/50µL.

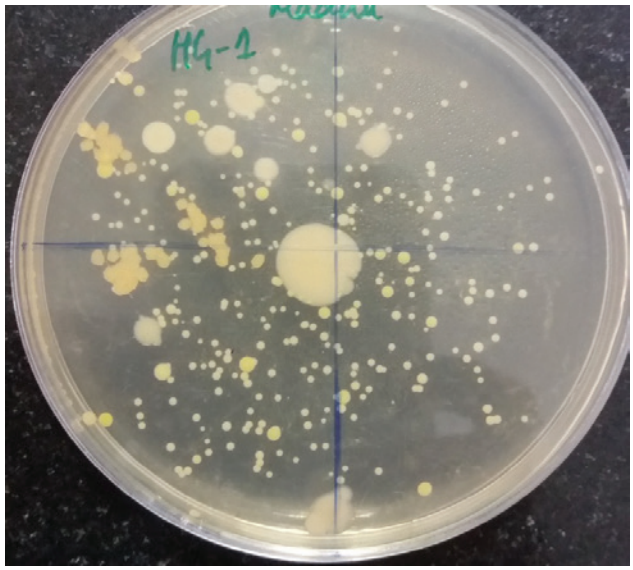


Figure-2 depicts the bacteria in agar plate of patients with healthy gingiva.

Discussion

The result of this study showed that the bacterial contamination was more in toothbrush used by gingivitis patients than the patients with healthy gingiva and the predominant microorganisms isolated were S. aureus, and S.mutans.

In the present study, microbial contamination was seen in all the 10 toothbrushes (100%) and this finding was consistent with some previous studies found microbes on all of the tested toothbrushes[12-15].But in one of the previous studies, microbial contamination was seen in 7 out of 10 toothbrushes (70%)[16].Bunetel et al. found that toothbrushes used by patients with existing oral disease quickly became contaminated [18].Several of the studies found that toothbrushes were contaminated before use[17-20]. Caudry et al. found that toothbrushes are heavily contaminated with normal use[8].

In the present study, Predominant microorganisms isolated were S. aureus, and S. mutans and this finding was consistent with most similar studies[12,13,14].In other

study, Microbial growth was detected on almost all of the brushes tested in this study (>90%), with development of streptococci observed on the vast majority of the brushes, which shows that toothbrushes are an excellent means of transport for bacteria. Nearly half of the brushes showed growth of mutans streptococci, members of the oral microflora, that are currently considered to be major cariogenic agents [24]. Other study reported that toothbrushes are heavily infected with escheriachia coli followed by klebsiella pneumonia , streptococcus pyogenes, staphylococcus auerus [31].Glass found that toothbrushes from both healthy patients and patients with oral disease contained potentially pathogenic bacteria and viruses such as Staphylococcus aureus, E. coli, Pseudomonas, and herpes simplex virus[17].Svanberg M. found that toothbrushes could be heavily infected with microorganisims especially mutans streptococci[30].

In the present study, the mean of bacterial colony count in gingivitis patients ranges from 10^2 to 10^5 Colony forming units /50µL and in patients with healthy gingiva the mean ranges from10^1 to 10^3 colony forming units/50µL. In one of the previous studies, the total microbial load per tooth- brush was found to be $10^4$to 10^6colony forming units[15].

The American Dental Association recommends a routine change of toothbrushes every 3 months [7]. According to the reports of Denny and glass[23,24] healthy patients replace their toothbrush every two weeks. Patients who are sick should change their toothbrushes at the beginning of an illness, when they first feel better, and when they are completely well. Chemotherapy or immune-suppressed patients should change their toothbrushes every three days, and persons submitted to major surgery should change their toothbrushes every day. So, the replacement of toothbrush in regular time periods is very essential to prevent the continuation of reinfection of oral diseases.

Conclusion

1.The result of this study showed that the bacterial contamination was more in toothbrush used by gingivitis patients than the patients with healthy gingiva and the predominant microorganisms isolated were S. aureus, and S.mutans.

2.Toothbrushes have an important role in transferring microorganisms which increases the risk of infection. So, the dentist should be more responsible in order to aware the patients for the issue of choosing, keeping and maintaining the hygiene of the toothbrushes, as well as their replacement in regular period of time.

Limitations of the study:

- A first limitation was the time constraint .
- A second limitation was the small sample size**.**

Direction of the future research: It is the follow up of this present study, assessment of progression and prognosis of a disease by using decontaminant solutions.

Source of Funding- Self

Conflict of Interest -Nil

References

1. Karibasappa GN, Nagesh L, Sujatha BK. Assessment of microbial contamination of toothbrush head: an in vitro study. Indian Journal of Dental Research. 2011 Jan 1;22(1):2.
2. Sheiham A, Watt RG. The common risk factor approach: a rational basis for promoting oral health. Community Dentistry and Oral Epidemiology: Commentary. 2000 Dec;28(6):399-406.
3. Awad MA, Locker D, Korner-Bitensky N, Feine JS. Measuring the effect of intra-oral implant rehabilitation on health-related quality of life in a randomized controlled clinical trial. Journal of dental research. 2000 Sep;79(9):1659-63.
4. LamsterDDS, MMSc Evanthia Lalla DDS, MS1WencheS.BorgnakkeDDS, PhD2George W.Taylor DMD, DrPH3,The Relationship Between Oral Health and Diabetes Mellitus ,journal of American dental association ,Volume 139, Supplement 5, October 2008.
5. Renata S.LeiteDDS, MSNicole M.Marlow MSPH Jyotika K.Fernandes MDKathie Hermayer MD, MS(Guest Editor),,Oral Health and Type 2 Diabetes, The American Journal of the Medical Sciences, Volume 345, Issue 4, April 2013, Pages 271-273.
6. Mikaela Kogawaab Daniela Corrêa Grisib Denise Pinheiro FalcãoaIngrid Aquino Amorimcd Taia Maria Berto Rezendebcd Izabel Cristina Rodriguesda SilvaeOsmar Nascimento SilvafOctávio LuizFrancodgh Rivadávio Fernandes Batistade Amorima,Impact of glycemic control on oral health status in type 2 diabetes individuals and its association with salivary and plasma levels of

chromograninA, oral biology ,Vol 62 Feb 2016.

7. Frazelle MR, Munro CL. Toothbrush contamination: a review of the literature. Nursing research and practice. 2012;2012.
8. Caudry SD, Klitorinos A, Chan EC. Contaminated toothbrushes and their disinfection. Journal (Canadian Dental Association). 1995 Jun;61(6):511-6.
9. Cobb CM. The tooth brush as a cause of repeated infections of the mouth. The Boston Medical and Surgical Journal. 1920 Aug 26;183(9):263-4.
10. Tilak AH, Prasath S. Evaluation of the contamination and effective disinfection of toothbrushes used by children.
11. Naik R, Mujib BA, Telagi N, Anil BS, Spoorthi BR. Contaminated tooth brushes–potential threat to oral and general health. Journal of family medicine and primary care. 2015 Jul;4(3):444.
12. HP SS, VVb S. Contamination of toothbrush at different time intervals and effectiveness of various disinfecting solutions in reducing the contamination of toothbrush. J Indian Sot Pedo Prev Dent September. 2002;20(3):81-5.
13. Bhat S, Hegde KS, George R. Microbial contamination of tooth brushes and their decontamination. J Indian Sot Pedo Prev Dent September. 2003 Sep;21(3).
14. Nelson Filho P, Macari S, Faria G, Assed S, Ito IY. Microbial contamination of toothbrushes and their decontamination. Pediatr Dent. 2000 Sep;22(5):381-4.
15. Taji SS, Rogers AH. The microbial contamination of toothbrushes. A pilot study. Australian Dental Journal. 1998 Apr;43(2):128-30.
16. Mehta A, Sequeira PS, Bhat G. Bacterial contamination and decontamination of toothbrushes after use. New York State Dental Journal. 2007 Apr 1;73(3):20.
17. Glass RT, Lare MM. Toothbrush contamination: a potential health risk?. Quintessence international (Berlin, Germany: 1985). 1986 Jan;17(1):39-42.
18. Bunetel L, Tricot-Doleux S, Agnani G, Bonnaure-Mallet M. In vitro evaluation of the retention of three species of pathogenic microorganisms by three different types of toothbrush. Oral microbiology and immunology. 2000 Oct;15(5):313-6.
19. Glass RT. The infected toothbrush, the infected denture, and transmission of disease: a review. Compendium (Newtown, Pa.). 1992 Jul;13(7):592-4.
20. Grewal N, Swaranjit K. A study of toothbrush contamination at different time intervals and comparative effectiveness of various disinfecting solutions in reducing toothbrush contamination. Journal of the Indian Society of Pedodontics and Preventive Dentistry. 1996 Mar;14(1):10-3.
21. Verran J, Leahy-Gilmartin AA. Investigations into the microbial contamination of toothbrushes. Microbios. 1996;85(345):231-8.
22. Denny FW. Risk of toothbrushes in the transmission of respiratory infections. The Pediatric infectious disease journal. 1991 Sep;10(9):710.
23. Glass RT, Jensen HG. More on the contaminated toothbrush: the viral story. Quintessence international (Berlin, Germany: 1985). 1988 Oct;19(10):713-6.
24. Napimoga MH, Höfling JF, Klein MI, Kamiya RU, Gonçalves RB. Transmission, diversity and virulence factors of Streptococcus mutans genotypes. Journal of oral science. 2005;47(2):59-64.
25. Walls AW, Steele JG. Geriatric oral health issues in the United Kingdom. International Dental Journal. 2001 Jun;51(S3):183-7.
26. Genco RJ, Glurich I, Haraszthy V, Zambon J, DeNardin E. Overview of risk factors for periodontal disease and implications for diabetes and cardiovascular disease. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995). 2001;22(2 Spec No):21-3.
27. Rose LF. The periodontal-medical risk relationship. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995). 2000 Jan;21(1):10-2.
28. Holmlund A, Holm G, Lind L. Severity of periodontal disease and number of remaining teeth are related to the prevalence of myocardial infarction and hypertension in a study based on 4,254 subjects. Journal of periodontology. 2006 Jul 1;77(7):1173-8.
29. American Academy of Periodontology, Accessed 30 October 2011.
30. Svanberg M. Contamination of toothpaste and toothbrush by Streptococcus mutans. European Journal of Oral Sciences. 1978 Oct;86(5):412-4.

Prevalence of Cumulative Trauma Disorder of Wrist Joint in Auto Mechanical Workers

Mandar Kulkarni[1], Trupti Yadav[2]

[1]Final year, Faculty of Physiotherapy, [2]Assistant Professor, Department of Musculoskeletal Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed to be university, Karad, Maharashtra, India

Abstract

Purpose – To study prevalence of cumulative trauma disorder of wrist joint in Auto mechanical workers**. Method :** In this study 60 subjects were taken. Auto mechanical workers working more than 5 year were included in study to know incidence of CTD or wrist in Auto mechanical workers 4 special test were taken Majority group age was from 30-55 years of age. **Result :** In conducted study 4 special test were taken of subjects. In sharper's test was negative among all subjects in carpal compression test 3 (5%) subjects were positive. In phatent's test 11(18.33%) subjects were positive. In finkstein test 6 (10%) subjects very positive. Amount of CTD in Auto mechanical workers is 23.33%**. Conclusion:** The mean age of study subject was 36 years. Pains were preeminently & significantly observed among higher age group as compared to vesser age groups. Prevalence of CTD in AMW in present study in 23.33

Keywords: *cumulative trauma disorder, wrist, pain, flexibility*

Introduction

Anatomy

The wrist is complex joint that connects the radius and ulna to the carpal bones. The wrist joint allows for the manipulation of objects in space and provide us with the dexterity required for fine motor skills. The wrist joint is the junction of the distal end of the radius and ulna and the adjecent carpal bones. In this joint bones are smaller, there is less cartilage and ligaments are thinner which increases risk of injury. The eight carpal bones can be divided into two rows of four bones. The proximal row consist of scaphoid, lunate, triquetral, pisiform bone. The distal row consist of trapezium, trapezoid, capitates and hamate bone. There is direct connection between carpal bones and ulna, there is cartilaginous disc that acts to allow increase congruence between ulna and carpals. The disc is known as Triangular Fibrocartilage Complex (TFCC).[1]

Corresponding Author:
Dr. Trupti Yadav,
Assistant Professor, Department of Musculoskeletal Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India.
Email ID: mandar.31198@gmail.com

Biomechanics

The wrist joint is a complex linkage between forearm and hand which is capable of impressive motion yet retaining a remarkable degree of stability. Carpal stability is derived from intra and intercarpal ligament in addition to closely approximated wrist flexor and extensor. Motion occurring at the campus is predominantly biplane radial ulnar deviation and palmar flexion and extension. The centre of motion for these planes of movement is located within the proximal and palmar pole of capitate. When painful condition arise at the wrist, a loss of wrist motion usually follows. Occasionally a loss of wrist extensor is noted with finger flexor activity. Wrist motion is essential for most activities of daily living, the preservation of wrist motion is for some individual essential for the performance of specific occupational or recreational activities.[2]

Cumulative Trauma Disorder (CTD)

Cumulative Trauma Disorder are caused due to excessive wear and tear on tendons, muscles and sensitive nerve tissue caused by continuous overuse on extended period of time. Repetition of small movements, poor posture, forceful grasping can all contribute to CTD. CTD may be present with pain, tenderness and loss of joint mobility or loss of co-ordination.[3]

Triangular Fibrocartilage Complex (TFCC)

TFCC is an area between radius and ulna, the two bones that make forearm. TFCC is made of several ligaments and tendons, as well as cartilage. It helps wrist move and stabilize forearm forearm bones when we grasp something with our hand. In TFCC injury main symptoms of TFCC tear is pain along the ulnar side of wrist , though might also feel pain throughout entire wrist. Other symptoms of TFCC tear include:

1) Clicking sound when we move our wrist

2) Swelling

3) Weakness

4) Tenderness

Cause of TFCC tear are caused by injury e.g- falling or landing on outstretched hand may damage cartilage, tendons or ligaments in TFCC.[4]

Carpal tunnel syndrome

Carpal tunnel syndrome is common condition that causes pain, numbness and tingling sensation in hand and arm. The condition occurs when median nerve is squeezed as it travels through the wrist. Symptoms of CTS are numbness, tingling and burning sensation and pain.[4]

De Quervain's Tenosynovitis

De Quervain's Tenosynovitis is painful condition affecting the tendons on radial side of wrist pain occurs when there is grasping action or while making fist. There may be pain near thumb base , swelling may be present in thumb. Difficulty in moving wrist while doing grasping or pinching. It may be also caused due to overuse of wrist.[4]

Extensor Carpi-ulnaris Tendinitis

Extensor Carpiulnaris Tendinitis is a injury of wrist in which the tendon of extensor Carpiulnaris muscle becomes irritated and inflamed. The most common symptom of extensor Carpiulnaris Tendinitis is pain on ulnar side of wrist pain increases when person grabs some object or flexion and extension of wrist may also trigger pain. Other symptoms are swelling, stiffness and decreased ROM.[4]

Materials and Method

Material

It was an observational study comprised over a period of 24 weeks. consecutive method was used for calculating sample size. As per sample size calculation, 60 was the actual sample size, 60 subjects were included using random sampling method for data collection. We had selected only those subjects who spend more than 5 years of working . Subjects with any recent trauma history, recent fractures, any pain due to pathology in wrist, decreased range of motion due to stiffness, soft tissue injury of wrist were excluded from the study.

Methodology

After receiving clearance from the institutional human research ethical committee of Krishna institute of medical sciences 'deemed to be' university for this study, Informed written consent was taken from all the subjects. Sixty subjects fulfilling the inclusion criteria i.e subjects who are working more than 5 years as aoutomechanical worker. After taking consent and necessary demographic data including name, age, sex, weight, height, working hours per day . All the subjects were assessed using tests: such as phalen's test, finklestein's test, carpal compression test were performed.

Inclusion Criteria:

- Individual who is automechanical workers working more than 5 year

Exclusion Criteria

- Any recent wrist trauma
- Individual whose occupation do not required repetitive wrist movement

Outcome Measures

- Visual analogue scale

Limitations

1. Subject selection was limited to active workers.
2. Those away from the job with CTDs at the time of evaluation (potentially more severe cases) would not have been available for study.

Results

Demographic Characteristics

In the present study, we assessed the age distribution of the study subjects. We observed that the majority of the study subjects belonged to the age group of 31-40 years (60%), followed by less than 30 years and 4150 years (20% each)

Presenting Symptoms

In the present study, we assessed the study subjects according to their presenting symptoms. We observed that 26.66% cases had pain and 23.33% cases presented with limitation in movements.

Sharpey's Test

In the present study, we conducted Sharpey's tests among the study participants. None of the study subjects showed positive results. (Table 3)

Table 1: Distribution of study participants according to their signs

Sharpey's test	Number of subjects	Percentage
POSITIVE	0	0
NEGATIVE	60	100%
TOTAL	60	100%

Carpal Compression Test

In the present study, we conducted Carpal compression testamong the study participants. 5% of the study subjects showed positive results. (Table 2)

Table 2: Distribution of study participants according to their signs

Carpal compression test	Number of subjects	Percentage
POSITIVE	3	5%
NEGATIVE	57	95%
TOTAL	60	100%

Phalen's Test

In the present study, we conducted Phalen's test among the study participants. 18.33% of the study subjects showed positive results. (Table 2)

Table 3: Distribution of study participants according to their signs

Phalen's test	Number of subjects	Percentage
POSITIVE	11	18.33%
NEGATIVE	49	81.66%
TOTAL	60	100%

Finkelstein Test

In the present study, we conducted Finkelstein testamong the study participants. 10% of the study subjects showed positive results. (Table 3)

Table 4: Distribution of study participants according to their signs

Finkelstein test	Number of subjects	Percentage
POSITIVE	6	10%
NEGATIVE	54	90%
TOTAL	60	100%

Cumulative Trauma Disorder

In the present study, we assessed the prevalence of cumulative Trauma Disorder of wrist joint. We observed that out of 60 study subjects, 14 subjects showed positive tests which suggests cumulative Trauma Disorder of wrist joint (23.33%). (Table 4)

Table 5: Distribution of study participants according to prevalence of cumulative Trauma Disorder of wrist joint

CTD	Number of subjects	Percentage
Present	14	23.33%
Absent	46	76.66%
TOTAL	60	100%

Comparison Between Age Distribution and Clinical Presentation

In the present study we assessed the association between demographic characteristics and clinical presentation of study subjects. We observed that pain and limitation of movements of wrist joint were prominently and significantly observed among higher age groups as compared to lesser age groups (Chi-square value: 10.62, p-value: 0.0069 for pain and Chi-square value: 8.61, p-value: 0.0134 for limitation of movements)

Comparison Between Age Distribution and Carpal Compression Test

In the present study, we studied the association between age distribution and positive demonstration of carpal compression test. We observed that the observation were not statistically significant, when analysed among various age groups (Chi-square value: 0.93, p-value: 0.62**).**

Comparison Between Age Distribution and Phalen's Test

In the present study, we studied the association between age distribution and positive demonstration of Phalen's test. We observed that the observations were found to be statistically significant, when analysed among various age groups. As the age increases, the prevalence of CTD inceases (Positive Phalen's test) (Chi-square value: 10.09, p-value: 0.0064**).**

Comparison Between Age Distribution and Finkelstein's Test

In the present study, we studied the association between age distribution and positive demonstration of Finkelstein's test. We observed that the observations were not statistically significant, when analysed among various age groups (Chi-square value: 3.82, p-value: 0.147**).**

Conclusion

The mean age of the study subjects was 36.7 years. The pain and limitation of movements of wrist joint were prominently and significantly observed among higher age groups as compared to lesser age groups The prevalence of cumulative Trauma Disorder of wrist joint in the present study was 23.33%, the percentage of carpal tunnel syndrome was ranged from 21.42% of all CTDs (positive Carpal compression tests) to 78.57% of all CTDs (positive Phalen's sign), and the percentage of various tendon disorders (de Quervain's disease) was 42.85% of all CTDs.

Source of Funding: Self funded

Conflicts of Interest: There are no conflicts of interest.

References

1. Dutton M, Orthopaedic: Examination, evaluation, and intervention (2nd ed.). New York: The McGraw-Hill Companies, Inc.2008
2. Li, Zong M. The Influence of Wrist Position on Individual Finger Forces During Forceful Grip Views. The Journal of hand surgery. 2002. 27. 886-96.
3. Anderson P, V. (Ed.). Cumulative Trauma Disorders: A Manual for Musculoskeletal Diseases of the Upper Limbs. Cincinatti, OH; Taylor & Francis. Ed 1997
4. U.S. Department of Health and Human Services. Cumulative Trauma Disorders in the Workplace (DHHS (NIOSH) Publication No. 95-119). Cincinnati, OH. Ed 1995
5. Levangie, P.K. and Norkin, C.C. Joint structure and function: A comprehensive analysis (4th ed.). Philadelphia: The F.A. Davis Company. Ed 2005.
6. Neumann DA. Kinesiology of the musculoskeletal system: Foundations for Physical Rehabilitation.2nd Ed. Elsevier Health Sciences; Ed 2009
7. Parmelee P, K., Eathorne, S. The Wrist: Common Injuries and Management. Primary Care, Clinics in Office Practice, 2005; 35-70.
8. Wadsworth C, The wrist and hand examination and Interpretation, J. Orthopedic and sports physical therapy. 1983; 108-20.
9. Silverstein B, & Fine, Lawrence & Armstrong, Thomas. Hand wrist cumulative trauma disorders in industry. British journal of industrial medicine. 1986; 43. 779-84. 10.1136/oem.43.11.779.
10. Nelson NA, Park RM, Silverstein MA, Mirer FE. Cumulative trauma disorders of the hand and wrist in the auto industry. Am J Public Health. 1992; 82(11):1550–1552. doi:10.2105/ajph.82.11.1550
11. Kourinka 1, Koskinen P. Occupational rheumatic diseases and upper limb strain in manual jobs in a light mechanical industry. Scand J Work Environ

Health 1979; 5(suppl 3):39-47.

12. Luopajarvi T, Kuorinka 1, Virolainen M, Holmberg M. Prevalence of tenosynovitis and other injuries of the upper extremities in repetitive work. Scand J Work Environ Health 1979; 5(suppl 3):48-55.
13. Juntura V, Neck and upper limb disorders among slaughterhouse workers. Scand J Work Environ Health 1983; 9: 283-90.
14. Welch R, The measurement of physiological predisposition to tenosynovitis. Ergonomics . 1973; 5, 665-668
15. Obolenskaja A, and Goljanitzki, 1. A. Die seroseTendovaginitis in der Klinic und im Experiment. Dtsch. Z. Chir. 1927; 338-399.
16. Rais O, Heparin treatment of peritenomyosis (peritendinitis) crepitansacuta. Actachir. scand. 1961; suppl. 268, 1-88.
17. Thompson A, Plewes R, L. W. and Shaw, E. G. Peritendinitiscrepitans and simple tenosynovitis: A clinical study of 544 cases in industry. Br. j. indo med. 1951; 8, 150.
18. Melhorn JM. A prospective study for upper-extremity cumulative trauma disorders of workers in aircraft manufacturing. J Occup Environ Med. 1996 Dec;38(12):1264-71.
19. Gangopadhyay S1, Ray A, Das A, Das T, Ghoshal G, Banerjee P, Bagchi S. A study on upper extremity cumulative trauma disorder in different unorganised sectors of West Bengal, India. J Occup Health. 2003 Nov;45(6):351-7.

A Study to Assess the Knowledge on Cancer among Geriatric Patients at SRM General Hospital, Kattankulathur in Kancheepuram District, Tamil Nadu, India

Manju[1], T.Suseelal[2], C.Kanniammal[3]

[1]B.Sc Nursing, [2]Associate professor, SRM College of Nursing, [3]Dean, SRM College of Nursing, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu Dist, Chennai, Tamil Nadu, India

Abstract

Cancer is a dread full disease in India and all over the world. Nowadays after age of 75 many people are living longer. Therefore special attention must be taken to the treatment of older cancer patients. Hence it is necessary assess the knowledge on cancer among the geriatric patients to develop awareness on cancer.

Objectives

1. To assess the knowledge on cancer among Geriatric patients at SRM General Hospital, Kattankulathur.
2. To associate the knowledge on cancer among Geriatric patients with their demographic variables.

Methodology: Non experimental descriptive research design was adopted to assess the knowledge regarding cancer among Geriatric patients. Totally 100 samples who fulfilled the inclusion criteria were selected by convenient sampling technique. Self structured objective type questionnaire was used to assess the knowledge on cancer among Geriatric patients in SRM General Hospital at kattankulathur.

Major Findings: The result of the study revealed 23(23%) patients have poor level of knowledge; 70 (70%) patients have moderate level of knowledge; 7 (7%) patients have high level of knowledge regarding cancer.

Conclusion: The study conclude that there is a need for health education among Geriatric patients to understand and treat cancer earlier, hence morbidity and mortality may be prevented and their quality of life may be improved.

Key words: *Knowledge, cancer, geriatric patients, Health education, Morbidity.*

Introduction

Cancer is one of the non communicable disease and it ends with poor survival among all age group. Only little research data is available in radiation and chemotherapy treatment. Globally incidence of cancer and mortality is increasing vomiting, loss of hair, oliguria, dehydration are experienced by patients after chemotherapy.

Also, very few research results are reported on cancer and risk factors of cancer and its knowledge on care. Hence, this research topic intended to assess the knowledge of geriatric people on cancer. So that health education can be planned to create awareness to seek early treatment.

According to WHO statistics worldwide 60% people die with chronic disease like cancer. WHO estimate that 8.8 million people are died in 2015 with cancer. According to one of the study done in Shandong province among elderly the prevalence of chronic disease was 81.8% and their daily health care expense

Corresponding Author :
Dr. T. Suseelal
Associate Professor**,** SRM College of Nursing,SRM Institute of Science and Technology, Kattankulathur, Chengalpattu Dist – 603203, Chennai, Tamil Nadu, India

was 28.8%.

In 2017, it is estimated that 13%, 6 cases per 100,000 per year affected by cancer, In UK 356,860 people are approximately affected. One of the states 1,688,780 new cases are diagnosed and 600,920 cases died with cancer in US. In Tamil Nadu 2 million people were affected and In Chennai 2012-2016 annual cancer predicted is 6100[3].Among Chinese old people aged over 60 years are affected with all type of cancers.[4]

In china cancer is the leading cause of death. In UK cancer is the first cause of death[5]. Approaching and assessing the knowledge on cancer and doing screening is a difficult process. Early detection, treatment and improving health among elderly people is an important role of health professionals.[6-8]

Thus the study intended to assess the knowledge on cancer and identify the risk factors to prevent and treat cancer earlier.

Method

Study setting: The study was conducted among geriatric patients those who are admitted and came to medical out-patient department in SRM general hospital, Kattankulathur.

Ethical consideration:

This study was conducted after the opinion of experts in nursing, statistician and SRM Ethical Committee approval during the month of January 2019.

Sample selections:

The Patients those who are admitted and those who are came to medical op in SRM general hospital kattankulathur. The sample size consisted of 100 patients who were selected by convenient sampling technique.

Data Collection Tool

Demographic variables which includes age, gender, marital status, education, occupation, place of living, health insurance status, duration of illness, family history of chronic diseases, if yes, types of chronic illness and visual acuity.

Face to face interview questionnaire which consist of 36 items was used to assess the knowledge on cancer among geriatric patients. It has questions on domains like causes, signs and symptoms, diagnosis, diet pattern, treatment, exercise, complications and health education Each correct answer carries score (1). Wrong answer carries score (0). Total score was 36. TheReliability of the tool was established by split half method. The coefficient correlation r = 0.996 which is greater than r=0.05 which was very high. Hence, the tool was considered reliable and feasible for proceeding with the main study.

Statistical Analysis

The data was tabulated in excel sheet and analysis was done with descriptive and inferencial statistics. The significant statistical p value was < 0.05.

Results

The demographic variables revealed among 100 participants majority of them were between 50-60 years (51%), both male and female were (50%), married were (58%), people with informal education were (64%), majority of them were unemployed (73%), urban population were (54%), majority of them had no insurance (67%), people with chronic disease were (63%), most of them with diabetes mellitus (41%), participants with myopia were (43%).

Table 1: Assessment of the level of knowledge on cancer among geriatric patients at SRM general hospital N= 100

S. No.	Level of Knowledge on Cancer	No. of Patients	Percentage
1	Poor Level Knowledge	23	23%
2	Moderate Level Knowledge	70	70%
3	High Level Knowledge	7	7%

The above table reveals that among 100 geriatric patients, 23 (23%) have poor level knowledge on cancer; 70 (70%) have moderate level knowledge on cancer; 7 (7%) have high level knowledge on cancer.

Regarding the association between knowledge of cancer among geriatric patients and with their demographic variables "Gender" is significant with ($p<0.05$). Other variables such as age, marital status, education, occupation, place of living, health insurance status, duration of illness, family history of chronic diseases, type of chronic disease, visual acuity are not having association with demographic variables.

Discussion

Cancer is thought to be the 2nd killing disease all over the world. Many people are not aware of the seriousness of this disease. Unfortunately many of the cancer in the affected organ are hidden for 4-5 years. Inspite of all vigorous treatment people lose their loved ones after spending lot of money for various treatment modalities in the hospital. It is hereditary disease in some families. Though the cause of cancer is unknown the food habits and job status and other environment pollution like smoking, radiation are causing abnormal cell growth in any part of the body. Some type of cancer like carcinoma of bronchi can not be diagnosed unless a biopsy is done. This may lead to mortality within short time if it is not identified earlier.[9,]

The warning signs of cancer must be taught to everyone to identify this disease earlier so that proper treatment can be given in the initial stage. Nowadays many new medications are found to care this disease. But if in fourth stage the treatment will not benefit. Hence it is the duty of all medical people and health care providers to support, educate and treat the people with any cancer to have quality and long life.

This result is consistent with the study done by Frida S. et al ., (2012) conducted a project in rural region of Tanzania on knowledge ,attitude and accessibility related to cervical cancer screening. Around 22.6% of the participants were enrolled in the study. The result revealed women's education level, knowledge on cervical cancer and prevention, husband permission for undergoing screening procedure, women's awareness on distance of cervical cancer services were associated with screening uptake and the study was found significant[10].

Also the study recommended to do further research on the knowledge and practice of cancer patients. The Present study helped to teach the participants and it cleared the patients doubts.

Conclusion

Thepresent study assessed the level of knowledge on cancer and association between knowledge on cancer among geriatric patients and with their demographic variables.The study concludes that there is a need for health education among geriatric patients to identify cancer earlier. So that death rate due to cancer can be reduced among all population.

Conflict of Interest: The authors have no conflict of interest.

Funding/Support: None declared.

Reference

1. WHO World Health Statistics 2015. World Health Organization website 2015.
2. Gao LP, Yuan CH, Xu R, Liu BF Study of Economic Burden of Diseases of the Elderly People in Shandong Province 2011. 30: 91-93
3. Song Y, Ma W, Yi X, Wang S, Sun X, et al. Chronic Diseases Knowledge and Related Factors among the Elderly in Jinan, China 2013.
4. Chen WQ, Zhang SW, Zheng RS, Zeng HM, Zou XN et al. Report of Cancer Incidence and Mortality in China 2009. 22: 2-12
5. Ministry of Health of the People's Republic of China. Main conditions of the third national death investigation. National Health and Family Planning Commission of the People's Republic of China website 2008.
6. Koo JH, Leong RW, Ching J, Yeoh KG, Wu DC et al. Knowledge of, attitudes toward, and barriers to participation of colorectal cancer screening tests in the Asia-Pacific region: a multicenter study 2012. 76: 126-135.
7. Ong CS, Ooi G, Tan XQ, Lee J, Koh GC. Prevalence of limited cancer knowledge inSingaporeans, its determinantsand association with cancer screening 2010. 50: 304-305.
8. Lund, Lars E. Matzen, PerPfeiffer, Hans H. Storm, JørnHerrstedt& On behalf of the Ac Marianne Ewertz, Kaare Christensen, GerdaEngholm, Anne Mette T. Kejs, Lars academy of Geriatric Cancer Research, 2016.
9. Mathy M, Terry F , Ruth M. N. E, Strumpf I. F, Nuamah D. C, Adler Mary E, Cooley C. J, Edward J, Lusk, Michael T. Cancer Research 2015.

10. Frida S, Tanya N Beran. Demographic, knowledge, attitudinal, and accessibility factors associated with uptake of cervical cancer screening among women in a rural district of Tanzania. 2012.
11. www.google.com
12. www.wikipedia.com

Type of Article : Research Article

Analysis of Factors Causing Extraction of Endodontically Treated Teeth-A Retroprospective Study

Mohammed Ahad[1], Pradeep S[2]

[1]Under Graduate Student, [2]Senior lecturer, Department of Conservative and Endodontics, Saveetha Dental College, Saveetha University, Chennai

Abstract

Aim: To study and analyze the various reasons for extraction of endodontically treated teeth.

Material and Method: 150 Endodontically treated teeth were reviewed, and the following reasons were recorded: patient's age, gender, type of tooth; presence and type of coronal restoration; motive of consultation; reasons for extraction.

Results: Pain was the primary reason for consultation .Mandibular first molar was the most common tooth involved followed by maxillary first molars. coronal failure where the main reason for extraction of endodontically treated teeth, this was due to neglegance in replacing permanent restoration where only 16% of the cases had either full veneer crown or post and core, followed by periodontal disease, vertical root fracture and non restorable caries.

Conclusion: A good coronal restoration is required for a successful long term outcomes.

Key words: *Endodontically treated teeth, Extraction, Pain, Molars, Coronal failure.*

Introduction

Root canal treatment is a "non-surgical" approach used to treat two particular endodontic diseases substances:"extirpated" vital, however irreversibly Inflamed pulp, where the objective is to keep up existing periapical health and therefore prevent Periapical disease; or the non-vital or dying, infected pulp related with apical periodontitis[1] . Success rate for endodontically treated tooth in around 40-96% which depends on differences in experimental design, patient selection, criteria for evaluation, clinical procedure, and length of postoperative observation[2-7] .This variation in suc-cess rate is to a limited extent because of the absence of a reasonable definition of the success and failure of endodontic treatment[3,6,7] . Albeit a few investigations have utilized tooth maintenance and the non appearance of clinical signs and indications to define success[3,6] ,most examinations have assessed to review radiograph to decide endodontic success. Since endodontic treatment is performed for the most part to avoid tooth extraction, it is imperative to assess the fate of endodontically treated teeth[8] . The survival or functionality of the endodontically treated tooth is currently the emerging aspect of endodontic treatment outcome, rather than healing[9].

Dental caries is of prime enthusiasm for the endodontist, as caries is thought to be a genuine risk to the long term result of endodontic treatment and also to the life span of root-filled teeth[10,11] . For instance, a current report observed nonrestorable caries injuries to be the primary explanation behind extraction of such teeth[12,13] . Despite the ob-vious significance of the issue, few examinations have been meant to investigate factors that impact the etiology and progression of caries in the root-filled tooth[14,15] . Dental caries is the fundamental cause of irreversible pulpi-tis and consequent root

Corresponding Author
Pradeep S
Senior lecturer, Department of conservative and Endodontics, Saveetha dental college,
Saveetha University, Chennai-77
pandu.pradeep@gmail.com
9710404482

canal treatment. Therefore , it may be suspected that endodontically treated teeth frequently are found in people with high caries hazard. Besides, there are signs in the literature that the loss of pulp vitality, depriving the dentin of a Several defence mechanism, will increase the suscep-tibility to caries. Additionally, the loss of an intrapulpal pain-signalling syestem will make it feasible for a caries lesion to be left undetected for a long period of time[16] . The microbial and non-microbial causes for essential root canal treatment failure have been completely looked into by Nair[17] Histo-pathological examinations recommended that Mostly likely the reason for treatment failure was intra-radicular microbes dwelling in accessory canals or alongside by the root-filling[18-20] . In a few examples, failure has been caused by: extra radicular actinomycosis[21-25] ; cystic apical periodontitis, foreign body response to cholesterol gems[26] , expelled dentine chips[24], expelled calcium hydroxide, expelled sealer, expelled amalgam[27], expelled gutta-percha filling material[27] or expelled cellulose segments from paper points, cotton wools, or pulses[28] . Several studies reveals failures can be because of not as much as ideal endodontic treatment however insufficient or unsuccessful restorative treatment is the significant issue. Almost 50% of all failures were because of fracture of the natural coronal tooth structure and seemed to involve either uncrowned teeth or crowned teeth without complete anchorage. They were considered unrestorable because of the degree of lost tooth structure. Teeth with crowns demonstrated longer clinical life than non-crowned teeth[29] . Vertical root fracture (VRFs) in endodontically treated teeth are a disappointing phenomenon for both the patient and dental specialist[30] . Diagnosis is frequently difficult because the signs, symptoms, and radiological features imitate true endodontic failure or periodontal infection, an issue that has been talked previously in the case reports[31-33.] Several etiologies for VRFs have been already recommended, mostly it is iatrogenic in origin . Two noteworthy causes are excessive pressure during lateral condensation of gutta-percha[31-33] and root canal reinforcement of these teeth at a later stage[31-35 .]

The aims of the present retrospective study, involving Indian adults, were to analyse the various factors that's leads to extraction of endodontically treated teeth such as Vertical root Fracture nonrestorable caries or cusp fracture, endodontic failure, periodontal disease, orthodontic or prosthetic reasons, and trauma and whether there were any associations between these reasons and tooth location, and the postendodontic permanent coronal restorations.

Materials and methods

Data were collected during a 2 month period between November - December 2018, from the oral surgery department, saveetha dental college , Tamil Nadu, chennai. A total of 150 cases was gathered and teeth that were extracted before the completion of root canal treatment was been excluded. Patients name age sex and any oral habits were obtained from record management system. The chief complaint for visiting the dentist after root canal treatment were noted (pain, mobility, trauma, other reasons).The tooth involved, the reason for extraction (caries, periodontal disease, endodontic failure, prosthetic, vertical root fractures, , orthodontic, esthetic, or other reasons to be specified)and whether the tooth is coronally restored with crown, post-core or with no permanent restoration was obtained and confirmed from pre-extraction periapical radiographs.

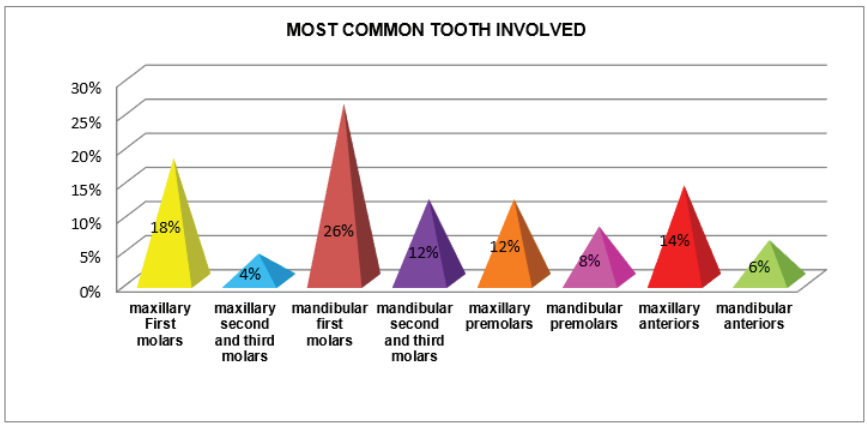


Figure 1

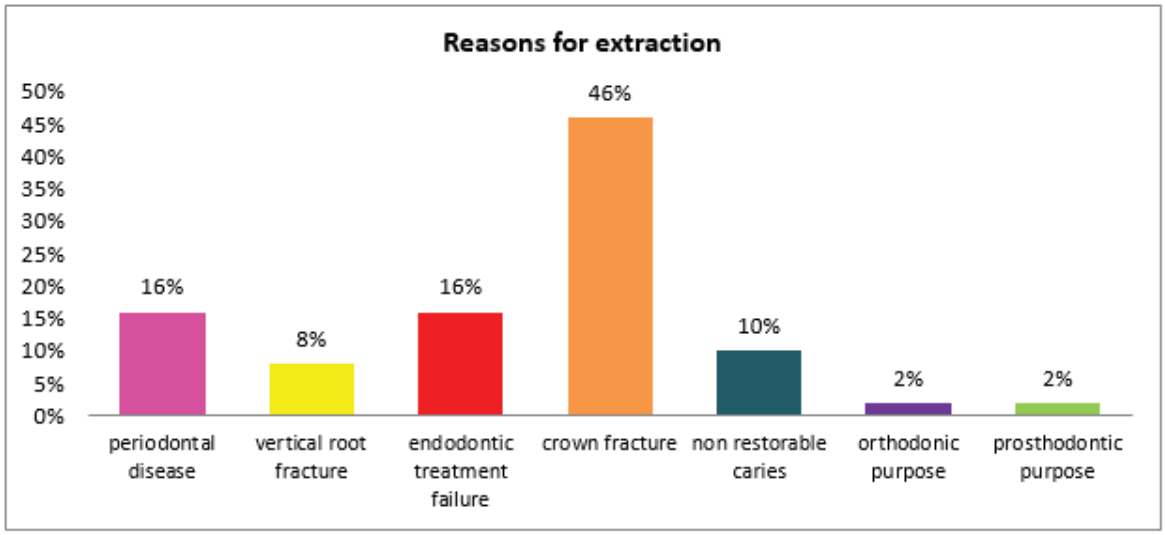


Figure 2

Results

Of the 150 cases taken for the study, 62% were male and 38% were female. The mean age was 37.7%±14.25%. 48% had underwent rct 1-2 years ago, whereas 18% of them had done rct more than 5 years ago. These root canal treatment done were mostly unintentionally (94%) while the rest were done for prosthodontics purpose as a full mouth rehabilitation cases. Dental pain was the main reason for visiting the dentist which accounts for 74% followed by dental mobility (10%), trauma (10%), and other reason for consultation were crown fracture were mentioned (4%). Molars were the most common tooth involved during emergency consultation. First mandibular molars (26%) were more common followed by maxillary first molar (18%), mandibular second and third molars (12%), maxillary incisors and canines(14%), maxillary first and second premolars (12%), mandibular first and second premolars(8%), mandibular incisors and canines(6%), maxillary second and third molars (4%).

Only 16% were previously coronally restored out of which 12% were restored with post and core and 4% were restored with crowns. 84% were not permanently restored and during time of extraction were with temporary coronal restoration and few were without coronal restoration at all. The reason on which the decision to extract the root canal treated tooth were based are presented in figure 2. Crown fracture(46%) was the most common reason for extraction due to neglegance in restoring the teeth with permanent restoration, followed by periodontal disease (16%), endodontic treatment failure (16%), vertical root fracture (10%), non restorable caries (8%), prosthodontics and orthodontic purpose each 2%.

Discussion

In this study, pain was the most common (74%) reason for consultation, similar to study done by toure et al (68.9%). Mandibular Molar's were the most common extracted teeth (46%), followed by maxillary molar (18%) which almost similar to study done by toure et al[8] , The predominance of mandibular molar was also noted by zadik et al[12] , in which around 44.6% were molars in the sample. 6% of mandibular incisor and canines were extracted in our study but zadik et al[12] , didn't had any case which involved mandibular anteriors, while toure et al represented 3.2%[8] .

In the present study, 84% of the extracted teeth never had a fully restored cuspal crown coverage, which was similarly seen in zadik et al (85%) and toure et al (94%), hence coronal fracture were the most primary reason for extraction of endodontically treated teeth(46%) in this study, where the other studies had more of nonrestorable caries and periodontal condition as reasons for extraction

Toure et al[8] reported periodontal reason as the main primary cause (40.3%) for extraction similarly seen in study done by Chen et al[36] and Vire[37] , who noted that 26.8% and 32%, respectively, whereas our study revealed only 16% and fuss et al had least cases of extraction caused due to periodontal diesease (5.5%)

Zadik et al[12] stated most common reason which relates to nonrestorable caries were the primary causes of extraction, whereas our study showed only 8% of extracted teeth caused due to non restorable caries which is slightly higher done study done by toure et al who had 5.2% of non restorable caries.

Prevalence of vertical fractures was found in sjogren study[2] which had 31% VRF in teeth after endodontic treatment. This contrasts with the results obtained in the present study, which revealed only 10% of extraction caused due to vertical root fracture similar to those of. Zadik et al 8.8%[12], toure et al[8] and Vire[37] with 13%

Fuss et al reported that endodontic treatment failure as the primary cause for extraction (63%) whereas only 16% reasons were found in our study similar to toure et al 19.3%[8] and zadik et al 12.1%[12]. Vire[37] revealed 59.4% were prosthetic failures which were due primarily to crown fracture.

Conclusion

The fate of endodontically treated teeth without a crown were the primary cause for teeth extraction followed by endodont treatment failure and periodontal disease. This study had limitation of lesser number of cases taken into account within a span of two months and no age limit hence a detailed study is necessary to obtained the results for the longevity of endodontically treated teeth.

Acknowledgement: The authors like to thank the oral surgery department saveetha dental college, chennai, India for sharing patients dental files and saveetha dental college for their record management system

Ethical Clearance- Research Department,Saveetha dental college

Source of Funding- Self

Conflict of Interest – Nil

References

1. Quality guidelines for endodontic treatment: consensus report of the European Society of Endodontology.Int Endod J. 2006 Dec;39(12):921-30.
2. Sjögren U, Hägglund B, Sundqvist G, Wing K. Factors affecting the long-term results of endodontic treatment. J Endod 1990;16:498-504.
3. Smith CS, Setchell DJ, Harty FJ. Factors influencing the success of con-ventional root canal therapy—a five-year retrospective study. Int Endod J1993;26:321-33.
4. Creugers NH, Mentink AG, Käyser AF. An analysis of durability data onpost and core restorations. J Dent 1993;21:281-4.
5. Cheung GS. Endodontic failures—changing the approach. Int Dent J.1996;46:131-8.
6. Briggs PFA, Scott BJ. Evidence-based dentistry: endodontic failure—howshould it be managed? Br Dent J 1997;183:159-64.
7. Weiger R, Axmann-Krcmar D, Löst C. Prognosis of conventional rootcanal treatment reconsidered. Endod Dent Traumatol 1998;14:1-9.
8. Babacar Tour e, DDS, PhD,* Babacar Faye, DDS, PhD,* Abdoul W. Kane, DDS, PhD,* Cheikh M. Lo, DDS,† Bassirou Niang, DDS,* and Yves Boucher, DDS, PhD.Analysis of Reasons for Extraction of Endodontically Treated Teeth: A Prospective Study.JOE — Volume 37, Number 11, November 2011
9. Friedman S, Mor C. The success of endodontic therapy: healing and functionality. J Calif Dent Assoc 2004;32:493-503.
10. Caplan DJ, Weintraub JA. Factors related to loss of root canal filled teeth. J Public Health Dent 1997;57(1):31-9.
11. Marcus SE, Drury TF, Brown LJ, Zion GR. Tooth retention and tooth loss in the permanent dentition of adults: United States, 1988-1991. J Dent Res 1996;75(Spec No):684-95.
12. Zadik Y, Sandler V, Bechor R, Salehrabi R. Analysis of factors related to extraction of endodontically treated teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;106(5):e31-5.
13. Bjorndal L, Laustsen MH, Reit C. Root canal treatment in Denmark is most often carried out in carious vital molar teeth and retreatments are rare. Int Endod J 2006;39(10):785-90.
1. MascresC,TheLuuH,MagnanR.[Influenceofpulpnecrosison experimental caries in the golden Syrian hamster]. Actual Odon- tostomatol 1982;36(140):565-76. French.
15. Brewer HE, Fischer RB, Muhler JC. Decreased vascularity of the dental pulp. I. The effects of unilateral ligation of major vessels to the teeth

and of combined ligation-salivary adenectomy on dental caries experience in the rat. J Dent Res 1957;36(1):92-4.

16. Khalid Merdad, Helal Sonbul, Moataz Gholman, Claes Reit, Dowen Birkhed.Evaluation of the caries profile and caries risk in adults with endodontically treated teeth.Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010;110(2):264-269.
17. Nair, P. N. R. (2006), On the causes of persistent apical periodontitis: a review. International Endodontic Journal, 39: 249–281.
18. Lin LM, Pascon EA, Skribner J, Gaengler P, Langeland K (1991) Clinical, radiographic, and histopathological study of endodontic treatment failures. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics 71, 603 –11.
19. Nair PNR (1987) Light and electron microscopic studies of root canal flora and periapical lesions. Journal of Endodontics 13, 29–39.
20. Nair PNR, Sjögren U, Krey G, Kahnberg K-E, Sundqvist G (1990a) Intraradicular bacteria and fungi in root-filled, asymptomatic human teeth with therapy-resistant periapical lesions: a long-term light and electron microscopic follow-up study. Journal of Endodontics 16, 580 – 8.
21. Sundqvist G, Reuterving C-O (1980) Isolation of Actinomyces israelii from periapical lesion. Journal of Endodontics 6, 602–6.
22. Nair PNR (1984) Periapical actinomycosis. Journal of Endodontics 12, 567 – 70.
23. Happonen R-P (1986) Periapical actinomycosis: a follow-up study of 16 surgically treated cases. Endodontics and Dental Traumatology 2, 205 – 9.
24. Byström A, Happonen R-P, Sjögren U, Sundqvist G (1987) Healing of periapical lesions of pulpless teeth after endodontic treatment with controlled asepsis. Endodontics and Dental Traumatology 3, 58 – 63.
25. Sjögren U, Happonen RP, Kahnberg KE, Sundqvist G (1988) Survival of Arachnia propionica in periapical tissue. Inter- national Endodontic Journal 21, 277 – 82.
26. Nair PNR, Sjögren U, Schumacher E, Sundqvist G (1993) Radicular cyst affecting a root-filled human tooth: a long-term post-treatment follow-up. International Endodontic Journal 26, 225 – 33.
27. Nair PNR, Sjögren U, Krey G, Sundqvist G (1990b) Therapy- resistant foreign body giant cell granuloma at the periapex of a root-filled human tooth. Journal of Endodontics 16, 589 – 95.
28. Koppang HS, Koppang R, Solheim T, Aarnes H, Stolen SO Cellulose fibers from endodontic paper points as an etiological factor in postendodontic periapical granulomas and cysts. Journal of Endodontics 15, 369 – 72.
29. Dorothy. Restoration of endodontically treated tooth-A literature review on clinical and non clinical topics around the world. 2008:1-20.
30. Zvi Fuss, Joseph Lustig, Alexander Katz and Aviad Tamse.An Evaluation of Endodontically Treated Vertical Root Fractured Teeth: Impact of Operative Procedures.JOURNAL OF ENDODONTICS.2001;27(1):46-48.
31. Meister F, Lommel TJ, Gerstein H, Bell WA. An additional clinical observation in two cases of vertical root fracture. Oral Surg Oral Med Oral Pathol 1991;52:91–6.
32. Linaburg RG, Marshall FJ. The diagnosis and treatment of vertical root fractures: report of a case. J Am Dent Assoc 1973;86:679–83.
33. Meister F, Lommel TJ, Gerstein H. Diagnosis and possible causes of vertical root fracture. Oral Surg Oral Med Oral Pathol 1980;49:243–53.
34. Tamse A. Iatrogenic vertical root fractures in endodontically treated teeth. Endod Dent Traumatol 1988;4:190–6.
35. Testori T, Badino M, Castaglola M. Vertical root fractures in endodon- tically treated teeth: a clinical survey of 36 cases. J Endodon 1993;19:87–90.
36. Chen SC, Chueh LH, Wu HP, Hsiao CK. Five-year follow-up study of tooth extraction after nonsurgical endodontic treatment in a large population in Taiwan. J Formos Med Assoc 2008;107:686–92.
37. Vire DE. Failure of endodontically treated teeth: classification and evaluation. J Endod 1991;17:338–42.

Assessment of Nuclear Changes between Hans and Arecanut Chewing Patient in a Subset of Population

Mohammed Ahad[1], Gheena S[2], Remmiya Mary Varghese[2],

[1]UnderGraduate Student, [2]Senior lecturer, Saveetha Dental College, Saveetha University, 162, Poonamallee High Road, Velappanchavadi, Chennai

Abstract

Aim: To study nuclear changes occurring in patients with Arecanut and Hans chewing habits

Background: Adverse oral habits lead to premalignant lesions. Tobacco chewing, smoking and alcohol intake have been attributed to as major risk factors.Different forms of tobacco usage are prevalent in India and many of them are specific to certain areas. Hans is mixture of tobacco products usually kept in between the cheek and gum or upper lip teeth and chewing. Arecanut has been recently linked to oral submucosal fibrosis.Exfoliative cytology, which is a quick and simple procedure, is an important alternative to biopsy in certain situations. In exfoliative cytology, cells shed from body surfaces, such as the inside of the mouth, are collected and examined.

Materials and Method: Cytological smear was taken among 30 patients using exfoliative cytology method. Tobacco users were grouped into two groups Hans and arecanut chewing habits.

Results: The result of the study shows increase in frequency of micronuclei among arecanut users when compared with Hans users and controls

Conclusion: The study reveals early identification of premalignant lesion in patient using arecanut and Hans products when compared to normal individual.

Keywords: *Arecanut, Hans, Premalignant Lesion, Oral submucous fibrosis, Exfoliative cytology.*

Introduction

Oral disease is right now the 6th most basic danger on the world[1] . In India it is the most widely recognised danger among men and one of the five most common malignancies among women[2] . Annually around 274000 people in the world are affected by oral cancer[3] . It represents 5% of every single threatening tumour and 60% of these lesions are very much progressed at the beginning of diagnosis. Analysing and treating these lesions can avoid tumour growth[4] . Smokeless tobacco products (STP) are utilised without burning and this eliminates the risk of direct exposure of toxic substances to the lung and different tissues of the user and of the general population around the world. But, the utilization of STP may result in health hazard, local or systemic as per the substance of different lethal items, including nicotine and tobacco-particular nitrosamines[5] . There is a geographic variety in the rate of tumour of the head and neck among various nations of the world and among various region inside a nation. This demonstrates ecological components may assume an essential part in the pathogenesis of tumour of the head and neck. Tobacco smoking and alcohol intake have been credited to as significant hazard elements. In Asia, biting tobacco causes a high frequency of oral malignancies and in the US there have been reports of oral snuff as hazard in oral cancer[6] . Squamous cell carcinoma (SCC) comprises 90% of all oral malignancies,among oral cancers[7-8] . Numerous oral SCC arises from premalignant states of the oral cavity[9-10] . A wide exhibit of conditions have been embroiled in the improvement of oral cancer, including leukoplakia, discoid lupus erythematosus, erythroplakia, oral lichen planus, palatial lesions, oral submucous fibrosis and innate disorders, for example, dyskeratosis congenital and epidermolysis bullosa[11] . The early discovery of cancer is of basic significance

since survival rates extraordinarily enhances when the oral lesions is recognized at an early stage[12] . Exfoliative cytology, which is a straightforward, noninvasive procedure, could build the odds of prior recognition of premalignant and malignant lesions[13] . It depends on the checking of exfoliated cells or cells chip off the mucosa whether through common or counterfeit means which shows cytomorphological and nucleomorphological variation[14] . This can be achieved through Hematoxylin and eosin (H&E) stains which have been used for at least a century and are still essential for recognizing various tissue and morphologic changes that form the basis of analysing cancer diagnosis[15] . The present study aimed to detect nuclear changes in mucosa between HANS and Arecanut chewing users to that of normal control.

Materials and Method

The study material includes oral smear obtained from tobacco users which includes Hans, Arecanut and healthy individuals.A total of 30 patients, 10 patients with Hans chewing habit, 10 patients with Arecanut chewing habit and 10 patients with normal mucosa which excludes non-smokers and non-alcoholic were selected from the outpatients who attended the Saveetha Dental College and Hospital, Chennai, Tamilnadu from October 2016 to December 2016. Informed consent was obtained from all patients to obtain a cytological smear. Using a moistened wooden spatula dipped with saline, cells were scrapped from the mucosal layer and smeared on a clean glass slide.The slides were immediately fixed with propan-2-ol kept in a couplin jar. The slides were then stained with routine hematoxylin and eosin staining procedure and studied under light microscope.

Results

All patients were aged between 25-60 years. Only male patients were screened for the purpose of the study. The study among 30 individuals revealed that there is a significant increase in frequency of micronuclei among arecanut users when compared with Hans users and controls ($p<0.05$) ,whereas other genotoxic changes such as condensed chromatin , karryorhexis, karryolysis, binucleation, pyknoyic were statistically not significant ($p>0.05$).

Table 1: Genotoxic changes among tobacco users

Genotoxic changes	ARECANUT	HANS	P VALUE
Micronuclei	2.142857143	0.769230769	0.001996
Condensed chromatin	0.142857143	0	0.177959
Karryorhexis	0.571428571	0.538461538	0.471903
Karryolysis	2.571428571	3.692307692	0.276737
Binucleation	0.428571429	0.230769231	0.210177
Pyknotic	2.142857143	1.769230769	0.329392

Discussion

Tobacco use (either by smoking or chewing) has harmful effects on buccal mucosa. The major toxic components of tobacco are nicotine, tar and polycyclic hydrocarbons. Long-term use [of betel-arecanut preparations] has been associated with pre-cancerous oral lesions, oral submucosal fibrosis(OSMF),and squamous cell carcinoma. AN (areca catechu—an endosperm (nut/fruit) from tropical tree Areca catechu Linnaeus) is the fourth regularly utilized psychoactive substance chewed as a guide to absorption and as stimulant, either utilized alone or included with various tobacco or non tobacco substances to make different combination. AN is a piece of betel quid normally devoured in Asian countries[16] , "betel nut" is a wrong phrasing commonly utilized for AN. In this study we have assessed the nuclear changes in smokeless tobacco products such as Arecanut and

Hans. Areca nut is known to create mutagenic and genotoxic impacts on tissues of body which may prompt different neoplastic and preneoplastic lesions[17-18] . Commission on tumor (COC) has first considered carcinogenesis of AN in 1993-1994[19] . The objective cells of AN are oral fibroblast/myofibroblasts and keratinocytes[20.] HANS" chewing tobacco is the finest Indian tobacco with the mixtures of aromatics, spices and flavours. It is appreciated all over India for its strong taste. It's taste is enjoyed by sucking rawly placed between teeth and lips. Oral exfoliative cytology has been used extensively for screening cellular alterations, such as karyolysis, karyorrhexis, micronucleus formation, pyknosis, binucleation, broken egg nucleus, anucleation, and so on[21.] Carcinogenic and mutagenic compounds, including tobacco-particular nitrosamines[22] , are responsible for induction of Micro nuclei. These compounds are produced from nicotine by bacterial or enzymatic action. A similar formation occurs in the mouth induced by saliva[23] . Presence of tobacco specific nitrosamines (TSNAs) in SLT attributes to increase risk of cancer[24] . In India, Tobacoo processing is performed by farmers and little organizations with little control over fermentation and curing, which causes increase in production of TSNAs. The assessment of micronuclei in exfoliated cells is a promising tool for the study of epithelial carcinogens and can be used to detect mitotic interference or chromosome breakage, thought to be relevant to carcinogenesis[24] . Since 1937 micronuclei have been used as an indicator of genotoxic exposure due to its association with chromosomal aberrations, based on the radiation studies conducted by Brenneke and Mather[25] . Pyknotic cells are characterised by a small shrunken nucleus which contains a high density of nuclear material that is consistently but intensely stained. They may represent as an alternative mechanism of nuclear breaking down that is distinct from the procedure leading to the condensed chromatin and karyorrhectic cell death stage. Karyorrhectic cells are cells with nuclear disintegration involving the loss of integrity of the nucleus[25] . They have nucleus that are portrayed by more extensive nuclear chromatin collection in respect to condensed chromatin cells. They have densely speckled nuclear pattern demonstrative of nuclear fragmentation prompting the inevitable deterioration of the nucleus[25] . Karyolytic cells: Cells in which the nucleus is completely depleted of DNA and is apparent as a ghost like image[26] . Cells with condensed chromatin demonstrates a generally striated nuclear pattern in which the aggregated chromatin is intensely stained. In these cells it is clear that the chromatin is aggregating in some regions of the nucleus whilst being lost in the other areas. At the point when chromatin aggregation is extensive the nucleus may appear to be fragmenting[26].

Our study was based on assessing the nuclear changes between two different tobacco chewing products, arecanut consuming had increase in micronuclei count when compared to hans tobacoo. Other studies done were based on comparison between smokers and tobacco chewers. Sarto et al., analyzed the genotoxic changes induced by tobacco on 25 individuals ,they observed a significantly higher frequency of micronuclei[27] . Patel PB et al., conducted a study to analyze tobacco related genotoxic effects into tobacco chewers monitoring chromosome aberrations (CA) and micronuceli From their study, they concluded that MN is a better surrogate biomarker to predict genotoxicity than CA for tobacco exposure and DNA damage index in tobacco chewers[28] . Pradeep et al., done a comparative study of genotoxicity in different tobacco related habits using micronucleus assay in exfoliated buccal epithelial cells, they concluded that tobacco in any form is genotoxic especially smokers are of higher risk[29]

Conclusion

This study concludes the importance of early recognition of cellular alteration for identification of pre-malignant changes in the patient with tobacco chewing. Exfoliative cytology cannot be taken as final diagnosis, biopsy is utmost important in detecting the premalignant lesions. This study was based on limited population hence a large scale study group is required to evaluate the nuclear changes by arecanut and Hans chewing tobacco.

Ethical Clearance- Research Department, Saveetha dental college

Source of Funding- Self

Conflict of Interest – Nil

References

1. Parkin DM, Bray F, Ferlay J, Pisani P (2001). Estimating the world cancer burden: Globocan. Int J Cancer. 2000;94(2): 153–156.

2. Boyle P, Macfarlans GJ, Maisonneuve P, Zheng T, Scully C, Tedsceo B. Epidemiology of mouth cancer in 1989: a review. J R Soc Med 1990;83(11): 724–730.
3. Sciubba JJ. Improving detection of precancerous and cancerous oral lesions. JADA 1999; 130:1445.
4. Cowpe JG., Green MW. Quantitative exfoliative cytology of abnormal oral mucosal smears, J R Soc Med 1988; 81(9):509–513.
5. Mogens Thomsen M, Ahlbom A, Bridges J and Rydzynski K. Scientic. Committee on Emerging and Newly identified Health Risks.; Health Effects of Smokeless Tobacco Products. Brussels: European Commission. 2008
6. LEWIN F, NORELL SE, JOHANSSON H, GUSTAVSSON P, WENNERBERG J, BIÖRKLUND A, RUTQVIST LE. Smoking tobacco, oral snuff, and alcohol in the etiology of squamous cell carcinoma of the head and neck: a population- based case-referent study in Sweden, Cancer. 1998, 82(7):1367–1375.
7. Alling CC, Secord RT. A technique for oral exfoliative cytology. Oral Surg Oral Med Oral Pathol 1964;17:668-76.
8. Binmadi NO, Basile JR. Perineural invasion in oral squamous cell carcinoma: A discussion of significance and review of the literature. Oral Oncol 2011;47:1005-10.
9. Silverman S Jr, Gorsky M, Lozada F. Oral leukoplakia and malignant transformation. A follow-up study of 257 patients. Cancer. 1984;53(3):563-8.
10. Silverman S Jr. Observations on the clinical characteristics and natural history of oral leukoplakia. J Am Dent Assoc. 1968;76(4):772-7.
11. Warnakulasuriya S, Johnson NW, van der Waal I. Nomenclature and classification of potentially malignant disorders of the oral mucosa. J Oral Pathol Med. 2007; 36(10):575-80.
12. Ries LAG, Melbert D, Krapcho M, Stinchcomb DG, Howlader N, Horner MJ, Mariotto A, Miller BA, Feuer EJ, Altekruse SF, Lewis DR, Clegg L, Eisner MP, Reichman M, Edwards BK (eds). SEER Cancer Statistics Review, 1975-2005, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2005/, based on November 2007 SEER data submission, posted to the SEER web site, 2008.
13. FREITAS MD, GARCÍA–GARCÍA A, CARNEIRO JLM, CRESPO– ABELEIRA A, GÁNDARA–REY JM. Exfoliative cytology of the oral mucosa: a cytomorphometric comparison of healthy oral mucosa in oral cancer patients and healthy subjects, Revista Brasileira de Patologia Oral. 2003; 2(4):2–6.
14. Perez-Sayans M, Somoza-Martin JM, Barros-Angueira F, Reboiras-Lopez MD, Gandara-Vila P, Gándara-Rey JM. Exfoliative cytology for diagnosing oral cancer. Biotech Histochem 2009;25:1–11.
15. Fischer AH Jacobson KARose JZeller R. Hematoxylin and eosin staining of tissue and cell sections. CSH Protoc. 2008;1.
16. Rooban T, Joshua E, Rooban A, Kumar G, Govind. Health hazards of chewing arecanut and products containing arecanut. Calicut Med J. 2005;3:e3.
17. Trivedy CR, Craig G, Warnakulasuriya S. The oral health consequences of chewing Arecanut. Addict Biol. 2002;7:115–25. [PubMed]
18. Betel-quid and Areca-nut Chewing and Some Areca-nut-derived Nitrosamines. Lyon: International Agency for Research on Cancer;International Agency for Research on Cancer: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. 2003;85
19. COC 2008 Statement on Betel Quid, Pan Masala and Areca Nut Chewing COC/08/S2 – July 2008.
20. Sundqvist K, Grafstrom RC. Effects of areca nut on growth, differentiation and formation of DNA damage in cultured human buccal epithelial cells. Int J Cancer. 1992;52:305–10.
21. Jois HS, Kale AD, Mohan KKP. Micronucleus as potential biomarker of oral carcinogenesis. Ind J Dent Advancements2010;2(2):197–202.
22. Hecht SS, Hoffmann D. Tobacco-specific nitrosamines, an important group of carcinogens in tobacco and tobacco smoke. Carcinogenesis 1988;9:875-84.
23. Winn DM, Blot WJ, Shy CM, Pickle LW, Toledo A, Fraumeni JF Jr. Snuff dipping and oral cancer among women in the southern United States. N Engl J Med 1981;304:745-9.
24. **Rodu B, Jansson C.** Smokeless tobacco and oral cancer: A review of the risks and determinants. Crit Rev Oral Biol Med 2004;15:252-

63.

25. Heddle JA, Hite M, Kirkhart B, Mavournin K, MacGregor JT, Newell GW, et al. The induction of micronuclei as a measure of genotoxicity. A report of the U.S. Environmental Protection Agency Gene-Tox Program. Mutat Res. 1983;123:61–118.
26. Sanchez-Siles M, Ros-Llor I, Camacho-Alonso F, Lopez-Jornet P. A novel application of the buccal micronucleus cytome assay in oral lichen planus: A pilot study. Arch Oral Biol 2011;56(10):1148-1153.
27. Sarto F, Finotto S, Giacomelli L, Mazzotti D, Tomanin R, Levis AG. The micronucleus assay in exfoliated cells of the human buccal mucosa. Mutagenesis. 1987;2(1):11–7.
28. Patel PB, Trivedi PJ, Brahmbhatt MM, Shukla SN, Pankaj M, Shah PM, et al. Micronuclei and chromosomal aberrations in healthy tobacco chewers and controls: A study from Gujarat, India. Arch Oncol. 2009;17(1-2):7–10.
29. Pradeep MR, Guruprasad Y, Jose M, Saxena K, K D, Prabhu V. Comparative Study of Genotoxicity in Different Tobacco Related Habits using Micronucleus Assay in Exfoliated Buccal Epithelial Cells. Journal of Clinical and Diagnostic Research : JCDR. 2014;8(5):ZC21-ZC24.
30. Sivapathasundharam B, Kalasagar M. Yet another article on exfoliative cytology. J Oral Maxillofac Pathol 2004;8:54-7.
31. Thomas, Priya & Ramani, Pratibha & Premkumar, Priya & Natesan, Anuja & Sherlin, Herald & Chandrasekar, Thiruvengadam. Micronuclei and Other Nuclear Anomalies in Buccal Mucosa Following Exposure to X-Ray Radiation. Analytical and quantitative cytology and histology / the International Academy of Cytology [and] American Society of Cytology. 34:161-9.
32. Krishnamurthy Anuthama, Herald J. Sherlin, N. Anuja, Pratibha Ramani, Priya Premkumar, T. Chandrasekar. Characterization of different tissue changes in normal, betel chewers, potentially malignant lesions, conditions and oral squamous cell carcinoma using reflectance confocal microscopy: Correlation with routine histopathology, Oral Oncology.2010;46(4):232-248, ISSN 1368-8375.

Antibacterial Activity of *Acacia Catechu* Seed Against Urinary Tract Pathogens

Mohammed Ahad, Remmiya Mary Varghese[2]

[1]UnderGraduate BDS, [2]Senior lecturer, Saveetha Dental College, Saveetha university, 162, Poonamallee High Road, Velappanchavadi, Chennai

Abstract

Aim: The aim of the study is to investigate the antibacterial efficacy of the *Acacia catechu seed* extract against selected Urinary tract pathogens

Background :*Acacia catechu* is known as Cutch tree.This plant has following medicinal properties: Astringent, Bactericidal, Refrigerant, Stimulant, Masticator, Expectorant. Acacia catechu seeds are flat, dark brown and measure 5-8 mm in diameter. The seeds are edible and the extract is useful in the treatment of many medical conditions in the Ayurveda.

Reason: Urinary tract infections are most common infection caused in woman, hence this study can determine the antibacterial effectiveness among the pathogens causing urinary tract infections.

***Key words**: Acacia catechu, Medicinal, Urinary tract infection, Antibacterial.*

Introduction

The acknowledgment of traditional medicine as an elective type of health insurance and the in-efficiency and other ill-effects of accessible anti-microbials has driven researchers to investigate the capability of therapeutic plants which are a rich wellspring of antimicrobial agents and effective medication[1]. The development of bacterial resistance from by and by accessible antibiotics has required the search for new antibacterial agents[2]. The gram positive bacterium, for example, Staphylococcus aureus is predominantly in charge of post operative wound contaminations, endo-carditis, toxic shock syndrome, osteomyelitis and sustenance harming[3]. Bacillus subtilis are rod shaped aerobic microorganisms and are accounted for to have some pathogenic part[4] . The gram negative bacterium, for example, Escherichia coli is available in human Intestine and bring down lower urinary tract contamination, coleocystis or septicemia[5] . Pseudomonas predominantly causes urinary tract contamination, wound or burn infection, chronic otitis media, septicemia and so forth in people[6] . Work has been done which go for knowing the diverse antimicrobial and phyto-chemical constituents of medicinal plants and utilizing them for the treatment of microbial contaminations as conceivable adjust locals to chemically manufactured medications to which numerous irresistible microorganisms have turned out to be resistant[7]

Acacia catechu is a moderate size deciduous, thorny tree common to Southern Asia and widely distributed in India.It is commonly known as “khair” and its various parts have been used since ancient times in Ayurvedic medicine[8,24,26] .In Ayurveda, is used in the treatment of cough, dysentery, throat infections, chronic ulcers and wounds[9,25] . Catechu is also reported for its anti-inflammatory,antimicrobial immunomodulatory, antipyretic, antidiarrhoeal and hypoglycemic[10-13] properties. Urinary tract infections occur when bacteria enter the urinary tract through the urethra and begin to multiply in the bladder[14.] The bark of this plant is strong antioxidant, anti-inflammatory, anti-bacterial, astringent and antifungal in nature. The extract of this plant is used

Corresponding author:
Lakshmi T
Assistant Professor, Department of Pharmacology,
Saveetha Dental College, Saveetha University,
162, Poonamallee High Road, Velappanchavadi,
Chennai-600077, Lakshmi085@gmail.com

to treat diarrhoea and sore throats, also useful in high blood pressure, bronchial asthma, cough, leucorrhoea, dysentery, colitis, gastric problems, and leprosy. It is used as mouthwash for sore throat, gingivitis, mouth, gum, dental and oral infections. The heartwood is used to yield concentrated aqueous extract i.e. cutch which is cooling, astringent and digestive. It is useful in boils, cough, ulcers and eruptions of the skin. Decoction of the bark is given internally in case of leprosy. Acacia spp. produces gum exudates, traditionally called gum Arabic or gum Acacia, which are widely used in the food industry such as adhesives, stabilizers, emul- sifiers, and in chronic renal failure[15-16] . Main chemical constituents of Acacia catechu are catechin, (-) epicatechin, lupeol, procyanidin AC, kaempferol, epigallocatechin, acid, quercetin, poriferasterol glucosides, poriferasterol acyglucosides, lupenone, epicatechin gallate, epigallocatechin gallete rocatechin, phloroglucin, protocatechuic, dihydrokaemferol, taxifolin, (+)-afzelchin gum and mineral[17-23] . The chief phytoconstituents of the heartwood are catechin and epicatechin.

Urinary tract infections (UTIs) are the most common conditions requiring medical treatment with 6-10% of all young females demonstrating bacteriuria[27-28] . The incidence of UTI's increases with age and 25-50% of females aged 80 or more have bacteriuria[29] . Urinary tract infection are a continuous issue overall which are caused by microbial invasion to different tissues of the urinary tract. Urine is normally sterile, that is, free of microscopic organisms, infections, and parasites[30] . A urinary tract disease is a condition in which at least one sections or more of the urinary framework (the kidneys, ureters, bladder, and urethra) become contaminated. UTIs are a standout amongst the most widely recognized bacterial contaminations in all general population , with an expected general rate of 18 for every 1000 person per year. It is the most regular bacterial disease recorded in older people[31] . Moreover, UTIs are a noteworthy reason for clinic affirmations and are related with significant morbidity and mortality and additionally a high financial burden[32] . The financial burden of using the emergency department for the treatment of UTIs is evaluated to be $2 billion US dollars every year [33] . UTIs can show in a wide clinical range from bacteriuria with restricted clinical indications to sepsis[34] . The primary essential hazard factors for the advancement of UTI include: age, presence of catheter, diminished mental status, chronic comorbidities, neurogenic bladder, urinary incontinence, diabetes, male prostatic hypertrophy, being female, gynecological disorders etc. Secondary hazard factors incorporate other contamination, dehydration, immobility, colonization with resistant organism, and poor individual cleanliness. Older adults, particularly ladies, are at increased risk of secondary disease after the advancement of a urinary tract contamination[32] . UTIs are classified into three groups, depending on the factors that trigger the infections such as complicated and uncomplicated, depending on whether the infection is occurring they are classified as Primary or recurrent, based on signs and symptoms they are classified as asymptomatic and symptomatic[34]. Most of the urinary tract infections are caused by gram-negative bacteria like Escherichia coli, Klebsiella sp., Pseudomonas aeruginosa. The treatment mainly involves use of antibiotics but the pathogenic bacteria are becoming increasingly resistant to antibiotics[35-36] . Diarrhoea is a syndrome that can be caused by different bacterial, viral and parasitic pathogens. Accurate understanding of the cause of diarrhoea in a given setting is an onerous task that requires systematic monitoring of the various pathogens. The availability of a well equipped clinical microbiology laboratory is a prerequisite to undertake such studies. Clinical studies conducted at the National Institute of Cholera and Enteric Diseases (NICED), which includes hospital and community, based surveillance for diarrhoea was focused on common enteric pathogens using conventional assay[37-39] . The present study aimed at antibacterial potential of Acacia catechu seeds.

Materials and Method

Plant Material:

Acacia seed is obtained from Green chem Herbal extract and formulations, Bengaluru .

Antibacterial activity:

Microorganisms tested

1. S. a – *Staphylococcus aureus* MTCC3381
2. E. c – *Escherichia coli* MTCC739
3. K. p – *Klebsiella pneumonia* MTCC432
4. P. a – *Pseudomonas aeruginosa* MTCC424

Minimum Inhibitory Concentration (MIC)

The minimum inhibitory concentration (MIC), which is considered as the least concentration of the

sample which inhibits the visible growth of a microbe was determined by the broth dilution method.

Preparation of inocula

Organisms were subcultured on nutrient agar, followed by incubation for 24h at 37°C. Inocula were prepared by transferring several colonies of microorganisms to sterile nutrient broth. The suspensions were mixed for 15sec and incubated for 24h at 37 °C. Required volume of suspension culture was diluted to match the turbidity of 0.5 McFarland standard (1.5x108 CFU/mL).

Preparation of sample

Samples were prepared in dimethylsulphoxide (DMSO) at the concentration of 2 mg/ml.

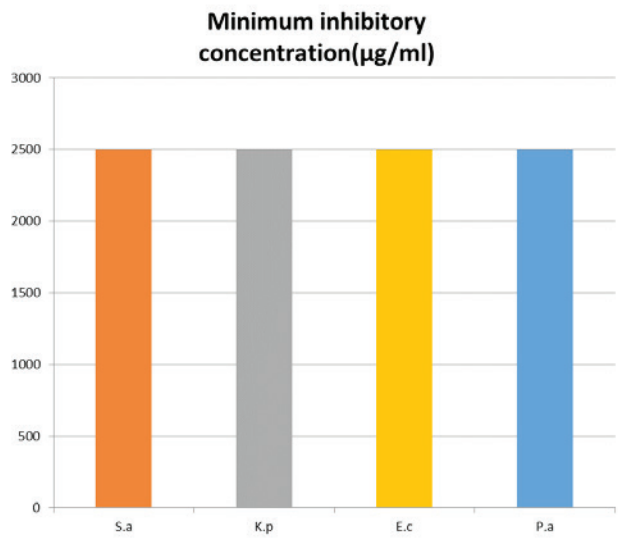
Broth dilution assay

A series of 15 tubes were filled with 0.5 ml sterilized nutrient broth. Sequentially, test tubes 2□14 received an additional 0.5 ml of the Sample serially diluted to create a concentration sequence from 5000 □ 1.2.µg. The first tube served as the control. All the tubes received 0.5ml of inoculum. The tubes were vortexed well and incubated for 24h at 37°C. The resulting turbidity was observed, and after 24 h MIC was determined to be where growth was no longer visible by assessment of turbidity by optical density readings at 600nm.

Result and Discussion

Acacia catechu seed was tested against *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae which are* the major pathogen that commonly causes urinary tract infection. Microbroth dilution was performed Which revealed no growth from the concentration at 2500mg/ml. The values recorded are means of three independent analysis ± Standard Deviation (n=3). Different research have been led on antimicrobial action of A.catechu extract, and exhibited good to excellent action contingent upon the organism included. An aqueous extract of A.catechu displays direct movement against a numerous drug resistant Salmonella typhi which was conducted by rani et al[40] Patel et al demonstrated that an aqueous extract of A.catechu resin from heartwood displayed excellent action against Bacillus subtilis, while a petroleum ether extract gave amazing activity against Pseudomonas aeruginosa, and a chloroform remove was dynamic against Staphylo-coccus aureus. No recognizable proof of dynamic constituents was led[41] .

Joshi et al conducted a study based on An ethyl acetic acid derivation concentrate of heartwood which displayed antimicrobial action against B. subtilis, S. aureus, Klebsiella pneumonia, and Shigella species[42] . A methanol extract of A.catechu was appeared to have antimicrobial activities against B. subtilis, S. aureus, Sal.typhi, Escherichia coli, P.aeruginosa, and Candida albicans studied by Negi and Dave in 2010[43] . Voravuthikunchai et al states that Aqueous and ethanol concentrates of A. catechu showed direct action against hospital isolates of methicillin-resistant S. aureus[44] . Lakshmi et al have additionally exhibited that ethanol concentrates of A. catechu exhibit inhibitory movement against different organisms[45] .



Conclusion

The study reveals that *Acacia catechu* could be useful in the management of Urinary tract infection. Rotavirus and cholera vaccines are now available as prescription product in India for the first time after a hiatus of 30 years. Not much progress has, however, been made with a Shigella vaccine. It would be interesting to see how these vaccines would ameliorate the burden of enteric infections in settings of diarrhoea in endemic areas all over India[46] .

Ethical Clearance- Research department, Saveetha dental college

Source of Funding- Self

Conflict of Interest - Nil

References

1. Arvind Kumar Bhatt, Rajeshwer, Aman Bhatia, Sudhir Saroea1 and J. P. Yadav. Antimicrobial activity of Acacia catechu bark extracts against selected pathogenic bacteria. Altern Integ Med. 2013;2(10):48.
2. Parekh J, Karathia N, Chanda S. Screening of some tra- ditionally used medicinal plants for potential antibacterial activity. Indian J Pharm Sci. 2006;68(6):832–834.
3. Chambers HF, Deleo FR. Waves of resistance: Staphylo- coccus aureus in the antibiotic era. Nat Rev Microbiol. 2009;7:629–641
4. Tenover F. Mechanisms of antimicrobial resistance in bacteria. Am J Med. 2006;9:3–10.
5. Zhou L, Lin Q, Li B, Li N, Zhang S. Expression and purification of the antimicrobial peptide CM4 in Escherichia coli. Biotechnol Lett. 2009;31:437–441
6. Livermore DM.Multiple mechanisms of antimicrobial resistance in Pseudomonas aeruginosa: our worst nightmare. Clin Infect Dis.2002;34:634–640
7. Arunkumar S, Muthuselvam M. Analysis of phytochemical constituents and antimicrobial activities of Aloe vera L. against clinical pathogens. World J Agric Sci 2009;5(5):572–576.
8. Ghate, Nikhil Baban et al. "Heartwood Extract of Acacia Catechu Induces Apoptosis in Human Breast Carcinoma by Altering Bax/bcl-2 Ratio." Pharmacognosy Magazine 10.37 (2014): 27–33. PMC. Web. 13 Feb. 2017.
9. Chopra RN, Nayar SL, Chopra IC. Vol. 2. New Delhi: CSIR Publication; 1996. Glossary of Indian medicinal plants.
10. Burnett BP, Jia Q, Zhao Y, Levy RM. A medicinal extract of Scutellaria baicalensis and Acacia catechu acts as a duel inhibitor of cyclooxygenase and 5-lypoxygenase to reduce inflammation. J Med Food. 2007;10:442–51. [PubMed]
11. Patel JD, Kumar V, Bhatt SA. Antimicrobial screening and phytochemical analysis of the resin part of Acacia catechu. Pharm Biol. 2009;47:34–7.
12. Ismail S, Asad M. Immunomodulatory activity of Acacia catechu. Indian J Physiol Pharmacol. 2009;53:25–33. [PubMed]
13. Jayasekhar P, Mohanan PV, Rathinam K. Hepatoprotective activity of ethyl acetate extract of Acacia catechu. Indian J Pharmacol. 1997;29:426–8.
14. LE Nicolle. Uncomplicated urinary tract infection in adults including uncomplicated pyelonephritis. Urol. Clin. North Am., 2008, 35: 1-12.
15. Shen D, Wu Q, Wang M, Yang Y, Lavoie EJ, Simon JE. Determination of the predominant catechins in Acacia catechu by liquid chromatography/ electrospray ionization-mass spectrome- try. J Agric Food Chem. 2006;54(9):3219–3224.
16. Negi BS, Dave BP. In Vitro Antimicrobial Activity of *Acacia catechu* and Its Phytochemical Analysis. *Indian Journal of Microbiology*. 2010;50(4):369-374.
17. Anonymous, Indian Herbal Pharmacopoeia, Revised new edition 2002, Indian Drug Manufacturer's Association, Mumbai. 2002;1-11.
18. Sharma P, Dayal R, Ayyer KS, Chemical constituents of Acacia catechu leaves, Indian Journal of Chemical Society, 60, 1997.
19. Sharma P, Dayal R, Ayyer KS, Acylglucosterole from Acacia catechu , Journal of Medicinal andAromatic Plants Science. 1999;21(4):1002-1005.
20. Rao PR, Seshadri TR, L-Epi-catechin from Acacia catechu, Journal Scientist Indian Research. 1948;59:28.
21. Jain R, Patni V, Arora DK, Isolation and identification of flavonoid "quercetin" from Acacia catechu (L.F.) Willd- A katha yielding plant,

Journal of Phytological Research. 2007;20(1):43-45.

22. Natures healing touch, Kathacin available at http://www.phytotech.in/www3/html/conventionalExtractsProducts/products.phpNo .
23. Sham JS, Chiu KW, Pang PK. Hypotensive action of Acacia catechu. Planta Med 1984;50(2):177–180.
24. Lakshmi.T, Geetha R.V, Anitha Roy.Acacia catechu willd -a gift from ayurveda to mankind" -a review.Pharma Research 2011; 5(2):273-293.
25. Lakshmi T,Ramasamy R, Thirumalaikumaran R.Preliminary Phytochemical analysis and In vitro Antioxidant, FTIR Spectroscopy, Anti-diabetic activity of Acacia catechu ethanolic seed extract. Pharmacognosy Journal. 2015;7(6)
26. Suhashini R.and Lakshmi T. Acacia catechu a Pivotal in Root Canal Treatment-A ReviewResearch journal of pharmacy and technology. 2013;6(10):0974-3618.
27. Al-Jiffri; MFZahira; El Sayed; FM Sharif. Urinary Tract Infection with Escherichia coli and Antibacterial Activity of Some Plant Extracts.Int. J. Microbiol Res. 2011; 2(1): 1-7.
28. S Salvatore; E Cattoni; G Siesto; M Serati; P Sorice; M Torella, Urinary tract infections in women.Europ. J. Obs. Gynec. Rep. Biol. 2011;156 (2):131–6
29. G Reid. Current scientific understanding of urinary tract infections in women: an overview. World J. Urol. 1999;17:336-338.
30. Edmond Puca. Urinary Tract Infection in Adults. Clinical Microbiology: Open Access.2014;3(6):1-2
31. Laupland KB, Ross T, Pitout JD, Church DL, Gregson DB. Community-onset urinary tract infections: a population-based assessment. Infection 2007;35:150–153.
32. Smith AC, Almond M. Management of urinary tract infections in the elderlyTrends in Urology Gynaecology & Sexual Health 2007;12:31-34.
33. Sammon JD, Sharma P, Rahbar H, Roghmann F, Ghani KR. Predictors of admission in patients presenting to the emergency department with urinary tract infection. World J. Urol 2013;32:813-819.
34. Tazebew E, Getenet B, Wondewosen T, Silabat M. Associated risk factors of urinary tract infection among pregnant women at Felege Hiwot Referral Hospital, Bahir Dar, North West Ethiopia BMC Research Notes 2013; 6:292.
35. MA Chowdhury; KM Rahman; MR Miah; JA Haq, Transferable drug resistance (R- Factor) among the enterobacteriaceae in urinary tract infection: A study at an urban hospital in Bangladesh.Top. Med. Hyg. 1994;97:161-166.
36. MA Haque; DJ Gomes; Z Hasan, Emergence of multi-drug resistance among significant bacteria isolates in Bangladesh. Dhaka University J. Biol. Sci. 2001;10: 51-57.
37. Sen D, Saha MR, Niyogi SK, Nair GB, De SP, Datta P, Datta D, Pal SC, Bose R, Roychowdhury J: Aetiological studies on hospital in-patients with acute diarrhoea in Calcutta. Trans Roy soc Trop med hyg. 1983;77:212-214.
38. Ghosh AR, Nair GB, Dutta P, Pal SC, Sen D: Acute diarrhoeal diseases in infants aged below six months in hospital in Calcutta, India: and an aetiological study. Trans Roy soc Trop med hyg. 1991 85:796-798
39. WHO 5th Programme Report, Programme for control of diarrhoeal diseases, Geneva. WHO Bulletin. 1985;63: 557-772.
40. Rani P, Khullar N. Antimicrobial evaluation of some medici- nal plants for their anti-enteric potential against multi-drug re- sistant Salmonella typhi. Phytother Res. 2004;18: 67–673.
41. Patel JD, Kumar V, Bhatt SA.Antimicrobial screening and phytochemical analysis of the resin part of Acacia catechu. Pharmaceut Biol 2009;47: 34–37.
42. Joshi S, Subedi YP, Paudel SK. Antibacterial and antifungal activity of heartwood of Acacia catechu of Nepal. J Nepal Chem Soc. 2011;27: 94–99.
43. Negi BS, Dave BP. In vitro antimicrobial activity of Acacia catechu and its phytochemical analysis. Indian J Microbiol 2010;50:369–374.
44. Voravuthikunchai SP, Kitpipat L. Activity of medicinal plant extracts against hospital isolates of methicillin-resistant Staphylococcus aureus. Clin Microbiol Infect 2005;11:510–512.
45. Lakshmi.T, Geetha R.V, Anitha Roy "In vitro Evaluation of Anti bacterial Activity of Acacia catechu willd Heartwood Extract." International journal of Pharma and Biosciences. 2011;2(1)

46. D. H. Tambekar* and B. S. Khante Evaluation of Antibacterial Properties of Ethnomedicinal Herbs used by Korkus in Melghat of India against Enteric pathogens. International Journal of Pharma and Bio Sciences. 2010;6(1)

47. LAKSHMI.T*,GEETHAR.V ,ANITHAROY. In Vitro Anti Bacterial Activity of Ethanolic Bark Extract of Acacia catechu Willd against Enteric Pathogens Int. J. Drug Dev. & Res., July-Sep 2011;3(3): 328-334

Effectiveness of Music Therapy and Visual Imagery Techniques on Preoperative Anxiety among Children Undergoing Surgeries in Selected Hospitals of Rajasthan-Pilot Study

Mohanasundari SK[1], Padmaja A[2], Kirtikumar Rathord[3], Sunil Kothari[4]

[1]Scholar in INC, College of Nursing, AIIMS Jodhpur, Rajasthan, [2]Vice-Principal/Professor, College of Nursing, SVIMS, Tirupati.AP., [3]Associate Professor, Dept of Pediatric surgery, AIIMS Jodhpur, [4]HOD of pediatric surgery Department. Dr SNMC Jodhpur

Abstract

Introduction: Increasing attention is nowadays being paid to a variety of non-pharmacological interventions for decreasing preoperative anxiety such as music therapy, music medicine interventions, and visual imagery technique and so on. Method: 3 arm RCT was conducted to assess the effectiveness of music therapy and visual imagery techniques on preoperative anxiety with total 36 children aged between 4 to 12 years. Group A received Music therapy and group B received Visual imagery technique for 15 to 30 minutes duration minimum 3 times a day. Group C (control group) received conventional intervention. Result: The mean and SD score of pre and post-test in experimental group A, B and C was 7 ±3.43 & 1.67 ±2.06, 15.33 ±4.86 & 8.83 ±4.78, and 19.67 ±14.88 & 19.08 ±12.12 respectively. The effect size of group A was 1.88 & Group B was 1.34. Conclusion: If music therapy or visual imagery technique given especially just before giving anesthesia, the child will experience very less anxiety.

***Key words**: Music therapy, visual imagery technique, conventional interventions, preoperative anxiety and children undergoing surgeries.*

Introduction

Background:

Each year, > 2 million children undergo surgical procedures. The perioperative phase can be stressful for the children, their parents, and the nurses who care for them. Children may experience anxiety and fear about surgery, pain, separation from parents, unfamiliar surroundings, the unknown, unpleasant sensory stimulation, and loss of autonomy and control.[1] In the immediate preoperative period, which corresponds to 24 hours before surgery, discomfort is imminent for the children and their family, regardless of the type of surgery, outpatient or hospital approach and cultural context in which the child is inserted.[2,3] In addition, the susceptibility of the child, lack of understanding about the surgical procedure, unknown hospital environment, fear of physical injury, separation from their parents and feelings of sadness and punishment related to the fact that surgery is a scheduled procedure may contribute to such discomfort.[4,5]

Several evidence indicate age and temperament of the child, behavioral problems during health care previous surgery and hospitalizations level of parental education and maternal anxiety as factors associated with preoperative anxiety in children.[6-10]

Anxieties in children arise due to their altered interpretation of healthcare surroundings. Anxiety manifestations are variable as children transition through different stages of physical, emotional, and psychological development. Parental separation and

Corresponding Author:
Dr. A Padmaja,
Vice-Principal/Professor, College of Nursing, SVIMS, Tirupati.AP. E-mail: raajinaidu@rocketmail.com.
Mob.: 9396805831

induction of anesthesia have been implicated as the most stressful periods for children to endure during their surgical experience.[11]

Anxiety is a common feeling among children in the preoperative period. As acute stress source, anxiety induces functional changes in the central nervous system, increases the deleterious effects on the child's body when associated with other perioperative stressors[12] produces negative behaviors and high pain intensity scores in the postoperative period.[13.] In addition, anxiety causes sleep disruption, nausea, fatigue, and inadequate responses to anesthesia and analgesia leading to higher costs for the health services and family.[14]

Increased anxiety, disturbances in eating and sleeping, as well as increased pain and analgesic use; continue to be psychological problems during postoperative period also. Parents also anxious and their concern about the competency of staff, possible complications, and how to support their child, unfamiliarity of surroundings, role expectations, added to parental stress and anxiety that can transmit to their children.[1]

The literature revealed the effects of preoperative pediatric anxiety as contributory to the manifestation of numerous postoperative psychological behavioral changes such as feeding and sleeping problems, bedwetting, withdrawal and apathy, and these symptoms exist up to 2 weeks after surgery. [15]

Certain interventions like music may provide a viable alternative to sedatives and anti-anxiety drugs for reducing preoperative anxiety.[16]

Visualization & imagery (sometimes referred to as guided imagery) techniques offer yet another avenue for anxiety reduction.[17]

Nurses must have an understanding of the impact of surgery on children & families to help ease the stress of this difficult time.[18] Present study focused on effect of two complementary therapies such as music therapy & visual imagery technique with conventional interventions in management of preoperative anxiety in children.

Method

The effectiveness of music therapy & visual imagery technique versus conventional interventions on preoperative anxiety among 36 children aged between 4- 12 years undergoing surgery in UMAID hospital was assessed in 3 arm Randomized controlled trial research design. The Children undergoing elective/planned surgery were included & children with emergency surgery, mentally retarded, hearing impairment, undergoing ear surgeries & participating in any other clinical trial were not included in the study. The samples were randomly distributed into 3 groups (12 in each) through computer-generated randomization allocation sequence.

Tool has 4 sessions[(19,20)] section-1 was demographic variables (e.g. accompanying parent, age of the child, gender of the child, habitat, religion, socio economic status, duration of preoperative period, previous hospitalization & previous experience with anesthesia/ Surgery. The level of parental anxiety was assessed through numerical visual anxiety scale (NVAS) Session-2 was physiological variables (e.g. pain, respiration & pulse rate). Preoperative pain of the child was assessed through numerical visual pain scale (NVPS). Session -3 was standard rating scale -Hamilton Anxiety rating scale. The scale contains 14 items. A total score range of 0-56 is given with each item scored on a scale of 0 (not present) to 4 (severe). Session 4 was semi structured check list of conventional intervention (e.g. The use of toys, playing games, watching videos, cartoons, psychological support, story telling, play therapy, preadmission tour ward & others interventions). The setting reliability of the tool was tested found to be r=0.76.

Ethical permission was obtained from institutional ethical committee of Dr SNMC Jodhpur. The informed consent was obtained from the children above 7 years & from the guardian of children below 7 years.

On 1st preparative day children were screened for anxiety with Hamilton Anxiety rating scale (HAM-A). Recorded demographic data, level of pain & vital signs. For group-A from the day of admission until administering preoperative medication, prerecorded instrumental music was played 3 times a day on average, through head phone for the period of 15 to 30 minutes. Group B received prerecorded guided visual imagery audio through headphone for the period of 15 to 30 minutes from the day of admission until receiving preoperative sedative medications. The child received other conventional interventions throughout the preoperative period. The children in all 3 group received two or more conventional intervention as a part of supportive measures which helped to reduce

preoperative anxiety of the children , they are Parental presence, the use of toys, playing games, videos, drawing cartoons, psychological support, storytelling & listening, playing actively/passively. After the intervention children from all 3 groups were reassessed for level of anxiety through HAM-A, reassessed for pain & vital signs, & all the samples were questioned & assessed for the conventional interventions received until receiving preoperative sedative medications. The data was compiled & analyzed with help of SPSS-16.

Results

It was inferred from the table-1 that 50% children who exposed to music therapy with convention intervention showed improvement in anxiety reduction from mild to no anxiety. There was no one in music therapy group experience neither moderate nor severe anxiety at pre & post-test. The children who exposed to visual imagery technique showed improvement up to 42.4% & anxiety was reduced to moderate to mild & no one had sever anxiety in pre & posttest. Children who received conventional intervention alone suffered from mild to severe level of anxiety in post -test (41.7% mild, 16.7% moderate, 25% severe & 16.7% very sever anxiety), were in pretest it was 58.3% with mild anxiety & 41.7% children had severe to very severe anxiety.

It was inferred from the table-2 that the samples in experimental group A (music therapy) experienced 76.1 % of reduction in anxiety level, were as samples in experimental group-B (visual imagery technique the anxiety reduction rate was 42.4%, & in control group C the reduction rate was 2.89% only. The effect size was calculated by Cohen's D & it was 1.88 among children exposed to music therapy & it was 1.34 among children exposed to visual imagery technique. So it was interpreted that the music therapy was very effective in reducing preoperative anxiety level of the children when comparing to visual imagery technique. And both the interventions were effective when comparing to conventional intervention alone. As the effect size in control group was only 0.04.

From Table 3 it was interpreted that there was significant difference exist between pre & posttest anxiety level within & between the experimental group A, experimental group B & control group C at $p<0.05$ level as tested by one way ANOVA.

It was inferred from the table-4 that experimental group A posttest mean was significantly different from the experimental groups B & control Group C. Group B posttest mean was significantly different from group A but not with group C. Were as group C post-test mean was not significantly different from Group A & group B. So it was interpreted that the Music therapy (Group A) was more effective in reducing preoperative anxiety level when comparing to VIT or conventional intervention. The pretest mean was significantly different between group A& B but not with group C.

Table-1: Frequency and percentage distribution of samples in pre and posttest. N=36

Score	**Interpretation**	**Frequency (%)**					
		Group-A		**Group-B**		**Group-C**	
		Pretest	**Post test**	**pretest**	**Post test**	**pretest**	**Post test**
No anxiety	**0**	**0**	**6 (50)**	**0**	**0**	**0**	**0**
Mild	<17	12 (100)	6 (50)	7 (58.3)	12 (100)	7 (58.3)	5 (41.7)
Mild to Moderate	17-24	0	0	5 (41.7)	0	0	2 (16.7)
Moderate to severe	24-30	0	0	0	0	0	3 (25)
Severe to very severe	>30	0	0	0	0	5(41.7)	2 (16.7)
Total		12		12		12	

Table-2: Pre and posttest mean and standard deviation of the samples

Group	Pretest mean and SD	Posttest mean and SD	Mean differences	Effect size	Percentage of effect
Experimental Group-A (Music therapy-MT)	7 ±3.43	1.67 ±2.06	-5.33	1.88	76.1
Experimental Group-B (Virtual reality therapy-VIT)	15.33 ±4.86	8.83 ±4.78	-6.5	1.34	42.40
Control Group-C (Conventional intervention-CI)	19.67 ±14.88	19.08 ±12.12	-0.57	0.04	2.89

Table-3: One Way ANOVA to find out difference between and within the group on level of anxiety

Group and test		Sum of Squares	df	Mean Square	F	Sig.
posttest	Between Groups	1839.056	2	919.528	15.844	.000*
	Within Groups	1915.250	33	58.038		
	Total	3754.306	35			
pretest	Between Groups	994.667	2	497.333	5.801	.007*
	Within Groups	2829.333	33	85.737		
	Total	3824.000	35			

Table-4: Post hoc test for Multiple Comparisons (Tukey HSD)

Dependent Variable	(I) groups	(J) groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Posttest	Group A	Group B	17.417*	3.110	.000*	9.79	25.05
		Group C	10.250*	3.110	.006*	2.62	17.88
	Group B	Group A	-17.417*	3.110	.000*	-25.05	-9.79
		Group C	-7.167	3.110	.069	-14.80	.46
	Group C	Group A	-10.250*	3.110	.006*	-17.88	-2.62
		Group B	7.167	3.110	.069	-.46	14.80
Pretest	Group A	Group B	12.667*	3.780	.006*	3.39	21.94
		Group C	4.333	3.780	.493	-4.94	13.61
	Group B	Group A	-12.667*	3.780	.006*	-21.94	-3.39
		Group C	-8.333	3.780	.085	-17.61	.94
	Group C	Group A	-4.333	3.780	.493	-13.61	4.94
		Group B	8.333	3.780	.085	-.94	17.61
*. The mean difference is significant at the 0.05 level.							

Discussion

The mean - pre & post test score of experimental group A was 7 ±3.43 and 1.67 ±2.06 and mean difference was -5.33 and the effect size was 1.88. The mean pre and post -test score of experimental group B was 15.33 ±4.86 and 8.83 ±4.78 and mean difference was -6.5 and the effect size was 1.34. The post-test mean difference in experimental groups B was 18% more when comparing with experimental group A. The mean pre and post -test score of control group was 19.67 ±14.88and 19.08 ±12.12.

Around 50% Children exposed to music therapy experienced no preoperative anxiety at posttest. The present study shows that the samples in experimental group A (music therapy) experienced 76.1 % of reduction in anxiety level, were as samples in experimental group-B (visual imagery technique) the anxiety reduction rate was 42.4%, and in control group C the reduction rate was 2.89% only when comparing to pretest anxiety level. The find of one way ANOVA interpreted that there was significant difference exist between 3 groups & post hoc test interprets that the Music therapy (Group A) was more effective in reducing preoperative anxiety level of the children when comparing to VIT or conventional intervention.

Similarly the findings of this study was supported by studies conducted by Goldbeck L (2012)[21] on multimodal music therapy for children with anxiety disorders, Lambert et al (1996)[22] on effect of hypnosis/ guided imagery on the postoperative course of pediatric surgical patients), Thomas MB (2003)[23] et al on effect of relaxation & guided imagery on autonomic nervous system & Hartling et al (2013)[25] on music to reduce pain & distress in the pediatric emergency department. This study finding was contrast to the study finding of Kain ZN et.al (2004)[24] who assessed interactive music therapy is an effective treatment for pre-induction anxiety.

Conclusion

It was concluded that music & visual imagery technique both are effective in reducing preoperative anxiety level of the children when comparing to children who received conventional intervention alone. Music therapy was even more effective when comparing with visual imagery technique. If music therapy given especially just before giving anesthesia, the child will experience very less anxiety or no anxiety & that could reduce the post-operative stay & improve outcome status of the child. Music therapy & visual imagery technique can become part of preoperative intervention.

Conflict of Interest: No actual or potential conflict of interest

Acknowledgement: I thank to friends who helped in data collection.

Funding: Self funded.

References

1. Banchs RJ, Lerman J. Preoperative Anxiety Management, Emergence Delirium, & Postoperative Behavior. Anesthesiol Clin. 2014;32(1):1–23.
2. Pritchard MJ. Identifying & assessing anxiety in pre-operative patients. Nurs Stand. 2009;23(51):35–40.
3. Brewer S, Gleditsch SL, Syblik D, Tietjens ME, Vacik HW. Pediatric Anxiety Child Life Intervention in Day Surgery. J Pediatr Nurs. 2006;21(1):13–22.
4. Lee JH, Jung HK, Lee GG, Kim HY, Park SG, Woo SC. Effect of behavioral intervention using smartphone application for preoperative anxiety in pediatric patients. Korean J Anesthesiol. 2013;65(6):508–518.
5. Garanhani ML, Valle ERM. O significado da experiência cirúrgica para a criança. Cienc Cuid Saúde. 2012;11:259–266.
6. Al-Jundi SH, Mahmood AJ. Factors affecting preoperative anxiety in children undergoing general anaesthesis for dental rehabilitation. Eur Arch Paediatr Dent. 2010;11(1):32–37.
7. Kim JE, Jo BY, Oh HM, Choi HS, Lee Y. High anxiety, young age and long waits increase the need for preoperative sedatives in children. J Int Med Res. 2012;40(4):1381–1389.
8. Davidson AJ, Shrivastava PP, Jamsen K, Huang GH, Czarnecki C, Gibson MA. Risk factors for anxiety at induction of anesthesia in children a prospective cohort study. Pediatr Anesth. 2006;16:919–927.
9. Cagiran E, Sergin D, Deniz MN, Tanatti B, Emiroglu N, Alper I. Effects of sociodemographic factors and maternal anxiety on preoperative anxiety in children. J Int Med Res. 2014;42(2):572–580.
10. Kain ZN, Caldwell-Andrews AA, Mayes LC, Weinberg ME, Wang S, MacLaren JE et al. Family-centered preparation for surgery improves perioperative outcomes in children. Anesthesiology, 2007. 106(1), 65-74.

11. Borsook D, George E, Kussman B, Becerra L. Anesthesia and perioperative stress Consequences on neural networks and postoperative behaviors. Progress in Neurobiology. 2010;92:601–612.
12. Chorney JM, Tan ET, Martin SR, Fortier MA, Kain ZN. Childrens behaviour in the post-anesthesia care unit the development of the child behaviour coding system-PACU (CBCS-P) J Pediatr Psychol. 2012;37(3):338–347.
13. Hilly J, Hörlin AL, Kinderf J, Ghez C, Menrath S, Delivet H. Preoperative preparation workshop reduces postoperative maladaptive behavior in children. Paediatr Anaesth. 2015;25(10):990–998.
14. Kain ZN, Caldwell-Andrews AA, Maranets I, Nelson W, & Mayes LC. Predicting which child-parent pair will benefit from parental presence during induction of anesthesia: A decision-maiking approach. Anesthesia and Analgesia, 2006. 102, 81-84.
15. Bradt J, Dileo C, Shim M. Music interventions for preoperative anxiety. Cochrane Database Syst Rev. 2013 6;(6)
16. Mohanasundari SK. Padmaja A. Music therapy in caring for children. IJPEN. 2018 4 (3). 187-194
17. Mohanasundari SK. Padmaja A. Visual Imagery Technique in Caring for Children. AJANM, 2018. 6 (3). 263-268
18. DeFrances CJ, Lucas CA, Buie VC, & Golosinskiy A. 2006 National Hospital Discharge Survey. National Health Statistics Reports. (No. 5). Hyattsville, MD: National Center for Health Statistics.2008
19. Maier W, Buller R, Philipp M, Heuser I. The Hamilton Anxiety Scale: reliability, validity and sensitivity to change in anxiety and depressive disorders. J Affect Disord 1988;14(1):61–8.
20. Sheikh MS. Modified Kuppuswamy scale updated for Year 2018. PIJR, 2018: 7 (3)
21. Goldbeck L, Ellerkamp T. A randomized controlled trial of multimodal music therapy for children with anxiety disorders. J Music Ther. 2012 Winter;49(4):395-413.
22. Lambert, Sally A. The Effects of Hypnosis/Guided Imagery on the Postoperative Course of Children. JDBP.1996.
23. Thomas M, Daniel E, Cynthia J. Pilot Study of the Use of Guided Imagery for the Treatment of Recurrent Abdominal Pain in Children. 2003
24. Kain ZN, Caldwell-Andrews AA, Krivutza DM, Weinberg ME, Gaal D, Wang SM, et al. Interactive music therapy as a treatment for preoperative anxiety in children: a randomized controlled trial. 2004; 98(5):1260-6.
25. Hartling L, Newton AS, Liang Y, Jou H, Hewson K, Klassen TP, & Curtis S. Music to reduce pain and distress in the pediatric emergency department: a randomized clinical trial. 2013; 167(9):826-35.

Type of manuscript: Original article

CBCT use to Evaluate Vital Mandibular Inter-Foramin Anatomical Structures

Needhika Chibber[1], Satvinder Singh[2], Supinder Sudan[3], Megha Anand[3]

[1]Registrar (OMR), [2]Associate Professor, HOD (OMR), Indira Gandhi Government Dental College, Jammu, [3]House Surgeon (OMR), Indira Gandhi Government Dental College, Jammu

Abstract

Background: The aim of the study was to evaluate the vital anatomical structures in the mandibular inter-foramin region and to investigate the presence of sexual dimorphism with respect to the left and right sides region using CBCT.

Materials & Method: A total of 60 CBCT scans (30 male & 30 female) were analysed for the MF position & shape, presence and measurement of AL & MIC (both in mm), patterns of emergence of mandibular canal, symmetry of MF & AL. All the scans were taken by CS 9300 (Care stream Health India Private Limited) CBCT machine adjusted at 80 kVp, 15mA, Voxel size 0.3x0.3x0.3 and field of view (FOV) of 10x5 (mandible only). The acquired images were reconstructed into multiplane views (axial, panoramic and cross-sectional) for evaluation.

Results: Position 4 of MF (below the apex of second premolar) was most common on right side while position 3 (between first & second premolar) on left side, with 75% of symmetrical MF position. The prevalence of MIC was noted in 93.75% of the patients with mean length of 12.09±5.95 mm. The prevalence of AL was 53.13% with mean length of 1.07±1.42mm.

Conclusion: The present study recommends a CBCT evaluation of inter-foraminal anatomical structures before planning the placement of implants. However, no sexual dimorphism was found regarding these parameters.

Keywords: *Anterior mental loop, inferior alveolar nerve, mental foramen, mandibular incisive canal.*

Introduction

The mandibular incisive canal (MIC) is described as a continuation of the IAC anterior to the MF and contains one of the terminal branches of the IAN, the Incisive branch. The MF has been reported to vary in its position in different genders and ethnic groups having different craniofacial skeletal and dental occlusion.[1] Philips *et al* [2] reported that its average size was 4.6mm horizontally and 3.4mm vertically. The knowledge of the position of MF is important in clinical dentistry when administering local or regional anaesthesia, orthodontic tooth movement/surgery, performing periapical surgery and implant placement in the mental region of the mandible. The MF is occasionally misdiagnosed as a radiolucent lesion in the periapical area of the mandibular premolar region.[3] The MF also aids in interpreting anatomical landmark in oral and forensic pathology.[4]

The use of appropriate imaging techniques is therefore essential to enable the accurate identification and location of these vital structures. With the development of computed tomography (CT) three dimensional (3D) assessments of craniofacial structures become possible and widely available means for head and neck diagnosis and treatment planning. The excessive radiation exposure, increased cost and limited availability impede the routine use of this technology for dental applications.

Corresponding author:
Dr. Needhika Chibber,
Registrar (OMR), Indira Gandhi Government Dental College, Jammu, Phone no.: 7734879313
Email id : drsatinderpalaggarwal@gmail.com

Now cone beam CT (CBCT) offers a promising alternative approach since it provides sub-millimeter resolution images of high diagnostic quality with short time and reduced radiation dose up to 15 times lower than multi-slice CT scans (MSCT) and produce images that demonstrate on different planes and real size of anatomical structures.[5] In recent years, several studies have analysed the characteristics of anatomical landmarks in the mandibular anterior region in various populations around the world. Nevertheless, to date few studies have evaluated by CBCT in population from North-eastern India. With this background, the present study was conducted to evaluate the vital anatomical structures in the mandibular inter-foraminal region and to investigate the presence of sexual dimorphism and differences with respect to the left and right sides region using CBCT.

Materials & Method

The cross sectional study was conducted on randomly selected 60 CBCT scans taken as a part of the planning procedure/diagnostic workup for implant placements, orthognathic surgeries, bone harvesting from the chin and mandibular osteotomies in Indira Gandhi Government Dental College, Jammu. The study sample consisted of 30 males and 30 females between the age of 20 to 70 years. The CBCTs were performed in a private maxillofacial radiology clinic located in Jammu. All the scans were taken by the same technologist, following a standardized protocol for patient positioning and exposure parameter settings. The informed and written consent was taken for each patient. The institutional ethical committee clearance was obtained before the conduct of study.

The inclusion criteria consisted of; 1. Patients who are fully dentate in posterior regions of two sides including the second premolars and first, second molars without crowding or spacing, 2. Cone-beam CT scans displaying the entire mandibular bone of both sides, free of large pathologies and 3. Absence of pathology that could affect the position of MF, AL or MIC. The exclusion criteria considered was as; 1. CBCT of patients with history of maxillofacial trauma, fracture or supernumerary or impacted teeth in region of interest (ROI), 2. Syndromic patients, 3. Pregnant females, and 4. Presence of implants or metal artefacts in the Mandibular Inter-foraminal region.

Method: The diluted 0.2% chlorhexidine gluconate mouthwash was given to rinse the oral cavity. A detailed case history including the individuals demographic details (age, gender, Address etc), general and medical history followed by through clinical examination was carried out in a systematic manner. Then the hard tissue intra-oral examination was carried out for each patient for the number of teeth present, presence or absence of dental caries, calculus, gingival recession, periodontal pockets and the findings were entered in a specially designed performa. After the clinical examination, the CBCT scan of the selected patients was accomplished with a Cone-beam volumetric tomography Device CS 9300 (Care stream Health India Pvt. Ltd) adjusted at 80 kVp, 15mA, Voxel size 0.3x0.3x0.3. The CBCT images were taken with field of view of (FOV) of 10x5 (mandible only) & 17x13.5 (full mouth) and were used only if they cover the ROI and matched the inclusion criteria.

Mental Foramen (MF): The MF position was assessed relative to the adjacent mandibular teeth on the right and left sides as: Position 1: Between canine and first premolar; Position 2: Below the first premolar; Position 3: Between first and second premolars; Position 4**:** Below the second premolar; Position 5: Between second premolar and first molar; Position 6: Below the first molar. The position of MF was also recorded on the basis of gender and symmetry (MF on both sides with same anterio-posterior position relative to the teeth) or asymmetry (MF on both sides with different anterio-posterior position relative to the teeth). The shape of MF was recorded as: oval, round and irregular.

The **length AL** was measured between the anterior border of the AL and the anterior margin of the MF. The **MIC length** was determined by measuring the distance in millimetre between the most anterior border of the MF and the most mesial slice where the canal was definitely visible in cross-sectional images. In addition, the differences with respect to the left and right sides and the presence of sexual dimorphism was also investigated.

The data thus collected was tabulated and statistically analysed using SPSS 18.0 (Microsoft Corporation Inc., Chicago, IL, USA) statistical software.

Results

The overall mean age of the patients was found to be 42.64±16.22 years with males having slightly more age than females although the difference was insignificant.

In the present study, most common position noted for MF of right side related to teeth on CBCT was position 4 (in line with the apex of the second premolar) & position 3 (between the apices of the first and second premolars) for males while for females it was position 4 (Table 1).

The mean length of AL noted on the right side for both genders was 1.22±1.92 mm while on left side it was 0.92±1.14 mm. The overall mean length of AL for both sides was found to be 1.07±1.42 mm with statistically insignificant difference. (Table 2)

Present study showed the existence of MIC in 93.75% of the patients. The three patients had symmetrical absence of MIC and four showed absence of either side only. The mean length of MIC noted on right side for both genders was 12.90±6.11 mm while on left side it was 11.28±6.17 mm. The overall mean MIC length for both sides was found to be 12.09±5.95 mm. (Table 3) Moreover, no correlation was found between MF positions with emergence patterns of mental canal from MF for either side. ($p>0.05$)

Table 1: Association between gender and position of right and left mental foramen

Mental foramen Position	Right		Left	
	Male, n (%)	Female, n (%)	Male, n (%)	Female, n (%)
Position 1	0	0	0	0
Position 2	5 (16.67%)	1 (3.33%)	3 (10%)	0
Position 3	12 (40%)	12 (40%)	15 (50%)	16 (53.33%)
Position 4	10 (33.33%)	15 (50%)	10 (33.33%)	9 (30%)
Position 5	2 (6.67%)	2 (6.67%)	2 (6.67%)	5 (16.67%)
Position 6	1 (3.33%)	0	0	0
Total	30	30	30	30
Chi square	2.46		4.76	
p value	0.54		0.11	

Table 2: Mean length of mandibular anterior loop

Gender	Right (in mm)		Left (in mm)		Total (in mm)	
	Mean	SD	Mean	SD	Mean	SD
Male	0.94	1.31	1.08	1.32	1.02	1.10
Female	1.49	2.84	0.75	1.18	1.11	1.69
Total	1.22	1.98	0.92	1.14	1.07	1.42
't' test	1.09		1.18		0.28	
p value	0.31		0.24		0.78	

SD: standard deviation

Table 3: Mean length of Mandibular incisive canal

Gender	Right (in mm)		Left (in mm)		Total (in mm)	
	Mean	SD	Mean	SD	Mean	SD
Male	14.17	6.88	11.26	6.93	12.72	6.22
Female	11.62	6.07	11.30	6.86	11.46	5.66
Total	12.90	6.11	11.28	6.17	12.09	5.95
't' test	1.76		0.03		0.95	
p value	0.08		0.98		0.35	

SD: standard deviation

Discussion

The CBCT provides multiplanar reconstructions and true –to size images at very low radiation dosage, which enables excellent resolutions and good contrast for the visualization of these dento-alveolar inter-foraminal structures compared to CT and conventional radiographic view.[4] The CT acquires image data using rows of detectors, while CBCT exposes the whole section of the patient over one detector.

In our series of 60 CBCTs scans, the most common position for the MF was between first and second premolars. The sexual dimorphism was not found ($p>0.05$) regarding positions of MF in the studied population. The position was determined along the long axis of the teeth, considering the whole width of the teeth. Similar results were seen by Moiseiwtsch *et al*[1] in a North American Caucasian population and also by Fishel*et al*[6], Olasoji*et al*[7] in Northern Nigerian adults. In contrary, few previous similar studies performed in other populations such as Malays, Asian Indians, Kenyan, Africans and Moroccan found most common position for the MF in line with the second premolar. The difference in results could be due to genetics, which play an important role in determining the morphological characteristics of dental structures.

In our study, at least one AL of the mandibular canal was visualized in 53.13% of the patients. This is higher than the prevalence reported by Ngeow *et al*[8] who conducted the study using panoramic radiographic images. The relatively low prevalence rates reported in those studies may reflect the failure of panoramic radiography to detect the presence of the anterior loop, due to the limitations & disadvantages of radiography like two dimensionality, distortion, the presence of overlapping structures and calcification degree of the cortex which represents radiopaque in radiographic images.

In our study, mean value of the AL was 1.07±1.42 mm, coinciding with the values found by other authors also using CBCT. However, in a study performed in South-eastern Brazil was found a mean 2.41 mm length of AL in the analyzed CBCT scans. These differences may be at least partly due to the racial influence.

The present study showed 93.75% visibility of the MIC by CBCTs, with mean length of 12.09±5.95 mm. The same results were found in the study by Pires *et al*[9] documenting 83% & 93% existence of MIC on CBCTs and spiral CTs respectively. In contrast, most of the cadaver dissection studies, it is possible to find 100% of existence of the MIC/nerve. The reason could be that the MIC becomes smaller while progressing from distal to the anterior part of the mandible to midline, so sometimes MIC narrows as it approaches the midline, and its visibility might be hindered by limited spatial and contrast resolution and by the partial volume averaging effect in inherent in the CBCT images.

Conclusion

It can be concluded that there may be large variations in the anatomical landmarks in the mandibular inter-mental foraminal region, and therefore the concept of

"a safe region" during surgical procedures in the inter-foraminal region should be questioned and a detailed study of the region must be performed using multiplaner images of CBCT during preoperative surgical planning. Our study showed that oral radiologist obtains high rates of identification of AL and MIC when CBCT images are used. The large variations in the lengths of AL & MIC was obtained, so it is suggested that preoperative radiographic evaluation of both should be carried out case by case, using CBCT scans which could clearly show the 3D structures.

Ethical Clearance: Indira Gandhi Government Dental College, Jammu

Source of Funding: Self

Conflict of Interest: Nil

References

1. Moiseiwtsh DM, Gungor E, Guven S, Unal M. Evaluation of mental foramen location in the 10-70 years range using CBCT. Niger J Clin Pract.2005;2(1):33-45.
2. Phillips JL, Weller RN, Kulid JC. The mental foramen part 1. Size, orientation and positional relation to the mandibular second premolar. J Endod 1990;16:221-3.
3. Baxman M. Mental parasthesia and orthodontic treatment. Angle Orthod 2006;76:533-7.
4. Robinson RC, Williams CW. Documentation method for inferior alveolar and lingual nerve paresthesias.OralSurg Oral Med Oral Pathol 1986;62:128-31
5. Mardinger O, Chaushu G, Arensburg B, Taicher S, Kaffe I. Anterior loop of the mental canal: an anatomical radiologic study. Implant Dent 2000;9: 1205.
6. Fischel D, Buchner A, Hershkowith A, Kaffe I. Roentologic study of the mental foramen. Oral Surg Oral Med Oral Pathol 1976;41:682-6.
7. Olasoji HO, Tahir A, Ekanem AU, Abubaker AA. Radiographic and anatomic locations of mental foramen in northern Nigerian adults. Niger Postgard Med J 2004;11:230-3.
8. Ngeow WC, Dionysius DD, Ishak H, Nambiar P. A radiographic study on the visualization of the anterior loop in denate subjects of different age groups. J Oral Sci 2009;51(2):231-7.
9. Pires L, Fuentes R. Prevalence and morphometric analysis of mental foramen in human dry skulls. Int J morphol 2007;35(3):931-7.

Comparison of Foot Posture in Runners (Sprinters) and Non-Runners in Indian Population- An Observational Study

Nikhil Aggarwal[1], Nidhi Ved[2]

[1]Assistant Professor Chandigarh University, Mohali, NH-95, Ludhiana Chandigarh state Highway, Punjab,
[2]Assistant Professor RK University, Rajkot, Bhavnagar Highway, Kasturba Dham, Rajkot Gujarat

Abstract

Introduction : The foot and ankle are located most distally in the lower limb and are responsible for allowing effective weight reception and generating torque required for propulsion during dynamic activities. Proper foot motion specifically subtalar pronation and supination are critical to achieving these functions. The normal foot transitions between pronation and supination to optimize adaptability versus stability as needed but foot mal alignments may negatively affect the lower leg to function optimally during weight bearing stance.

Aim : To compare the foot posture of Indian Runners and Non- Runners.

Objectives : (1) To determine the foot posture of runners in Indian Population. (2) To determine the foot posture of non-runners in Indian population. (3) To compare the foot posture of Indian runners and non-runners.

Method: 30 runners and 30 non-runners participated in the study. Footprint indices and Navicular drop was calculated. Foot print indices i.e. Arch angle, Chippaux- Smirak index, Staheli index, Arch length index, arch index, footprint index, truncated arch index were calculated using an ink pad and Navicular drop were calculated of the dominant feet.

Results: The normality of data was checked by using Shapiro-Wilk test which shows data was of parametric type. Comparison between the groups was done by unpaired t-test The arch index and truncated arch index were significantly higher in runners than non-runner and Staheli index was significantly higher in Non-runner than runners.

Conclusion: The result of this study shows that Runners have more pronated foot as compared to Non-runner.

Keywords*: Foot Posture, Runners, Navicular Drop, Footprint Indices.*

Introduction

When humans adopted a bipedal posture and gave up the use of the upper extremities for movement, body weight was transmitted from the vertebral column through the pelvis and lower extremities, especially the feet[1]. The foot became the contact point with the ground and evolved so that it could easily adapt to changes in both weight and the ground surface to absorb forces while walking or standing and to facilitate rotational movements[2 3]. For this purpose, its structure forms an arch on a bony skeleton strengthen by ligaments and muscles, unlike the feet of other primate's[4.5].

The foot and ankle are located most distally in the lower limb and are responsible for allowing effective weight reception and generating torque required for propulsion during dynamic activities[6]. Proper foot motion specifically subtalar pronation and supination are critical to achieving these functions. The normal foot transitions between pronation and supination to optimize adaptability versus stability as needed but

foot mal alignments may negatively affect the lower leg to function optimally during weight bearing stance. Considering that the foot is the most distal segment in the lower extremity chain and represents a relatively small base of support upon which the body maintains balance, it seems reasonable that even minor biomechanical alterations in the support surface may influence postural-control strategies[7].

Aims and Objectives

To determine the foot posture of runners (Sprinters) in Indian Population

· To determine the foot posture of non-runners (Non-sprinters) in Indian population.

· To compare the foot posture of Indian Runners and Non- Runners.

Hypothesis

H_0- There is no significant Difference in foot posture of runners (Sprinters) and non-runner in Indian population.

H_1- There is a significant Difference in foot posture of runners (Sprinters) and non-runner in Indian population

Operational Defination

SPRINTERS: Sprinters are the athletes who races up to and including the 400m. Subjects included were involved in the sprinting events and participated in competitions at inter collage level. The subjects are also participating in competitions till date.

Methodology

· Research Design: Comparative Study

· Sample Size: 60 Subjects

· Sample Source: New Delhi

· Inclusion Criteria:

o Asymptomatic Males and Females

o Runners and Non-runners

o Age Group 18 to 25 years

o Willing to participate in the study

· Exclusion Criteria:[89]

o Any history of Systemic disease, neurological disorder, cardiovascular disorder, malignancy, unhealed scars or wounds on lower extremity, vestibular problem foot surgery or Back problem for more than one year.

· Instrumentations:

o Instruments and Tool used:

§ Black marker

§ 3*5 index card

§ Measuring tape

§ Washable ink pad

§ Centimeter calibrated Graph Sheet

Procedure

Potential subjects of age group 18 to 25 years were apprised of the procedure and its potential risks and benefits and the evaluation was done. Subjects those who fulfill the study's inclusive and exclusive criteria and give their consent form were included in the study. Prior to testing, the subjects were familiarized with the testing procedure

Measuring the Navicular Drop:

The subject was placed in a sitting position with their feet flat on a firm surface and with the knees flexed to 90* and ankle in neutral position. After that the most prominent point of the Navicular tubercle while maintain subtalar neutral position was identified and marked with a pen. Subtalar neutral position was established when talar depressions are equal on medial and lateral side of the ankle.

While maintaining the subtalar neutral position, index card was placed in the inner aspect of the hind foot, with the card placed from the floor in a vertical position passing the Navicular bone. The level of the most prominent point of the Navicular tuberclue was marked on the card.

The subject was then asked to stand without changing the position of the feet and to distribute equal weight on the both feet. In the standing position, the most prominent point of the Navicular relative to the floor s again identified and marked on the card. Finally, the difference between the original heights of the Navicular

tuberclue in sitting position as assessed with a measuring tape.

Measuring the Footprint indices:

Seven footprint indices was calculated: the arch(Clarke) angle, Chippaux-Smirak index, Staheli index, Arch length index, Arch index, Footprint index and Truncated arch index using the ink pad. The subject was instructed to stand on a washable inkpad with totally covering the plantar aspect of the dominant foot. Then he/she was instructed to stand on a cm-calibrated graph sheet provided, so that it totally covers his/her dominant foot.

Arch (Clark) angle:

This is the angle between the line connecting the medial side-most points of the heel and metatarsal regions and the line connecting the lateral most point on the medial foot border to the medial most point of the metatarsal region[10.11.12]. Normal values for the Clarke's angle are considered in intervals from 42* to 54*. Higher value indicates High-arched foot and Lower values indicates flatfoot.

Chippaux Smirak index:

This is the ratio of the minimum width of the midfoot arch region to the maximum width of the forefoot[13]. The minimum CSI value, 0% indicated a high arch, 0.1+_ 29.9% indicated a normal arch, 30+_ 39.9% indicated an intermediary arch, 40+ 44.9% indicated a lowered arch and a percentage of 45% or above indicated a morphological flat arch foot.

Staheli index:

This is the ratio of minimum width of the midfoot arch region to the maximum width of the rearfoot[14].

Arch length index:

This is the ratio of the length of the line between the medial area-most points of the metatarsal and heel region to the border length of the arch outline between these points[15].

Arch index:

This is the ratio of the area of the middle third of the toeless footprint to overall toeless footprint area. A line is drawn between the center point of the second toe and the posterior most point on the heel. Two parallel lines perpendicular to this line are drawn to divide the toeless footprint area into equal thirds[13]. An arch index of less than 0.21 has been said to be indicative of a cavus foot, while the greater than 0.26 is indicative of planus foot whereas arch index between 0.21-0.26 corroborate normal arch height.

Footprint index:

This is the ratio of the non-contact area to the contact areas of the toeless footprint. The non-contact area is the area between the medial borderline axis formed by the medial most points of the metatarsal and the heel regions of the footprint and the medial border of the footprint outline. The contact area is the area of the toeless footprint[13].

Truncated arch index:

This is the ratio of the non-contact area (the arch area) to the truncated footprint area. The non-contact area is the area between the medial border line and the medial footprint outline. The truncated footprint area is bounded to the medial borderline axis of the footprint through the medial most points of the metatarsal and heel regions of the footprint[13].

Result

Statistical Analysis

Study design: Comparative study.

Statistical software: The statistical software named SPSS 20.00 was used for data analysis. Microsoft Excel and Word were used to generate graphs and tables.

Test: The normality of data was checked by using Shapiro-Wilk test which shows data was of parametric type. Comparison between with groups was done by unpaired t-test.

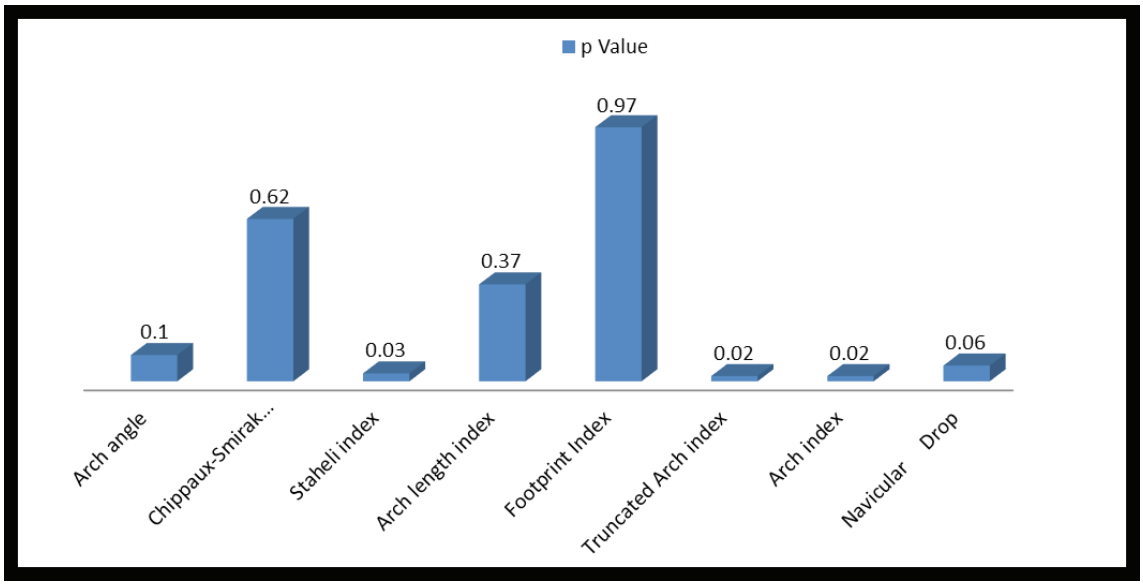
Level of significance (p value) was set to 0.05

Tables and Graphs

	Runners(Sprinters)	Non-runners
Age(years)	20.56±1.59	21.36±1.9
Weight(kg)	51±3.08	48.13±3.71
Height(cm)	170.1±3.36	169±3.60

	Variables	Runners(Sprinters)	Non-runners	t	P
Footprint indices		Mean±SD	Mean±SD		
	Arch angle	49.23±5.83	46.30±7072	1.65	0.10
	Chippaux-Smirak index	0.32±0.8	0.31±0.11	0.48	0.62
	Staheli index	0.56±0.13	0.36±0.14	-2.13	0.03
	Arch length Index	3.27±0.90	3.09±0.64	0.89	0.37
	Footprint Index	0.24±0.05	0.24±0.09	-0.33	0.97
	Truncated Arch index	0.35±0.07	0.30±0.09	2.25	0.02
	Arch index	0.19±0.06	0.079±0.07	-2.26	0.02
Navicular Drop		0.58±0.11	0.51±0.15	1.87	0.06

Table 1 Mean and SD of Age, Height and weight and Comparison of Footprint indices and Navicular drop of Runners (Sprinters) and non-runners. of runners (Sprinters) and Non-runner



Graph 1 Showing p value of all the variables.

For Dominant foot, Arch index, and Truncated arch index were significantly higher in runners (Sprinter) and Non- runner (Non-sprinter) ($p<0.05$). Whereas Staheli index was higher in

Non-runners (Non-Sprinters)

Discussion

This study was about the differences in foot posture of sprinters and non-runners. The study included 30 subjects in each group. In this study arch index and truncated arch index of right foot was found to be higher for sprinters whereas Staheli index was higher for non-sprinters. For left foot arch length index and truncated arch index was higher for sprinters whereas Staheli index was higher for non-sprinters.

These differences can be due to the difference in muscle function and force distribution between runners and non –runners. Powerful muscles strength in lower extremity was usually considered to be required for excellent performances in running and foot arch would

then be functionally changed for compensation. The primary extrinsic muscles, such as the posterior tibial, flexor halluces longus, flexor digitorum longus, and wabductor hallicus longus, and the intrinsic muscles of the foot are dynamic supporters of MLA and do not become active until walking.[4,16,17]

Certain muscles in the foot and ankle either depress or support the arch, and their insuffiency may result in changes in the sole. For example, posterior tibial tendon rupture and tenosynovitis results in flat foot[16]. The posterior tibia, peroneus brevis/longus, flexor hallicus longus muscles. Flexor didgitorum longus, and abductor halliucis longus muscls, for example, support the formation of the medial longitudinal arch; whereras the extensor hallicus longus and tibialis anterior muscles have a depressing effect on this arch[17].

Most of the movement in running depends on the lower extremity musces and of course on the foot. Consequentlty, prolonged activation of these muscles might cause lasting changes in the sole of the foot, which would be detected in the static footprint parameters. Although some of the parameters in the present study differed between the sprinters and non-runners, these parameters do not reflect the same processes, as the truncated arch index is directly proportional to the arch height whereas Staheli index are inversely proportional to the arch height. During specific movement in running pressure on the different areas of the sole and resistance to this pressure could have different effect[16].

The result of this study matches with the study done by Dr Cenk Murat Ozer et. al on professional football player and controlled group where they found higher value for Truncated arch index for right foot and arch length index and truncated arch index for left foot.

Urry and wearing[18] studied the arch index and identified statistically significant difference between some contact areas of the sole using ink footprints and electronic images obtained with pressure platforms.

Miyashita and associates have reported that integrated EMG activity of the tibialis anterior and gastrocnemius increases exponentially with increasing speed[19]. Ito.et.al reported that with increasing running speed, the EMG increased during swing but remained the same during support phase[20].

According to Schlee et al[21]., 2009 and Gerlach et al[22].,2005 loading rates have been reported to remain unchanged after a prolonged run above lactate threshold or decrease after a graded exercise test. Perhaps the MLA became less stiff after the run which decreased loading rate.

Conclusion

The result of this study shows that Runners (Sprinters) have more pronated foot as compared to Non- runner.

Clinical relevance

Knowledge of type of foot posture will help to provide an optimal environment for muscle strengthening and/ or tendon rehabilitation. After the analysis of the foot posture more focused exercise program can be design to focus on specific part of the foot i.e. rear foot, mid foot or hind foot which is majorly responsible for the alteration in foot posture.

Limitation

· There is no one variable present which can measure every component of foot posture.

· Blinding was not done in the study.

· Only one type of the runners was included in the study.

· Sample size was relatively small.

Further recommendations

· Equal number of male and female can be included in the study.

· All variables can also be measured by different methods and them the results can be correlated to make a universally accepted method.

· Different types of runners can also be included in the study.

Source of Funding – self

Conflict of Interest - Nil

Ethical Clearance – was taken at Banarsidas chandiwala institute of Physiotherapy.

Refrences

1. Cartmill M, Hylander Wl, Shafland J. Human structure. Massachusetts, Harvasrd University Pres, 2001: pp229-338.
2. Tsung BYS, Zhang M, Fan YB, et al. Quantitative comparison of planter foot shapes under different weight-bearing conditions. J Rehabil Res Dev. 2003;40(6):517-526.
3. Dogan A, Uslu M, Aydinoglu A, ei al. Morphometric Study of the human metatarsals and phalanges. Clin Anat. 2007;20(2): 209-214
4. Basmajian JV, Stecko G. The role of muscles in arch support of the foot: An electromyographic study. J Bone Joint Surg Am. 1963;45:1184-1190.
5. Shozo T. Structural components of the arch of the foot analyzed by radiogram metric and multivariate statistical methods. Acta Anat. 1984;119(3):161-164.
6. Gary L. Soderberg. Kinesiology: Application to pathological motion. pp.258
7. Karen P. Cote, Michael E. Brunet, Bruce M. Gausneder, Sandra J. Schultz. Effects of pronated and supinated foot postures on static and dynamic postural stability. J Athl Train 2005; 40(1): 41-46.
8. Catherine Busseuil et.al Rearfoot- Forefoot Orientation and traumatic Risk for runners.
9. ST aydog.et.al. Diggerences in sole arch indices in various sports.
10. López N, Alburquerque F, Santos M, et al. Evaluation and analysis of the footprint of young individuals. A comparative study between football players and non-players. Eur J Anat. 2005; 9(3):135-142.
11. Shiang TY, Lee SJ, Chu WC. Evaluating different footprint parameters as a predictor of arch height. IEEE Eng Med Biol Mag. 1998; 7(6):62-66.
12. Hawes MR, Nachbauer W, Sovak D, et al. Footprint parameters as a measure of arch height. Foot Ankle. 1992; 13(1):22-26.
13. Cavanagh PR, Rodgers MM. The arch index: a useful measure from footprints. J. Biomechanics. 1987;20(5):547-551.
14. Catherine Busseuil et.al Rearfoot –Forefoot Orientation and Traumatic Risk for runners.
15. Cavanagh PR, Rodgers MM. The arch index: a useful measure from footprints. J. Biomechanics. 1987;20(5):547-551.
16. Dr Cenk Murat Ozer, MD, Associate professor Cagatay Barut,MD, Phd: Evaluation of the sole morphology of professional Football Players. March 2012
17. Kapandji IA. The physiology of the joints. Vol 2 lower limb. Edinburgh: Churchill Livingstone, 1976
18. Urry SR, Wearing SS. A comparison of footprint indexes calculated from ink and electronic footprints. J Am Podiatr Med Asoc. 2001;91(4): 203-09
19. Miyashita M, Matsui H, Miura M: The relation between electrical activity in muscles and speed of walking and running. In vredenbregt J, Wartenweiler JW(eds): Biomechanics II. Baltimore, MD, University Park press, 1971, pp 192-196.
20. Ito A, Fuchimoto T, Kaneko M: Quantitative analysis of EMG during various speeds of running.
21. Schlee, G., Milani, T., and Roemer, K. (2009). Plantar pressure distribution, rearfoot motion and ground reaction force after long distance running. Footwear Science, 1(3), 129-134.
22. Gerlach, K.E., White, S.C., Burton, H.W., Dorn, J.M., Leddy, J.J., and Horvath, P.J. (2005). Kinetic changes with fatigue and relationship to injury in female runners. Medicine and Science in Sports and Exercise, 37(4), 657-63.

Prevalence of Lumbar Spine Dysfunction in Sugar Industry Workers of Karad Taluka

Nikhil Jitendra Desale[1], Javid H. Sagar[2]

[1]Final Year, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad,
[2]Professor, Department of Cardiopulmonary Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad

Abstract

Background: From past few years, in most of the industrialized world there has been increase in number of individuals having problem in musculoskeletal system. The term spinal dysfunction refers to an abnormal increase or decrease in spinal movement (mobility). Sugar industry workers are directly involved in the production process that's why some existing studies shows that the sugar industry work is characterized by repetitive movement, heavy load movement, wrong or awkward posture, forceful activity which causes cumulative trauma to the spine due to increase variability in weights.

Repetitive bending movement causes backache, prolonged working hours causes feeling of fatigue, long hour movement of hand causes numbness of fingers and strenuous activities all these activities put workers at risk for work related musculoskeletal disorders. There was hardly any literature available on the prevalence of spinal dysfunction in sugar industry workers in rural Maharashtra. Hence this observational study is to find out prevalence of spinal dysfunction in sugar industry workers in karad taluka.

Methods: This is an observational study which included 100 subjects. Then they were screened and distributed according to their age, gender, BMI and were asked to fill the modified oswestry low back pain disability Questionnaire. Later the subjects were assessede using modified oswestry low back pain disability Questionnaire.

Result: In this study 100 sugar industry workers (68 males and 32 females) were taken for study. It was found that 59 sugar industry workers had a lumbar spine dysfunction. The age is from 30-above 50 years of workers were taken in this study, which was found to be more prevalent in male(63%) than in female(50%), although this difference was not statistically significant.

Conclusion: This study has provided the evidence to support the increase in lumbar spine dysfunction in sugar industry workers of karad taluka.

***Keywords**: Lumbar spine dysfunction, sugar industry workers, modified oswestry low back pain disability Questionnaire.*

Introduction

From past few years, in most of the industrialized world there has been increase in number of individuals having problem in musculoskeletal system.

Musculoskeletal disorders are defined as a group of disorder that affect the musculoskeletal system including the nerve, tendon, muscle supporting structure such as intervertebral disc.[1]

The term spinal dysfunction refers to an abnormal increase or decrease in spinal movement (mobility). The term may use to describe a spinal segment, a spinal region or the whole spine. Spinal dysfunction includes prolapsed discs, degeneration, sciatica, referred leg

Corresponding Author:
Nikhil Jitendra Desale
Qualifications: Final Year, Institute: Krishna Institute of Medical Sciences Deemed To Be University, Karad.
Work E-mail address: nikhildesale779@gmail.com
Work telephone: 9420107179

pain.[7]

Sugar industry workers are directly involved in the production process that's why some existing studies shows that the sugar industry work is characterized by repetitive movement, heavy load movement, wrong or awkward posture, forceful activity which causes cumulative trauma to the spine due to increase variability in weights.[1,4]

Repetitive bending movement causes backache, prolonged working hours causes feeling of fatigue, long hour movement of hand causes numbness of fingers and strenuous activities all these activities put workers at risk for work related musculoskeletal disorders.[2-3]

Here are some examples of physical hazards which sugar industry workers are facing everyday includes lifting and carrying heavy weights, working with frequently flexed trunk, risk of slips and falls on slippery and uneven surfaces, risk of accident caused by any unpredictable activity.[4]

There was hardly any literature available on the prevalence of spinal dysfunction in sugar industry workers in rural Maharashtra.

Hence this observational study is to find out prevalence of spinal dysfunction in sugar industry workers in karad taluka.

Material and Method

An observational study of Analytical study design was used to investigate the prevalence of spinal dysfunction in sugar industry workers in karad taluka. An approval for the study was obtained from the Protocol committee and Institutional Ethical Committee of Krishna Institute of Medical Sciences Deemed To Be University and written consent was obtained from each participant.

Participants

Participants were approached from karad taluka. It is an observational study which included 100 subjects. The subjects were screened and those fulfilling the inclusion and exclusion criteria were distributed according to their age, gender, BMI and were asked to fill the modified oswestry low back pain disability Questionnaire. Inclusion Criteria: 1.Sugar industry Workers, 2.both males and females, 3.sugar industry workers working for overtime/extra time. Exclusion Criteria: 1.Intervertebral disc prolapsed, 2.Recent spinal surgeries, 3.Patient undergone laminectomy, 4.Any secondary complications. Later the subjects were assessed using modified oswestry low back pain disability Questionnaire.

Assessment procedure

Before the assessment, demographic data of all participants were recorded. Then the participants were screened and those fulfilling the inclusion and exclusion criteria were distributed according to their age, gender, BMI and were asked to fill the modified oswestry low back pain disability Questionnaire. Modified oswestry low back pain disability Questionnaire was used to assess the participants.

Statistical Analyses

Statistical analysis was done manually and by using the statistics software INSTAT so as to verify the results derived. The statistical analysis of parametric data was done by using chi square test.

Results

Table no.1. Gender Wise distribution

Gender	No of patient present with low back pain	No. of patient	Percentage
Male	43	68	63%
Female	16	32	50%
total	59	100	59%

Table no.2. Age Wise Distribution

Age(years)	No. of patient present with low back pain	Total No. of patient	Percentage
30-39	29	50	58%
40-49	22	39	56%
50 or more than 50	9	11	81%
total	51	100	51%

Table no.3. Physical parameters for sugar industry workers

PARAMETERS	MEAN	SD	P-VALUE	T-VALUE
AGE	40.630	7.205	<0.0001	56.391
HEIGHT	5.509	0.2495	<0.0001	22.082
WEIGHT	65.410	7.161	<0.0001	91.347
MODIFIED OSWESTRY LOW BACK PAIN DISABILITY INDEX	24.580	7.289	<0.0001	33.720

Ns: Considered as non significant

Discussion

The industrial work of heavy lifting and carrying those heavy weights from one place to other increases the mechanical work load on the workers body is the one of the main cause of having the low back pain in industrial workers.

Working with carrying heavy weights repeatedly causes the musculoskeletal pain in the worker's body and in that pain low back pain is the most common and most severe musculoskeletal pain workers experienced at the workplace. This low back pain is causes due to the lumbar spine dysfunction.

Sugar industry workers has to lift heavy weights of sugarcane on their shoulder and back that causes the musculoskeletal pain and most common is low back pain due to the repeated bending activity with the heavy stress on the back. This occurs in with workers who have poor ergonomic knowledge about handling the heavy load on their shoulders and back. The pain is very severe sometimes that is affecting the day to day life of the workers.

In this study 100 sugar industry workers (68 males and 32 females) were taken for study. It was found that 59 sugar industry workers had a lumbar spine dysfunction. The age is from 30-above 50 years of workers were taken in this study, which was found to be more prevalent in male(63%) than in female(50%), although this difference was not statistically significant.

This study was conducted in KIMS, where subjects were selected as per the criteria and underwent a study where they had to answer the questions of Oswestry low back pain questionnaire. Subjects were informed about the study and prior consent was taken.

The results of this study showed are based on statistical analysis that there was significant increase in low back pain in sugar industry workers of karad taluka.

CONCLUSION

The present study based on statistical analysis showed that there was significant increase in low back pain in sugar industry workers thus providing evidence

to support the increase in lumbar spine dysfunction in sugar industry workers of the karad taluka.

Acknowledgement

I would like to thank respected Dean Dr. G. Varadharajulu, Dean, Faculty of Physiotherapy, KIMSDU for his inspiration, motivation, valuable guidance and suggestions throughout this project. I wish to express my sincere thanks to Dr. S. V. Kakade, Department of Biostatistics, KIMSDU for helping to carry out statistical analysis. I would also like to express my sincere thanks to Dr. JAVID H SAGAR, Professor, department of cardiopulmonary sciences, Faculty of Physiotherapy, KIMSDU. I express my sincere thanks to the volunteers who participated in my project for their kind cooperation in my project work.

Conflict of Interests: There were no conflict of interests in this study

Ethical Clearance : Ethical clearance was taken from institutional ethical committee of Krishna institute of medical sciences, Deemed to be university, Karad.

Funding : No funding.

References

1. Miss. Smita Yashvants Vasave, Dr. Deepak B. Anap. Prevalence of musculoskeletal disorders among sugarcane workers – a cross sectional study. Indian Journal of Basic and Applied Medical Research; September 2016: Vol.-5, Issue- 4, P. 752-758
2. Baxi MS, Sant SS, Hande DN. Prevalence of musculoskeletal disorders among sugar factory Workers of loni: an ergonomic study. IOSR Journal of Nursing and Health Science (IOSR-JNHS), e-ISSN.:2320-1959.
3. Singh A, Singh M, Kaur A. Musculoskeletal disorders in repetitive manual lifting and carrying of 50 kg load: a case study of sugar mill. Int J Engine Tech Res. 2014;2(4):146-9.
4. Marras WS. Occupational low back disorder causation and control. Ergonomics. 2000 Jul 1;43(7):880-902.
5. Fritz JM, Irrgang JJ. A comparison of a modified Oswestry low back pain disability questionnaire and the Quebec back pain disability scale. Physical therapy. 2001 Feb 1;81(2):776-88.
6. Fairbank JC, Couper J, Davies JB, O'brien JP. The Oswestry low back pain disability questionnaire. Physiotherapy. 1980 Aug;66(8):271-3
7. Desale, N. (2019). Spinal stenosis - Symptoms and causes. [online] Mayo Clinic. Available at: https://www.mayoclinic.org/diseases-conditions/spinal-stenosis/symptoms-causes/syc-20352961 [Accessed 28 Nov. 2019].

System Level Barriers in Early Initiation of Breastfeeding- Finding from a Cross-sectional Survey in Khagaria District of State Bihar, India

Nishtha Kathuria[1], Priya Krishnan[2], Rajesh Kumar Sinha[3], Theophilus Lakiang[4], Javvad Suri[5], Sunil Mehra[6]

[1]Assistant Director- Maternal, Child Health and Nutrition, [2]Senior Program Manager, [3]Deputy Director- Research and Health Economics, [4]Regional Manager- Research, [5]Deputy Director- Maternal and Child Health, [6]Executive Director, MAMTA Health Institute for Mother and Child, New Delhi, India

Abstract

Purpose: Despite 55% children aged 0-6 months being exclusively breastfed in India, 0.26 million children die each year from diarrhoea and pneumonia that can be prevented through early initiation of and exclusive breastfeeding (EIBF). A study was conducted to assess the factors associated with EIBF in 20 villages from the District Khagaria (State Bihar).

Method: The cross-sectional study was carried out from Jan-March 2017 with a sample of 288 married women who had delivered in last 1 year. Bivariate and multivariate logistic regression analyses were performed to identify associated factors of EIBF.

Results: Analyses show that institutional delivery (aOR: 2.69; CI 1.22 to 5.93; $p<0.05$) and delivery with normal mode (aOR: 4.61; CI 1.74 to 12.18; $p<0.01$) were significant contributors of EIBF. Additionally, likelihoods of EIBF were lower when the delivery was performed in a private institution (OR 0.28, CI 0.14 to 0.59; $p<0.001$) and by a doctor (OR 0.33, CI 0.18 to 0.60; $p<0.001$). Besides, higher birth order (OR 2.00, CI 0.98 to 4.10; $p<0.05$) was also found to be significantly associated with EIBF.

Conclusion: System level efforts are needed to promote EIBF, along with improved training and reinforcement in doctors for breastfeeding. Reduction in caesarean section rates can positively contribute to EIBF.

Key words: *Breastfeeding, Public Health, Determinants, Caesarean, Nurses*

Introdution

Early initiation of breastfeeding (EIBF) within the first hour of delivery is recommended by the World Health Organization (WHO) to reduce newborn deaths [1,2]. EIBF means neonates are introduced to colostrum which confers numerous benefits including active and passive immunity against a wide range of pathogenic diseases [1,2]. It also reduces postpartum bleeding in mothers, as well as protects against the leading causes of neonatal mortality such as respiratory tract infections (pneumonia, in particular), diarrhoea, and neonatal sepsis [2,3,4]. EIBF is responsible for enhancing bonding, improving the chances of breastfeeding success, additionally contributes to longer breastfeeding duration [5]. Despite the numerous benefits, EIBF rate is poor in many countries including India [7,8]. Although India reports 55% exclusive breastfeeding rate in children below the age of six months, there is a high population of under-six months children who die each year [8], that could have been reduced through EIBF, exclusive breastfeeding till 6 months and continued breastfeeding [7].

India has witnessed a considerable decline in maternal and new-born mortality indicators with increase

Corresponding Author:
Dr. Rajesh Kumar Sinha
Deputy Director- Research and Health Economics
Email: rajeshks@mamtahimc.org

in institutional deliveries. The rate of institutional deliveries increased by 52.9 percentage points between 1998-99 (NFHS-2) and 2015-16 (NFHS-4) however, the rates of EIBF and exclusive breastfeeding showed dismal improvements of just 8.1 and 25.7 percentage points respectively [8, 9].

Presently as per the National survey, the EIBF is 41.6% in the country with as low as 25.2% in Uttar Pradesh [8]. Additionally, with increase in institutional deliveries there has been a rise in caesarean sections as well. Prospective cohort studies in India have shown that infants born by caesarean section were almost four times less likely to initiate breast feeding within one hour of birth than infants born by vaginal delivery [11].

This study was conducted to assess facilitators and inhibitors of EIBF in rural Khagaria district of Bihar, India.

Method

Study Design and participation: A population-based, cross-sectional study was undertaken between Jan and March 2017. We assumed a 0.25 prevalence of EIBF (p) with a degree of precision (d) of 0.05 at 95% confidence interval (CI). The sample size was calculated by the following equation: $([Z^2 \times p \times q]/[d^2])$. The sample size estimated was 288. Two-stage sampling design was adopted in the study. From the study block, 20 villages (primary sample unit) were selected randomly. The secondary sample unit was at the household level. List of eligible population was obtained from the health service providers. After that, 288 eligible samples were randomly selected from the list.

Data Collection: Data was collected through interviews, using pretested structured questionnaire, after obtaining informed consent from mothers. Interviewers recruited for data collection were trained before actual data collection work. 10% questionnaires were randomly chosen for quality checks by Supervisors. Breastfeeding information for the latest child was included in the study.

Data analysis: Data was analysed using SPSS-20 software (IBM Corporation). Descriptive analysis was performed to determine the prevalence of EIBF and to present the background characteristics of the subjects. Chi square tests ($\chi 2$) were performed to evaluate the association of the independent and socio-demographic variables with the EIBF. Multivariate logistic regression analysis was performed to examine the association of exploratory variables with dependent variable (EIBF) after adjusting for socio-demographic variables. A p-value <0.05 was considered statistically significant.

Results

Mean age of the respondents was 22.5 (± 2.16) years. 78% of respondents were from the Scheduled Caste/ Scheduled Tribe or Other Backward Classes. 66% were below the poverty line (BPL). 33% of respondents were less than 21 years of age. 84% of respondents had institutional delivery. 83% of these deliveries took place in public hospitals. 76% of the deliveries were conducted by Skilled Birth Attendant (SBA) or local/ indigenous Traditional Birth Attendant (TBA). 83% of deliveries were through the normal vaginal route. 66% of the mothers had received information about breast feeding during their antenatal care visits. 75% of mothers initiated breast feeding within one hour while 25% had initiated late.

The social determinants of EIBF

Bivariate Analysis

Type of institution for delivery, mode of delivery, service provider during delivery and birth order were significantly associated ($p<0.05$) with EIBF. EIBF was not significantly associated with poverty status, type of family, breast feeding information received during antenatal care, age of the respondent, level of mother's education and place of delivery. Respondent who had vaginal birth (normal delivery) (OR 5.57, CI 2.66 to 11.63; $p<0.001$) was more likely to initiate early breast feeding compared to those who had caesarean delivery. Respondent whose delivery was performed by a doctor (OR 0.33, CI 0.18 to 0.60; $p<0.001$) and who delivered in a private institution (OR 0.28, CI 0.14 to 0.59; $p<0.001$) had less likelihoods of initiating early breast feeding compared to those whose delivery was performed by a SBA/TBA and those who delivered in a public institution, respectively. Respondent with three or more children was (OR 2.00, CI 0.98 to 4.10; $p<0.05$) more likely to initiate early breastfeeding compared to those with less than three children.

Multivariate Analysis

EIBF rate was significantly associated with place of delivery and mode of delivery. In the bivariate analysis, place of delivery was not associated with EIBF but it was found to be significantly associated in the multivariate

analysis. Respondent who had undergone institutional delivery was (aOR: 2.69; CI 1.22 to 5.93; p<0.05) more likely to initiate early breastfeeding compared to those who had delivered at home. Mode of delivery was found significantly associated with EIBF in the bivariate analysis, was also found significantly associated in the multivariate analysis. Respondent who had normal delivery was (aOR: 4.61; CI 1.74 to 12.18; p<0.01) more likely to initiate early breastfeeding compared to those with caesarean delivery.

In the bivariate analysis, doctors performing the delivery was found to be a significant barrier to EIBF, though no significant association was found in the multivariate analysis. Similarly, birth order was found significantly associated with EIBF in the bivariate analysis but not in the multivariate analysis. Association of types of institution for delivery (public/private) was separately assessed only in the bivariate analysis and not in the multivariate analysis.

Table 1: Early Initiation (within 1 hour after birth) and correlating factors (EIBF: Early initiation of BF), LIBF (Late Initiation of Breast Feeding)

Variables		Initiation of Breast feeding			Chi Square	Odds Ratio	CI	p value
		EIBF (n=) (%)	LIBF (n=) (%)	Total				
Age	Less than 20	72 (80)	18 (20)	90	1.86	1.52	0.83 to 2.81	0.17
	21 and above	131 (72.4)	50 (27.6)	181				
Age at Marriage	Less than 20	190 (76)	60 (24)	250		0.51	0.20 to 1.29	0.15
	21 and above	13 (61.9)	8 (38.1)	21	2.04			
Socioeconomic status	Below poverty line	134 (75.3)	44 (24.7)	178	0.15	0.89	0.51 to 1.5	0.69
	Above poverty line	68 (73.1)	25 (26.9)	93				
Type of family	Nuclear	106 (74.1)	37 (25.9)	143	0.03	0.95	0.55 to 1.65	0.86
	Joint	96 (75)	32 (25)	128				
Education	Above elementary	100 (71.4)	40 (28.6)	140	1.39	0.71	0.41 to 1.24	0.23
	No schooling or elementary	101 (77.7)	29 (22.3)	130				
Breast feeding information given during ANC	Yes	131 (73.6)	47 (26.4)	178	0.24	0.86	0.48 to 1.54	0.62
	No	71 (76.3)	22 (23.7)	93				
Place of delivery	Institution	175 (76.4)	54 (23.6)	229	2.44	1.73	0.86 to 3.48	0.11
	Home	28 (65.1)	15 (34.9)	43				
Type of institution	Public	152 (80.9)	36 (19.1)	188	12.19	0.28	0.14 to 0.59	0.000
	Private	22 (55)	18 (45)	40				
Mode of delivery	Normal	187 (79.9)	47 (20.1)	234	24.22	5.57	2.66 to 11.63	0.000
	Caesarean	15 (41.7)	21 (58.3)	36				
Delivery Performed by	SBA/TBA/Untrained	163 (80.3)	40 (19.7)	203	13.61	0.33	0.18 to 0.60	0.000
	Doctor	38 (57.6)	28 (42.4)	66				
Number of Children	3 or more	56 (83.6)	11 (16.4)	67	3.76	2.00	0.98 to 4.10	0.05
	0-2	147 (71.7)	58 (28.3)	205				

Table 2: Logistic Regression predicting the likelihood of mothers reporting early initiation of breastfeeding.

Predictors	Beta Coefficient	adjusted Odds Ratio (aOR)	CI	p-value
Caste/Tribe	0.55	1.05	0.45 to 2.42	0.89
Family type (nuclear/joint)	0.67	1.06	0.55 to 2.06	0.84
Socioeconomic Status (BPL/APL)	0.297	1.34	0.66 to 2.73	0.41
Current age of the mother (< 21 years/>= 21 years)	0.180	1.19	0.60 to 2.37	0.60
Age at Marriage	-.110	0.89	0.29 to 2.73	0.84
Education (Elementary level and above/Less than elementary level)	-.014	0.98	0.47 to 2.05	0.97
Place of Delivery (Institutional/Home)	0.990	2.69	1.22 to 5.93	0.01
Mode of Delivery (Normal/Caesarean)	1.530	4.61	1.74 to 12.18	0.002
Delivery performed by (SBA or Trained Nurse or TBA/Doctor)	-.560	0.57	0.22 to 1.44	0.32
Breast feeding information	-.030	0.97	0.55 to 1.84	0.92
Constant	-.974	0.37		0.18

Discussion

In the present study 75% of mothers initiated breastfeeding within 1 hour. Bivariate and multivariate analyses show that the important factors contributing to the EIBF were the place of delivery, mode of delivery and service provider attending the delivery. The EIBF rates in private hospitals were significantly lower than public hospitals. The reasons attributed to this could be poor knowledge and uptake of government programs and high caesarean section rates in private hospitals. In India, caesarean section rates are disproportionately higher than public health facilities [20].

Similar results were obtained in other studies wherein caesarean section was found to be a significant barrier in EIBF [13, 14]. In India, with increase in institutional deliveries, caesarean section rates are increasing at an alarming rate [8] and needs to be factored in for EIBF promotion [19]. The interventions for removing this impediment can be directed at the service delivery level. One study showed that Quality Improvement (QI) approach was able to accomplish sustained improvement in EIBF rates in caesarean deliveries from 0 to 93% [10]. In another trial in Karnataka, deployment of a trained lactation manager resulted in no significant difference in EIBF rates in normal and caesarean births [20]. Recently, a joint statement has been released by Federation of Obstetrics & Gynaecological Societies of India (FOGSI) and Indian Academy of Paediatrics (IAP) which calls for greater engagement with private sector, policy to support immediate skin-to-skin contact, raising awareness on pre and post-surgery lactation support, educating mothers and families, presence of birth companion and mother support groups [21].

The likelihood of EIBF was lower when a doctor was the birth attendant. One study reported that, mothers with a midwife birth attendant were six times more likely to exclusively breastfeed the baby at least for six months compared to those who had an obstetrician birth attendant [22]. The reasons for lesser rates with physicians

or obstetricians could be high number of cases a doctor attends in resource limited settings, limiting their time to support breastfeeding. An alternative model with a nursing led model of maternity care may be considered to address this. WHO estimates 85% of pregancies do not require specialized interventions; a professionally trained nurse or a midwive can handle bulk of the workload and address barriers to breastfeeding. Furthermore, studies have shown that nurses directly impact breastfeeding success through emotional, informational and tangible support [22].

Lastly, higher birth order contributed significantly to EIBF. There is evidence to support that mothers are likely to choose the same feeding method for each of their children, independent of the number of children they have. Breastfeeding promotion must take into consideration previous infant feeding experiences, if any [23].

Limitation of the study

As this was a cross-sectional study, it cannot provide cause and effect relationship between EIBF and risk factors taken for the analysis. Secondly, as the study was self-report in nature, it is susceptible to biases such as responder bias, recall bias, interviewer bias and social desirability bias. Also, the study was conducted only in 20 villages therefore, the findings cannot be generalised for the entire districts.

Conclusion

The study findings show that system level interventions like efforts to reduce caesarean section rates, systemic support to doctors, greater engagement with private hospitals, introduction of lactation manager at hospitals, de-medicalization of child birth through nurses and midwives, could lead to improved breastfeeding outcomes.

Ethics: The study was part of one of the nutrition promotion projects. Informed consent was taken from all study participants.

Source of Funding: Corporate Social Responsibility (CSR) division of Philips India Limited

Conflict of Interest: Nil.

References

1. World Health Organization. Indicators for assessing infant and young child feeding practices: part 1: definitions: conclusions of a consensus meeting held 6 – 8 November 2007 in Washington DC, USA. Geneva
2. Victora C.G., Bahl R., Barros A.J.D., França G.V.A., Horton S., Krasevec J., Rollins, N.C. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effect. Lancet. 2016; 387(10017): p. 475-490; doi: https://doi.org/10.1016/S0140-6736 (15)01024-7.
3. Edmond K.M., Zandoh C., Quigley M.A., Amenga-Etego S., Owusu-Agyei S., Kirkwood, B.R. Delayed breastfeeding initiation increases risk of neonatal mortality. Pediatrics. 2006; 117(3), p. 380-386; doi: 10.1542/peds.2005-1496.
4. Bahl R., Frost C., Kirkwood B. R., Edmond K., Martines J., Bhandari N., Arthur, P. Infant feeding patterns and risks of death and hospitalization in the first half of infancy: multicentre cohort study. Bulletin of the World Health Organization. 2005; 83(6); p. 418–426.
5. Gray H., Meynell C., Spiro A. Wise, P. World Breastfeeding Trends Initiative UK Report 2016 Part 1: Main report. 2016; doi:10.13140/ RG.2.2.20110.41287.
6. Patel A., Bucher S., Pusdekar Y., Esamai F., Krebs N. F., Goudar S. S., Hibberd P. L. Rates and determinants of early initiation of breastfeeding and exclusive breast feeding at 42 days postnatal in six low and middle-income countries: A prospective cohort study. Reproductive health. 2015; 12 (Suppl 2) S10; doi:10.1186/1742-4755-12-S2-S10.
7. Global Breastfeeding Collective. Nurturing the Health and Wealth of Nations: The Investment Case for Breastfeeding. 2017.
8. IIPS (International Institute for Population Sciences) & Macro International. National Family Health Survey (NFHS-4), 2015–16: India, Volume I. Mumbai: IIPS. 2017.
9. Ministry of Health and Family Welfare. National Health Profile. 2018; 13th issue.
10. Dudeja S., Sikka P., Jain K., Suri V., & Kumar P. Improving First-hour Breastfeeding Initiation Rate After Cesarean Deliveries: A Quality Improvement Study. Indian Pediatrics. 2018; 55
11. Census of India. Office of the Registrar General & Census Commissioner, New Delhi, 2011. Available at http://censusindia.gov.in/Tables_Published/A-

Series/pca_main.html

12. Ministry of Electronics & Information Technology: Government of India. Digital India. 2019. Retrieved from https://digitalindia.gov.in/content/below-poverty-line-certificate
13. Singh A.K., Gupta S.B. & Khan H. Early initiation of breast feeding practice among institutional delivered women in district Bareilly. International Journal of Community Medicine and Public Health. 2017; 4; p. 3436-3441; doi: http://dx.doi.org/10.18203/2394-6040.ijcmph20173858.
14. Abie B. M., Goshu, Y. A. Early initiation of breastfeeding and colostrum feeding among mothers of children aged less than 24 months in Debre Tabor, northwest Ethiopia: a cross-sectional study. BMC research notes. 2019; 12(1); 65; doi:10.1186/s13104-019-4094-6
15. Acharya R., & Meena R.R. A descriptive cross-sectional study of breast-feeding practice in Bikaner, Rajasthan. International Journal of Medical Science and Public Health. 2016; 5; p. 1559-1562; doi: 10.5455/ijmsph.2016.06112015248.
16. Sharma A, Thakur P.S., Tiwari R. Kasar P.K., Sharma R., Kabirpanthi, V. Factors associated with early initiation of breastfeeding among mothers of tribal area of Madhya Pradesh, India: a community based cross sectional study. International Journal of Community Medicine and Public Health. 2016; 3(1); p. 194-199; doi: 10.18203/2394-6040.ijcmph20151561.
17. Subhadra K.T. A cross sectional survey to analyze infant and young child feeding practices among mothers of Chottanikkara Panchayat. *International Journal of Community Medicine and Public Health.* 2018; *5*(8); p. 3377-3382; doi: http://dx.doi.org/10.18203/2394-6040.ijcmph20183065
18. Babu R.A., Keepanasseril A., Kanimozhi, K. Practice of early initiation of breastfeeding among postnatal mothers in a tertiary hospital in South India. International Journal of Advanced Medical Health Research. 2018; 5; p. 18-20.
19. Bruno Tongun J., Sebit M.B., Mukunya D. et al. Factors associated with delayed initiation of breastfeeding: a cross-sectional study in South Sudan. Int Breastfeed J. 2018; 13(28); doi:10.1186/s13006-018-0170-0
20. Banapurmath C.R., Ramachandrappa S., Guruprasad G., Birada S.B. Is Caesarean Section a Barrier to Early Initiation of Breastfeeding? Indian Paediatrics; 2013; 50; p. 1062-1063.
21. FOGSI and IAP (2019). Joint Statement - Early Initiation of breastfeeding after caesarean section delivery.
22. Taylor J.S. & Bell E. Medical Education and Leadership in Breastfeeding Medicine. Breastfeeding Medicine. 2017; 12(8); p.476-478; doi: https://doi.org/10.1089/bfm.2017.0104
23. Taylor J.S., Geller L., Risca P.M., Kirtania U., Cabral H.J. (2008). Birth Order and Breastfeeding Initiation: Results of a National Survey, Breastfeeding Medicine. 2008; 3(1); p. 20-7; doi: 10.1089/bfm.2007.0006.

A Study on the Impact of Food Advertising (Television) on the Food Preferences of Preschoolers in Kochi City

Noonu Mary Jose[1], Indu Manish Kumar[2]

[1]*M.Phil. Scholar, Department of Commerce and Management,* [2]Assistant Professor, Department of Commerce and Management, ASAS, Amrita Vishwa Vidyapeetham, Kochi

Abstract

The time children spend, by watching television is increasing as everybody around them are busy. It is not just their favorite cartoons or movies that they watch but also many very different advertisements, which come in between these programs. Food advertisements are commercials or advertisements of food, both healthy and unhealthy. As the children watch these advertisements which are being presented in a very appealing manner, an inner urge is being created in children to try these food items and they start demanding these for their consumption. The study concentrates on preschoolers (3 -6 years) who are just stepping out to the society. Their initial years are very interesting for the study as they observe everything very keenly. Food preferences of children changes vastly in these initial years. The study gets to know the impact of food advertisement in children.

Keywords: *Food advertisements, food preferences, preschoolers.*

Introduction

Children are exposed to a huge amount of food advertising through various media, especially television. There is substantial evidence that this advertising influence children's food preferences and consumption and is likely to contribute to overweight and obesity. Current regulations are ineffective for reducing children's exposure to unhealthy food advertising.

The endorsements of food products by cartoon characters and offers and gifts are used to attract children's attention and persuade them to requestor buy an advertised product. Evidences prove that young children lack the ability to discriminate between healthy and unhealthy food.

Behavioural outcomes such as purchase requests have been shown to be modified by attractive advertisements. Parents are concerned about the advertising of food products at times when children watch television, and in particular, of unhealthy food. The particular aspects which concerned them are that such advertising is usually for unhealthy foods and that it creates a desire, expectation and / or demand for these foods.

In this study we are analysing the impact of food advertisement on pre-schoolers in Kochi city. Pre-schoolers are absolutely fresh and they are just stepping to the world around so their preferences and choices change over time, so these few years at preschool is brought under study. Behavioural outcomes such as purchase requests, have been shown to be modified by food advertisements.

Statement of the Problem

Future of a nation belongs to the young blood, today's children are tomorrow's youth. It is very important that the health of children is been taken utmost care. Children's food preferences and choices should be administered carefully. Food advertising plays a significant role in the mind of children about their food preferences. The study aims at understanding the impact of food advertising on the food preferences of pre-schoolers in Kochi city.

Corresponding Author:
Noonu Mary Jose,
M.Phil Scholar, Dept of Commerce and Management, ASAS, Amrita Vishwa Vidyapeetham, Kochi.
Address: 32/322 A, Thammanam, Kochi 682032, Kerala, E-Mail id : noonumaryjose@gmail.com
Mob no: +91- 9567014144

Objectives

The objectives of the study are designed as follows:

i. To study the factors that attract children towards advertisements.

ii. To study the food advertising influence on the various age categories of preschoolers.

iii. To estimate the time spend by children watching television and its influences on food choices.

Research Methodology

Exploratory study has been used for this topic. The study is based in a survey of the respondents (mothers of preschoolers). For that 200 samples were distributed, of which 120 were completely filled and returned, purposive sampling is the technique used. The data are collected through primary and secondary sources. Structured questionnaire has been used for collecting primary data, data was collected from parents of preschoolers at various school events like sports day and annual day of different pre-schools in Kochi. The data collected are analysed using Statistical Package for Social Sciences (SPSS).The various tests used were Chi square, Correlation and one way AVOVA. Secondary data was collected from various journals, articles and information from websites.

Hypothesis

H1: Food advertisements have a positive relationship with Children's Food preferences.

H2: The time spend on television and food advertisement based demands are positively related.

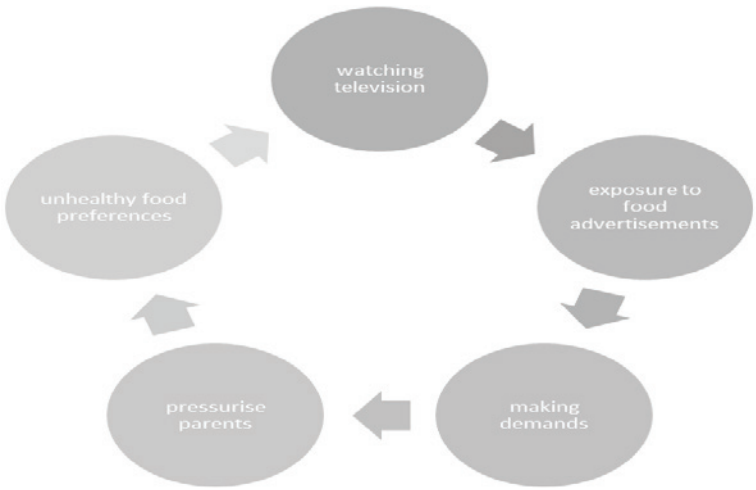
H3: There is a significant relationship between the age of pre-schoolers and the influence of food advertisement

LITERATURE REVIEW

Food preferences of children are not formed in a day, as an infant and in the initial years as a toddler a child eats normally what his mother feeds him or her. Once he starts distinguishing between tastes the child starts showing likes and dislikes for certain food items, even then parents can take the upper hand in deciding what the child should eat. But when the child starts to communicate, your tiny tots comes out with 'demands'. Normally these demands are for products which parents are least interested to feed the child.

Now the question is how children get to know about these products. When the child is inside home, the best thing to keep them sit in a place for some time is to switch on the television with their favourite cartoon programmes. The fact is that they don't only watch these cartoons in television but there are very many 'food advertisements' in television, which are very appealing to the kids.

Once, twice, thrice or more time they watch these advertisements an urge is grown these little minds to just try them, and then they start communicating about their demands, normally this starts in the pre-schooling age, where they see the outside world at large in the absence of their parents. The demand might be met sometimes or might be denied, depending on the parents. In the long run, these demands turn out to be a habit and result to unhealthy eating habits



Considerable scientific evidence establishes a link between unhealthy food advertising and children's food choices, purchases and consumption

The exposure that young mind goes through as a result of food advertising is a subject matter of study, their preferences and choice of what they eat are greatly influenced by the media advertisements at large.(1)

Children have been constituted as a very important consumer group, new day marketers are ready to pay more to this group recognising them as a primary market, an influencing market and a future market. The study underlines the fact that advertising influences children purchase request and family dynamics. (3)

Food advertisements in television has always been criticised as they play a major role in promoting unhealthy dietary practices among children. The study concluded that food advertisement environment should be changed in such a way that nutritious foods are promoted and unhealthy (junk) foods should be unrepresented and thus healthy eating habits can be reinforced. (8)

It was also pointed out that obesity, diabetes, hypertension and coronary heart disease have been directly related with children's eating habits and their food consumption. The study also marked that a desire is being created in children to purchase goods that is been shown in various advertisements. (9)

Some of the studies even concluded that childhood obesity is increasing worldwide due to the overconsumption of unhealthy food. This increase has been labelled as an epidemic by the canters for disease control and prevention and the world health organisation. (12)

It was noted that food advertisement and children's food preferences are of critical interest. In those study it was commented that exposure to more advertisements resulted in increased intake of unhealthy food. Exposure to food advertisements lead to increased consumption. (13)

ANALYSIS AND INTERPRETATION

Table 1.Chi-Square Tests

	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	38.788a	4	.000
Likelihood Ratio	36.648	4	.000
Linear-by-Linear Association	5.721	1	.017
N of Valid Cases	120		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .53.

From the above table1, the obtained chi square value 38.788 is significant at 95% confidence interval, it means that the obtained significance value (0.000) is less than the cut off value (0.05).

Table 2 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	82.500a	4	.000
Likelihood Ratio	84.107	4	.000
Linear-by-Linear Association	46.401	1	.000
N of Valid Cases	120		

a. 4 cells (44.4%) have expected count less than 5. The minimum expected count is .53.

The above table 2 indicates that the obtained significance value 0.00 which is less than cut off value of 0.05.

Therefore to sum up from both the chi- square tables above: the null hypothesis is rejected and alternative hypothesis is accepted. There is a positive relation between time children spend watching television and making demands.

Table 3 Correlations

		Time watching television	**frequency of making demands**
Time watching television	Pearson Correlation	1	.219*
	Sig. (2-tailed)		.016
	N	120	120
frequency of making demands	Pearson Correlation	.219*	1
	Sig. (2-tailed)	.016	
	N	120	120

*. Correlation is significant at the 0.05 level (2-tailed).

From the above table 3, the Pearson correlation value 0.219 is significant at 95% confidence interval, this indicates that frequency of making demands is positively correlated with time of watching television.

Table 4 : One way analysis of Variance

		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Unhealthy eating habits	Between Groups	.009	3	.003	.018	.997
	Within Groups	19.191	116	.165		
	Total	19.200	119			
Ads are too persuasive for children	Between Groups	.090	3	.030	.109	.955
	Within Groups	31.910	116	.275		
	Total	32.000	119			
identify products	Between Groups	.052	3	.017	.035	.991
	Within Groups	57.415	116	.495		
	Total	57.467	119			
pressurize parents to purchase	Between Groups	.056	3	.019	.092	.965
	Within Groups	23.411	116	.202		
	Total	23.467	119			

From, the above analysis we find that the significance value obtained for unhealthy eating habits is 0.997, ads

persuasive for children is 0.955, children identifying products is 0.991, pressurising parents to purchase is 0.965. All of these are above p value 0.05 and therefore, there is no statistically significant difference in the age of pre-schoolers and the above variables which shows the influence of food advertisements.

Hence the null hypothesis is accepted and alternative hypothesis is rejected, there is no significant relationship between age of preschoolers and influence of food advertisement.

Societial Implications of The Study

The study pinpoints to a solid statement that all of the preschoolers who were examined in the study watched television on a daily basis. The alarming fact is that parents consider television as a means to keep their kids engaged without causing any disturbance to them. But what really happens is that they watch a lot more than what is actually necessary for their age. The first thing is the very appealing food advertisements that they watch amidst their television programs, 90% of the children enjoy food advertisements and they make demands for these food items which are least important for their health.

Children at this tender age is very vulnerable and they are not aware of the genuineness and health implications of the products advertised, it is the parents and the care takers who should guide on them in this regard

When enquired about whether their children discuss with their classmates, about 60% disagreed and 40% of the parents had a neutral stand. Surprisingly 100% of the parents agreed that their children demand products based on food advertisements. Majority of the children demand food products when they are taken out for shopping.

Parents have a neutral response regarding advertisements being too persuasive for children. All parents unanimously agreed that food advertisements lead to unhealthy food preferences among children. 60% of the parents strongly agree and 40% of the parents agreed that their children pressurize them to purchase according to their demand. Children are very smart in identifying products shown in advertisements. Majority of the parents said that their children do not interfere in the products that parents buy. Some of the parents commented that there should be strict government regulations on advertising unhealthy food products.

Suggestions

- Proper awareness and education should be given to parents regarding the effects of unhealthy eating habits.
- Children should be encouraged to eat healthy food in pre-schools.
- No unhealthy food should be encouraged during meal time whether at school or at home.
- Children should be educated that all products advertised are not good ones.
- Healthy food habits should be inculcated right at home itself.
- Children should spent very limited time of their childhood unproductively in front of television.

Conclusion

As parents all of us are conscious about the health of our children, but sometimes parents tend to forget that it is very small things that contribute to this health factor. One thing that every parent disclosed during the study was that every child right from the age of three years watch television, even if not daily but watch them frequently, it is a mode of keeping their tiny tots sit at one place without roaming around. Everything else follows this first step of watching television.

But fortunately certain parents though their children watch television and make demand for unhealthy food products, they can win their child and divert their child to the right path. So to conclude on this study it is not only watching television and food advertisements cause unhealthy eating habits among pre-schoolers, but there are certain other things that parents should follow. They should always be vigilant on what is going around your child, what is he observing, what is he talking in his groups and whether the demands that these children make are right or wrong. Parents and teachers should train children in such a way that he or she is in a position to say no to what is not good for them.

Conflict of Interest: Nil

Source of Funding: Self, private

Ethical Clearance: No other companies or organisations are pointed out in this paper.

References

1. Harris JL, Kalnova SS. Food and beverage TV advertising to young children: Measuring exposure and potential impact. Appetite. 2018 Apr 1;123:49-55.
2. Maheshwar M, Vijayapushpam T, Rao SF. A current appraisal of health and nutrition related claims in Indian children'television food advertisements. Journal of Social Science Studies. 2014;1(2):125-35.
3. Khanna P. Children's attitude towards television advertisements and their impact on family purchase decisions
4. Kunkel D, McKinley C, Wright P. The impact of industry self-regulation on the nutritional quality of foods advertised on television to children. Oakland, CA: Children Now; 2010.
5. Guran T, Turan S, Akcay T, Degirmenci F, Avci O, Asan A, Erdil E, Majid A, Bereket A. Content analysis of food advertising in Turkish television. Journal of paediatrics and child health. 2010 Jul;46(7□8):427-30.
6. Runyan RC, Lear KE, Whitaker WH. Sports celebrity endorsements in retail products advertising. International Journal of Retail & Distribution Management. 2009 Mar 27
7. Calvert SL. Children as consumers: Advertising and marketing. The future of children. 2008 Apr 1:205-34.
8. Dixon HG, Scully ML, Wakefield MA, White VM, Crawford DA. The effects of television advertisements for junk food versus nutritious food on children's food attitudes and preferences. Social science & medicine. 2007 Oct 1;65(7):1311-23.
9. AKTAŞ ARNAS YA. The effects of television food advertisement on children's food purchasing requests. Pediatrics International. 2006 Apr;48(2):138-45.
10. Palmer EL, Carpenter CF. Food and beverage marketing to children and youth: Trends and issues. Media Psychology. 2006 May 1;8(2):165-90.
11. Panwar JS, Agnihotri M. Advertising message processing amongst urban children–An Indian experience: with special reference to TV advertising. InProceedings of Marketing Conference Entitled Marketing Paradigms for Emerging Economies Organized at IIM Ahmedabad in January 2005 Jan 12
12. Harrison K, Marske AL. Nutritional content of foods advertised during the television programs children watch most. American journal of public health. 2005 Sep;95(9):1568-74.
13. Halford JC, Gillespie J, Brown V, Pontin EE, Dovey TM. Effect of television advertisements for foods on food consumption in children. Appetite. 2004 Apr 1;42(2):221-5.
14. Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh AM, Rayner M, Godfrey C, Caraher M, Angus K. Review of research on the effects of food promotion to children. London: Food Standards Agency. 2003 Sep 22.
15. Coon KA, Tucker KL. Television and children's consumption patterns. Minerva Pediatr. 2002;54(5):423-36.
16. Fox RF. Harvesting minds: How TV commercials control kids. Greenwood Publishing Group; 1996.
17. Signorielli N, Lears M. Television and children's conceptions of nutrition: unhealthy messages. Health Communication. 1992 Oct 1;4(4):245-57.

Type of manuscript: Review article

Luciferase Enzyme and its Application

Poojashree. B[1], Geetha R.V[2], G. Karthikeyan[3],

[1]Graduate Student, BDS IV year, [2]Reader, Department of microbiology, [3]Professor, Department of Periodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India

Abstract

Aim: The aim of this review is to know about luciferase enzyme and its application

Background : Luciferase is a generic term for the class of oxidsative enzymes that produce bioluminescence and is distinct from a photoprotein. "Firefly luciferase" as a laboratory reagent often refers to P. pyralis luciferase although recombinant luciferases from several other species of fireflies are also commercially available. Firefly luciferase is a euglobulin protein that catalyses the oxygenation of luciferin using ATP and molecular oxygen to yield oxyluciferin, a highly unstable, singlet-excited compound that emits light upon relaxation to its ground state. Luciferase can act as an ATP sensor protein through biotinylation. Bioluminescence assay systems have become increasingly used in biology and medical research laboratories in addition to (or as alternatives to) fluorescence and chemiluminescence detection strategies. Luciferase enzymes isolated from different animal species have inherent variability in light emission, allowing two or more luciferase enzymes to be used in combination for multiplex analyses, including in vivo imaging, cell viability and single and dual-spectral luciferase reporter assays.

Reason: This review is made to know in detail about the Luciferase enzyme uses and its application in diagnosis

Keywords: *Luciferase enzyme, application, structure, bioluminance imaging, Green fluorescent protein*

Introduction

The term for the class of oxidative enzymes that produce bioluminescence, and is distinct from a photoprotein is. The name is derived from Lucifer, the root of which means 'light-bearer'. One example is the firefly luciferase from the firefly Photinus pyralis[1].

One well-studied luciferase is that of the Photinini firefly Photinus pyralis, which has an optimum pH of 7.8. Firefly bioluminescence color can vary between yellow-green [2]. Firefly luciferase are used to study the role of chaperones in protein folding [3] and of bacterial luciferase to study co-translational folding of polypeptides [4] and of the genes encoding luciferases to monitor transcriptional activities [5,6].

Luciferases from different organisms probably evolved independently, rather than from a common ancestral enzyme. Bacterial luciferase, the first luciferase to be cloned and also the first to be structurally characterized, is a flavin monooxygenase that utilizes flavin mononucleotide (FMN) to activate molecular oxygen, yielding a flavin C4a peroxide [7]. Luciferase is a light-producing enzyme naturally found in insect fireflies and in luminous marine and terrestrial microorganisms. the luciferase and other light-emitting photons a visualizing marker/reporter has drastically expanded the versatility of reporter gene technology. luciferase gene fusion product in expression confers on the host the ability to glow in the dark. The transcriptional and

Corresponding author
G. Karthikeyan
Professor, Department of Periodontics,
Saveetha Dental College, Saveetha Institute Of Medical and Technical Sciences, Saveetha University
162, Poonamallee High road,
Velappanchavadi, Chennai – 600077
Mobile - +91 – 9841222027.
Email: drkarthik79@yahoo.com

translational expression of the attached foreign gene, and enables one to localize it to particular domains, cells, or organelles of almost any organism. This can be done noninvasively, with inexpensive, nonisotopic, easily available substrates, and at extremely high sensitivity under no significant endogenous background.

Two types of luciferase genes cloned from bacteria and firefly are used as sensitive reporter systems in a wide variety of cells such as bacterial, yeast, insect, animal, and plant cells. Bacterial luciferases are flavoenzymes composed of two subunits each encoded by the *lux A* and *lux B* genes, while the firefly luciferase is a single polypeptide specified by the *lux* gene. The two types of luciferase catalyze different reactions. The bacterial luciferase oxidizes decanal (and some homologous long-chain aldehydes) with the energy transfer from $FMNH_2$ and produces blue-green light with an absorption maximum at 490 nm. The firefly enzyme couples the oxidation of luciferin with the energy transfer from ATP and produces yellow–green light with a pH-dependent absorption maximum. The bacterial and firefly luciferase systems present respective advantages and disadvantages associated with inherent differences in substrate profiles and enzyme structures. Recent developments and improvements on the two luciferase systems have rendered the two systems almost equally amenable to a wide variety of applications. To utilize the reporter systems to their full capacity, however, one has to make a judicious choice based on an understanding of their respective characteristics.

This section describes the bacterial luciferase (Lux) in the first part and the firefly luciferase (Luc) in the second part [8,9].

Structure of Luciferase

The fold assumed by the luciferase polypeptide appears to be unique. The N-terminal domain consists of a β barrel and two β sheets flanked by α helices which form a five-layered αβαβα structure. The C-terminal domain, consisting of five β strands and three α helices, is folded into a compact structure that is connected to the N-terminal domain by a disordered loop (connecting residues 435 and 441). There are three other disordered loops not visible in the electron density, one in the C-terminal domain connecting residues 523 and 529, and two in the N-terminal domain (connecting residues 198–204 and residues 355–359). Conti et al. have taken advantage eof the homology of firefly luciferase with other enzymes that catalyze similar reactions [8,9]. In the large N-terminal domain of the molecule, the central regions of the two -sheet subdomains share a similar structure. These regions can be superposed such that 87 pairs of topologically equivalent -carbon atoms, have a separation ≤2.5 Å, giving an overall rms separation of 1.6 Å. The two 'modules' are approximately related by twofold symmetry with a rotational component of 178.4° and a translational component of 2.0 Å[10].

Reaction catalysed by luciferase

Firefly luciferase catalyzes a multistep reaction [11]. In the first step, luciferin reacts with Mg2+-ATP to form luciferyl adenylate and pyrophosphate. The luciferyl adenylate is oxidized by molecular oxygen, with the intermediate formation of the cyclic peroxide, a dioxetanone and a molecule of AMP. The is decarboxylated as a result of intramolecular conversions to produce an electronically excited state of oxyluciferin in the enol or keto form. Return to the ground state is accompanied by emission of a quantum of visible light with a wavelength of maximum light intensity of 562–570 nm[12] demonstrated that one oxygen atom of the product CO2 arises from the substrate oxygen. Non-enzymatic oxidation of luciferin yields oxyluciferin without luminescence[13]. The appearance of bioluminescent light varies greatly, depending on the habitat and organism in which it is found. Most bioluminescence, for instance, is expressed in the blue-green part of the visible light spectrum. These colors are more easily visible in the deep ocean. Also, most marine organisms are sensitive only to blue-green colors. They are physically unable to process yellow, red, or violet colors. Most land organisms also exhibit blue-green bioluminescence. However, many glow in the yellow spectrum, including fireflies and the only known land to bioluminesce, native to thetropics of Southeast Asia. Few organisms can glow in more than one color. The so-called railroad worm (actually the larva of a beetle) may be the most familiar. The head of the railroad worm glows red, while its body glows green. Different luciferases cause the bioluminescence to be expressed differently[14].

Application of luciferase enzyme

Luciferase can be produced in the lab through for a number of purposes. Luciferase genes can be synthesized and inserted into organisms or transfected into cells. Mice, silkworms, and potatoes are just a few of the

organisms that have already been engineered to produce the protein[15]. All applications of bioluminescence systems are based on the principle of a chemical reaction; that is, the light intensity as the measurable product depends on the amounts of luciferase, luciferin, and cofactor(s). Using beetle bioluminescence as an example, in the presence of excess luciferin and luciferase, the bioluminescence intensity correlates with the amount of ATP, producing a beetle bioluminescence system that can measure the amount of ATP[16]. This system can be applied to detecting bacteria in food, because bacteria contain ATP as an energy source[17].

Bioluminescent organisms are a target for many areas of research. Luciferase systems are widely used in genetic engineering as reporter genes, each producing a different colour by fluorescence, and for biomedical research using bioluminescence imaging. For example, the firefly luciferase gene was used as early as 1986 for research using transgenic acceptor into a single polypeptide can also allow the detection of ligand-induced conformational switches in monomeric proteins in the millisecond time scale. Many of these approaches are amenable to high throughput screening and the drug discovery process. G protein-coupled receptors (GPCRs) represent a key drug target class. Specific applications of energy transfer techniques to the identification of ligands for this class of protein are highlighted to illustrate general principles.

Bioluminescence imaging

has emerged as a powerful new modality for studies of viral infection and therapy in small animal models. BLI technology captures the light emitted from different luciferase enzymes to detect sites of viral infection and quantify viral replication in the context of a living animal [18].

Green fluorescent protein

The technical revolution resulting from the discovery of relates to a miraculous property of the chromophore that is responsible for its fluorescence. This chromophore is formed spontaneously from a tri-peptide motif in the primary structure of , so that its fluores- cence is “automatically” turned on in every organism where it is expressed. In other words, the maturation of the tri-peptide-based chromophore in only requires oxygen and does not depend on the presence of enzymes or other auxiliary factors. and its related variants thereby provide universal genetic tags that can be used to visualize a virtually unlimited number of spatio-temporal processes in virtually all living systems. This revolution in the biological sciences has been greatly accelerated by a rapid parallel development of quantitative light microscopy, electronics, computational power and molecular modelling of intra- and inter-cellular processes with systems-biology approaches[19].

Bioluminescence and fluorescence resonance energy transfer

A limitation of is the requirement for external illumination to initiate the fluorescence transfer, which can lead to background noise in the results from direct excitation of the acceptor or to photobleaching. To avoid this drawback, Bioluminescence Resonance Energy Transfer has been developed[20,21].

Ethical Clearance: Nil

Source of Funding: Nil

Conflict of Interest: Nil

References

1. Gould SJ, Subramani S. Firefly luciferase as a tool in molecular and cell biology. Analytical biochemistry. 1988 Nov 15;175(1):5-13.

2. Baldwin TO. Firefly luciferase: the structure is known, but the mystery remains. Structure. 1996 Mar 1;4(3):223-8.

3. Pazzagli M, Devine JH, Peterson DO, Baldwin TO. Use of bacterial and firefly luciferases as reporter genes in DEAE-dextran-mediated transfection of mammalian cells. Analytical biochemistry. 1992 Aug 1;204(2):315-23.

4. Szabo A, Langer T, Schröder H, Flanagan J, Bukau B, Hartl FU. The ATP hydrolysis-dependent reaction cycle of the Escherichia coli Hsp70 system DnaK, DnaJ, and GrpE. Proceedings of the National Academy of Sciences. 1994 Oct 25;91(22):10345-9.

5. Fedorov AN, Baldwin TO. Contribution of cotranslational folding to the rate of formation of native protein structure. Proceedings of the National Academy of Sciences. 1995 Feb 14;92(4):1227-31.

6. Wood KV. Recent advances and prospects for use of beetle luciferases as genetic reporters. Bioluminescence and Chemiluminescence: Current

Status. 1991 Sep:543-6.

7. Branchini BR, Murtiashaw MH, Magyar RA, Portier NC, Ruggiero MC, Stroh JG. Yellow-green and red firefly bioluminescence from 5, 5-dimethyloxyluciferin. Journal of the American Chemical Society. 2002 Mar 13;124(10):2112-3.
8. Conti E, Franks NP, Brick P. Crystal structure of firefly luciferase throws light on a superfamily of adenylate-forming enzymes. Structure. 1996 Mar 1;4(3):287-98.
9. Fulda M, Heinz E, Wolter FP. Brassica napus cDNAs encoding fatty acyl-CoA synthetase. Plant molecular biology. 1997 Mar 1;33(5):911-22.
10. Matthews BW, Rossmann MG. Comparison of protein structures. InMethods in enzymology 1985 Jan 1 (Vol. 115, pp. 397-420). Academic Press.
11. Ugarova NN. Luciferase of Luciola mingrelica fireflies. Kinetics and regulation mechanism. Luminescence. 1989 Jul 1;4(1):406-18.
12. Shimomura O, Goto T, Johnson FH. Source of oxygen in the CO2 produced in the bioluminescent oxidation of firefly luciferin. Proceedings of the National Academy of Sciences. 1977 Jul 1;74(7):2799-802.
13. White EH, Rapaport E, Seliger HH, Hopkins TA. The chemi-and bioluminescence of firefly luciferin: an efficient chemical production of electronically excited states. Bioorganic Chemistry. 1971 Sep 1;1(1-2):92-122.
14. Contag CH, Bachmann MH. Advances in in vivo bioluminescence imaging of gene expression. Annual review of biomedical engineering. 2002 Aug;4(1):235-60.
15. Santos DA, Salgado AI, Cunha RA. ATP is released from nerve terminals and from activated muscle fibres on stimulation of the rat phrenic nerve. Neuroscience letters. 2003 Mar 6;338(3):225-8.
16. Venkateswaran K, Hattori N, La Duc MT, Kern R. ATP as a biomarker of viable microorganisms in clean-room facilities. Journal of Microbiological Methods. 2003 Mar 1;52(3):367-77.
17. Rees S. Pharmaceutical applications of GFP and RCFP. Green fluorescent protein: properties, applications and protocols. 2005 Nov 18;47:361.
18. Luker KE, Luker GD. Applications of bioluminescence imaging to antiviral research and therapy: multiple luciferase enzymes and quantitation. Antiviral research. 2008 Jun 1;78(3):179-87.
19. Ehrenberg M. The green fluorescent protein: discovery, expression and development. Information Department, The Royal Swedish Academy of Sciences. 2008.
20. Goudhaman M, Vanathi N, Sasikumar S. Frequency Synchronization Enhancement in Wireless Sensor Network using BAT Algorithm.
21. Vinothkumar TS, Kavitha S, Lakshminarayanan L, Gomathi NS, Kumar V. Influence of irrigating needle-tip designs in removing bacteria inoculated into instrumented root canals measured using single-tube luminometer. Journal of endodontics. 2007 Jun 1;33(6):746-8.

Type of manuscript: Research article.

Dental Management of Medically Compromised Patients- A Questionnaire among Dental Practitioner

Poojashree.B[1], Nandhini Subramaniam[2]

[1]Undergraduate Student, [2]Department of Oral Medicine and Radiology, Saveetha Dental College, Saveetha University, Chennai, India.

Abstract

Introduction : An increase in the number of medically compromised patients in dental clinics may cause serious problems for practicing dentists all over the world. When a dentist does not understand well the relationship between oral and systemic diseases, dental care may become a quite complicated issue. Management of the medically compromised patients require acquisition of complete health history as well as dental history of the patient. This should include documentation via questionnaire as well as a verbal history. Preferably an oral history should also be obtained as a review of systems. The dental history should also include questions related to current oral conditions such as periodontal disease or oral ulceration and past dental treatment and potential complications from prior intervention including treatment failure and the delivery of anesthesia or post-treatment medication. The first step in managing the patients with medical problems is acquiring thorough health history of the patients.

Aim: The aim of this study is to analyse the knowledge about dental management of medically compromised patients among dental practitioners.

Materials and Method: A cross sectional survey was initiated from a randomly chosen population of 100 dental practitioners. Informed consent was obtained from the participants. the survey was conducted online using online survey planet online survey tool. the survey instrument used was a pretested questionnaire comprising of 10 questions eliciting responses pertaining to the dental management of medically compromised patients among dental practitioners.

Results: Among 100 dental practitioners 100% of them enquire medical history including medication and allergy, 68% of them obtain vital signs of the patient commencing dental treatment, 50% of them are confident in handling emergency conditions. 82% of them have emergency kit in dental office, 98% of them get consent from the physician before treating medically compromised patients, 62% of them have knowledge about prescribing AHA guidelines of antibiotics for cardiovascular patients, 42% of them said they can efficiently manage patients on 1st, 2nd and 3rd trimester and 88% of them are aware of diagnosing oral signs of anemia and management.

Conclusion: Dental practitioners have adequate knowledge about managing medically compromised patients in a dental unit. The handling of a medical emergency in a dental office is a skill. One must have hands on experience to gain the level of confidence necessary to manage life threatening situations. This can be done by regularly attending hands-on workshop which will subsequently assess the skills acquired.

Keywords: *medically compromised patients, epilepsy, anemia, vital signs*

Corresponding Author
Poojashree. B
Undergraduate Student, Saveetha Dental College and hospitals, Saveetha Institute of medical and technical sciences, 162, Poonamallee High Road, Chennai 600077, Tamil Nadu, India
E-mail: poojashreebaskaran@gmail.com
Telephone no: 6383516877

Introduction

An increase in the number of medically compromised patients in dental clinics may cause serious problems for practicing dentists all over the world. When a dentist does not understand well the relationship between oral and systemic diseases, dental care may become a quite complicated issue. Management of the medically compromised patients require acquisition of complete health history as well as dental history of the patient. This should include documentation via questionnaire as well as a verbal history. Preferably an oral history should also be obtained as a review of systems. The dental history should also include questions related to current oral conditions such as periodontal disease or oral ulceration and past dental treatment and potential complications from prior intervention including treatment failure and the delivery of anesthesia or post-treatment medication. The first step in managing the patients with medical problems is acquiring thorough health history of the patients.

Effective management of medical emergencies in the dental office is ultimately the dentist's responsibility. Lack of training and inability to cope with medical emergencies can lead to tragic consequences and sometimes legal action. Therefore, dental practitioners must be able to recognize and communicate adequately about relevant medical problems as well as have appropriate knowledge of oral health care and potential interactions with medical conditions. The purpose of this study was to assess the dental management of medically compromised patients among dental practitioners[1].

Materials and Method

A cross sectional survey was initiated from a randomly chosen population of 100 dental practitioners. informed consent was obtained from the participants. the survey was conducted online using online survey planet online survey tool. the survey instrument used was a pretested questionnaire comprising of 10 questions eliciting responses pertaining to the dental management of medically compromised patients among dental practitioners.

The questions include:

1. Do you enquire about medical history including medication and allergy?

2. Do you obtain vital signs of the patients before commencing any treatment?

3. Do you think you can handle emergency condition on your dental office very confidently?

4. Availability of emergency kits in your dental office?

5. Do you get consult from the physician before treating medically compromised patients?

6. Are you aware of prescribing AHA guidelines (2007) of prescribing antibiotic prophylaxis for cardiovascular disease?

7. Are you aware of managing patients experiencing epilepsy attack on dental chair?

8. Do you monitor INR for the patients on combination of blood thinners?

9. Are you aware of managing patients during 1st, 2nd, 3rd trimester?

10. Are you aware of diagnosing oral signs of anemia and dental management of same patients?

Results

1. Do you enquire medical history including medication and allergy?

Responses To Question Number 1

Among the 100 dental practitioners 22 were male participants and 78 were female participants. 100%of the participants said that they will enquire medical history including medications and allergies.(Fig 1

2. Do you obtain vital signs of the patient before commencing dental treatment?

Responses To Question Number 2

Among the 100 dental practitioners 22 were male and 78 were female participants. Overall awareness about obtaining vital signs of the patients before commencing dental treatment is 68%. Among them 52 were females and 16 were males. In this survey 32% of the participants are not aware.(Fig 2)

3. Do you think you can handle any emergency in your dental office confidently?

Responses To Question Number 3

When we ask 'Do you think you can handle any emergency conditions in your dental office very

confidently', only 50% of the participants said yes. Among them 28 were female and 22 were male participants. In this survey 50% of the participants said No to this question.(Fig 3)

4. Availability of emergency kit in your dental office?

Responses To Question Number 4

When we ask about availability of emergency kit in dental office, 82% of them said yes. Among them 60 were female and 22 were male participants. In this survey 18% of the participants said no for this question. (Fig 4)

5. Do you get consent from the physician before dental treatment?

Responses To Question Number 5

When we ask ' Do you get consent from the physician before treating medically compromised Patients' 98% of them said yes. Among them 77 were female and 21 were male participants. In this survey 2% of the participants said no for this question.(Fig 5)

6. Are you aware of prescribing AHA guidelines of antibiotics for cardiovascular patients?

Responses To Question Number 6

Among 100 dental practitioners 22 were male and 78 were female participants. Overall awareness about prescribing AHA guidelines (2007) of prescribing antibiotic prophylaxis for cardiovascular patients is 62%. Among them 44 were female and 11 were male participants. In this survey 38% of the participants said no for this question.(Fig 6)

7. Are you aware of managing epileptic patient in dental chair?

Responses To Question Number 7

When we ask ' Will you able to manage patients experiencing epileptic attack on dental chair', 72% of them said yes. Among them 52 were female and 20 were male participants. In this survey 28% of the participants said no for this question.(Fig 7)

8. Do you monitor INR for patients on anticoagulants?

Responses To Question Number 8

When we ask 'Do you monitor INR for patients on anticoagulants?' 72% of them said yes. Among them 27% were male and 50% were female. In this survey 28% of the participants said that they are not aware about monitoring INR.(Fig 8)

9. Are you aware of managing patients under 1st, 2nd, 3rd trimester?

Responses To Question Number 9

When we ask 'Can you efficiently manage patients on 1st, 2nd, 3rd trimester of pregnancy?' only 42% said yes. Among them 13% were male and 29% were female. In this survey 58% of the participants said they can't manage pregnant patients efficiently.

10. Are you aware of diagnosing and management of anemia?

Responses To Question Number 10

When we ask about 'overall awareness about diagnosing oral signs of anemia and management of same patients', Majority of 88% of them are aware. Among them 11% were male and 77% were female. In this survey 12% of the participants are not aware of diagnosing and managing anemia.(Fig 10)

Discussion

Life-threatening emergencies are common in dental practice. Invasive procedures in the dental Office might result in medical emergencies. Dental surgeons must have good knowledge and awareness of medical emergencies, and they should be prepared to manage such situations. The extent of treatment by dentists requires preparation for and prevention and management of medical emergencies. To alter the treatment plan, a complete medical history is required[2].

Vital signs traditionally consist of blood pressure, temperature, pulse rate and respiratory rate[3]. Vital signs are an important component of monitoring the patient's progress during hospitalisation as they allow for the prompt detection of delayed recovery or adverse events[4]. Dysregulated organ system function as a result of age or age-associated pathophysiology, coupled with age-related loss of protective homeostatic mechanisms, suggests that among older patients vital sign response may not only deviate from normal ranges, but also

remain confined to a range of values, unable to respond appropriately to stressors. Thus, healthcare professionals should pay special attention to vital signs in the elderly[5].

Dentists must be prepared to manage medical emergencies that may arise in practice. Therefore, dentists should be ready to manage these events. Preparation focuses primarily on prevention but should also include the presence of specific equipment and emergency drugs[6]. Some of the emergency drugs that has to be mandatorily present are oxygen for almost any medical emergency. Epinephrine for anaphylaxis, asthma, cardiac arrest. Nitroglycerin for pain of angina. Antihistamine got allergic reactions. Salbutamol for asthmatic bronchospasm. Aspirin for myocardial infarction. Some of the other emergency drugs are glucagon for hypoglycaemia, atropine for bradycardia, ephedrine for hypotension. Hydrocortisone for adrenal insufficiency. Morphine for angina like pain. Naloxone for reversal of opioid overdose. Midazolam for status epilepticus. Flumazenil for benzodiazepine overdose[7].

Informed consent is a widely accepted part of medical practice. All clinicians recognise a duty to obtain the informed consent of patients before surgery, invasive procedures, and participation in biomedical research. Hospital accreditation standards require documentation of informed consent prior to designated procedure and treatments. Despite the wide acceptance of the general need for informed consent, clinicians have little guidance as to which clinical decisions need informed consent[8].

Following publication of the 2007 AHA recommendations, there was a significant reduction in AP prescribing. Consistent with the new recommendations, the greatest reduction was among those at moderate risk of IE[9]. Highest risk of adverse outcomes of AHA 2007 guidelines of endocarditis are previous infective endocarditis, prosthetic valve, unrepaired cyanotic congenital heart disease, 6 month period post prosthetic repair of chronic heart disease, repaired chronic heart disease with residual defects, cardiac transplant with valvulopathy. Antibiotic prophylaxis of AHA 2007 guidelines of endocarditis- All dental procedures involving gingival tissue manipulation or periapical region of teeth or oral mucosa perforation, procedures on respiratory tract or infected skin/musculoskeletal tissue.

Epilepsy is a disease that involves seizures, which are characterized by an alteration of perception, behavior, and mental activities, as well as by involuntary muscle contractions, temporary loss of consciousness, and chronic changes in neurological functions that result from abnormal electrical activity in the brain.Dental treatment of patients with epilepsy and seizures should be carried out by dentists who are knowledgeable about these disorders. patients who have poorly controlled epilepsy and experience frequent generalized tonic–clonic seizures exhibit worse oral health in comparison with patients who are better controlled or only have seizures that do not involve the masticatory apparatus[10]. If a seizure occurs while a patient is in the dental chair, a dentist should be able to manage the situation by knowing the primary steps including discontinuing the procedure immediately and placing the patient on his/her side to decrease the chance of aspiration of secretions or dental materials in the patient's mouth[11].

Efficacy of Oral anticoagulant depends on maintenance of the international normalized ratio within the designated therapeutic range. control of INR is beset by a large number of problems inherent to vitamin K antagonists that are heavily influenced by drug-drug and food-drug interactions, alcohol consumption, hepatic dysfunction, genetic variation in enzyme activity, and dietary intake of vitamin K. Maintenance of this narrow therapeutic INR range is important because there is an increased risk of hemorrhagic stroke with INR > 3.0 and thromboembolic complications at INRs < 2.0[12].

In general, pregnant females tend to over estimate the risk of teratogenicity in the foetus resulting from medical and dental procedures and/or drugs. This may cause them to avoid necessary treatment, leading to detrimental health effects for both the foetus and themselves[13]. Coronal scaling, polishing and root planing may be performed at any time as required to maintain oral health. However, routine general dentistry should usually only be done in the second and third trimester of pregnancy. Organogenesis is completed by the end of the first trimester, and uterine size has not increased to the extent that sitting in the dental chair is uncomfortable. Moreover, nausea has generally ceased by the end of the first trimester. Extensive elective procedures should be postponed until after delivery[14].

The diagnostic criteria for anaemia in IDA vary Hb <10–11.5 g/dl for women and <12.5–13.8 g/dl for men[15]. Pallor of the conjunctiva, tongue, palm or nail beds was 66% sensitive and 68% specific in distinguishing children with moderate a anaemia (haemoglobin concentration 5-8 g/dl) and 93% sensitive

and 57% specific in distinguishing those with severe anaemia (haemoglobin concentration < 5 g/dl)[16]. There are several ways to manage anemia including, following a healthy diet, exercising regularly, avoiding exposure to chemicals that set off anemia, washing your hands often to avoid infection, talking to your doctor about any changing symptoms. Patients with moderate to severe can improved by hospitalization and blood transfusion [17].

Conclusion

Dental practitioners have adequate knowledge about managing medically compromised patients in a dental unit. The handling of a medical emergency in a dental office is a skill. One must have hands on experience to gain the level of confidence necessary to manage life threatening situations. This can be done by regularly attending hands-on workshop which will subsequently assess the skills acquired.

Ethical Clearance: Nil

Source of Funding: Nil

Conflict of Interest: Nil

References

1. Mohan M, Sharma H, Parolia A, Barua A. Knowledge, attitude and perceived confidence in handling medical emergencies among dental practitioners in Dakshina Kannada, India. Oral Health Dent Manag. 2015 Feb; 14(1):27-31.
2. Elanchezhiyan S, Elavarasu S, Vennila K, Renukadevi R, Mahabob MN, Sentilkumar B, Raja S. Awareness of dental office medical emergencies among dental interns in Southern India: An analytical study. Journal of dental education. 2013 Mar 1;77(3):364-9.
3. Lockwood C, Conroy□Hiller T, Page T. Vital signs. JBI reports. 2004 Jul; 2 (6):207-30.
4. Evans D, Hodgkinson B, Berry J. Vital signs in hospital patients: a systematic review. International journal of nursing studies. 2001 Dec 1;38(6):643-50.
5. Chester JG, Rudolph JL. Vital signs in older patients: age-related changes. Journal of the American Medical Directors Association. 2011 Jun 1;12(5):337-43.
6. Haas DA. Emergency drugs. Dental Clinics of North America. 2002 Oct; 46(4):815-30.
7. Haas DA. Management of medical emergencies in the dental office: conditions in each country, the extent of treatment by the dentist. Anesthesia progress. 2006 Mar;53(1):20-4.
8. Braddock CH, Fihn SD, Levinson W, Jonsen AR, Pearlman RA. How doctors and patients discuss routine clinical decisions: informed decision making in the outpatient setting. Journal of general internal medicine. 1997 Jun; 12(6):339-45.
9. Thornhill MH, Gibson TB, Cutler E, Dayer MJ, Chu VH, Lockhart PB, O'Gara PT, Baddour LM. Antibiotic prophylaxis and incidence of endocarditis before and after the 2007 AHA recommendations. Journal of the American College of Cardiology. 2018 Nov 12;72(20):2443-54.
10. Aragon CE, Burneo JG. Understanding the patient with epilepsy and seizures in the dental practice. Journal of the Canadian Dental Association. 2007 Feb 1;73(1).
11. Albelaihi HF, Alweneen AI, Ettish A, Alshahrani FA. Knowledge, attitude, and perceived confidence in the management of medical emergencies in the dental office: A survey among the dental students and interns. Journal of International Society of Preventive & Community Dentistry. 2017 Nov; 7(6):364.
12. Lane DA, Lip GY. Maintaining therapeutic anticoagulation: the importance of keeping "within range". Chest. 2007 May 1;131(5):1277-9.
13. Wasylko L, Matsui D, Dykxhoorn SM, Rieder MJ, Weinberg S. A review of common dental treatments during pregnancy: implications for patients and dental personnel. Journal (Canadian Dental Association). 1998 Jun; 64(6):434-9.
14. Giglio JA, Lanni SM, Laskin DM, Giglio NW. Oral health care for the pregnant patient. Journal of the Canadian Dental Association. 2009 Feb 1;75(1).
15. Goddard AF, McIntyre AS, Scott BB. Guidelines for the management of iron deficiency anaemia. Gut. 2000 Jun 1;46(suppl 4):iv1-5.
16. Luby SP, Kazembe PN, Redd SC, Ziba C, Nwanyanwu OC, Hightower AW, Franco C, Chitsulo L, Wirima JJ, Olivar MA. Using clinical

signs to diagnose anaemia in African children. Bulletin of the World Health Organization. 1995;73(4):477.

17. Muhe L, Oljira B, Degefu H, Jaffar S, Weber MW. Evaluation of clinical pallor in the identification and treatment of children with moderate and severe anaemia. Tropical Medicine & International Health. 2000 Nov; 5(11):805-10.

Biomarkers in Orthodontics: An Overview

Poonam Agrawal[1], Dhirja Goel[2]

[1]Professor, Dept of Orthodontics and Dentofacial Orthopaedics, [2]Reader, Dept of Pediatric and Preventive Dentistry, School of Dental Sciences, Sharda University. Greater Noida (UP)

Abstract

A biomarker is a substance that is measured and evaluated objectively as an indicator of normal biologic processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention. Tooth movement by orthodontic treatment is characterized by remodelling changes in the periodontal ligament, alveolar bone, and gingiva. A reflection of these phenomenons can be found in the gingival crevicular fluid (GCF) of moving teeth, with significant elevations in the concentrations of its components like, cytokines, neurotransmitters, growth factors, and arachidonic acid metabolites. Knowledge of biomarkers present in the GCF may be of clinical use leading to proper choice of mechanical stress for better orthodontic treatment and lesser side effects.

***Key words**: Biomarkers, orthodontic tooth movement, gingival crevicular fluid*

Introduction

Orthodontic treatment aims at the correction of dental irregularities and disharmony in jaw relations. Tooth movement induced by orthodontic force application is characterized by remodelling in the dental and periodontal tissues.[1] Orthodontic tooth movement (OTM) is characterized by abrupt creation of compression and tension in periodontal ligament (PDL) (Goutoudi, Diza et al. 2004). These force-induced strains alter the PDL vascularity and blood flow, resulting in local synthesis and release of various key molecules, such as neurotransmitters, cytokines, growth factors, colony-stimulating factors, and arachidonic acid metabolites. These molecules can evoke many cellular responses by various cell types in and around teeth, providing a favourable micro-environment for tissue deposition or resorption (Simonet, Lacey et al. 1997; Cetin, Buduneli et al 2004). Gingival crevicular fluid (GCF) contains inflammatory products, bacterial products, and products of tissue break down. Noninvasive procedures to determine the changes in salivary constituents are used to diagnose several diseases in clinical medicine. Thus, examination of GCF is an ideal method of evaluating the tissue destruction during orthodontic treatment. GCF arises at the gingival margin and can be described as a transudate or an exudate. Clinically GCF can be easily collected using platinum loops, filter paper strips, gingival washings, and micropipettes. A number of GCF biomarkers are involved in bone remodeling during OTM. The data suggest that knowledge of the biomarkers present in the GCF may be of clinical use leading to proper choice of mechanical stress to improve and to shorten treatment time and avoid side effects.

Gingival crevicular fluid

Gingival crevicular fluid (GCF) is an exudate that can be harvested from the gingival sulcus, which offers a great potential as a source of factors associated with changes sand destruction in the underlying periodontium due to orthodontic force application. The early phase of orthodontic tooth movement involves an acute inflammatory response, characterized by periodontal vasodilation and migration of leukocytes out of periodontal ligament capillaries. The mechanism of bone resorption might also be related to the release of inflammatory mediators that can be detected in gingival crevicular fluid.

Biomechanism of orthodontic tooth movement

Two interrelated processes involved in OTM are bone bending and remodelling of the periodontal tissues, including the dental pulp, periodontal ligament, alveolar bone, and gingiva. The applied force causes the compression of the alveolar bone and the PDL on one side (pressure), while on the opposite side the PDL is stretched (tension). [2]Orthodontic forces change

periodontal tissue vascularity leading to the synthesis of various signalling molecules and metabolites. The released molecules generate cellular responses around the teeth, providing a favourable microbiological environment for tissue deposition or resorption.

The pressure-tension theory proposed by Schwartz in 1932 is the simplest theory describing tooth movement on mechanical loading. On the pressure side, the biological events are as follows: disturbance of blood flow in the compressed PDL, cell death in the compressed area of the PDL (hyalinization), resorption of the hyalinized tissue by macrophages, and undermining bone resorption by osteoclasts beside the hyalinized tissue, which ultimately results in tooth movement.[2]On the tension side, blood flow is activated where the PDL is stretched, which promote osteoblastic activity and osteoid deposition, which later mineralizes. The fluid flow hypothesis, describing a mechanism by which osteocytes respond to mechanical forces, states that locally evoked strain derived from the displacement of fluid in the canaliculi is very important. When loading occurs, interstitial fluid is squeezed through the thin layer of the non-mineralized matrix surrounding the cell bodies and cell processes, resulting in local strain at the cell membrane and activation of the affected osteocytes.

The sequence of events following orthodontic tooth movement can be characterized using suitable biomarkers. Proinflammatory cytokines: Interleukin-1 (IL-1), Interleukin- 6 (IL-6), Interleukin-8 (IL-8), tumor necrosis factor-α (TNF-α), and prostaglandin E (PGE). The analysis of the association between alkaline phosphatase (ALP) and bone metabolism, under healthy gingival conditions, is a suggestive indicator of histological and biochemical changes in bone turnover and therefore of the amount of tooth movement. Finally, specific properties of GCF ALP activity render this enzyme an interesting diagnostic tool in orthodontics.

Biomarkers of orthodontic tooth movement

A biomarker is a substance that is measured and evaluated objectively as an indicator of normal biologic processes, pathogenic processes, or pharmacologic responses to a therapeutic intervention.[3] A good biomarker should be specific and sensitive and have the ability to inform about the biological condition in terms of periodontal tissue changes and their relationships with the particular phase of OTM.

Table Showing Biomarkers of Orthodontic Tooth Movement

Metabolic products of paradental remodeling	Inflammatory mediators	Enzymes and enzyme inhibitors
Glycosaminoglycans	Prostaglandin E	Cathepsin B
Pyridinium derivatives	Neuropeptides (Calcitonin related gene peptide and substance P)	Acid phosphatase and alkaline phosphatase
Pantraxin 3	Transforming growth factorα1	Glucuronidase
N-telopeptide type 1 andosteocalcin	Epidermal growth factor	Aspartate aminotransferase
Matrix metalloproteins 1 & 8	α2 microglobulin and insulin like growth factor 1	Lactate dehydrogenase
	IL1 receptor antagonist 1α,2,6,8	
	Tumor necrosis factor	
	Macrophage-CSF	
	RANK/RANKL/ osteoprotegerin system	
	Myeloperoxidase	
	Markers of root resorption	

Metabolic products of paradental remodeling

Glycosaminoglycans (GAG) were investigated in the flow of GCF at three stages of orthodontic treatment viz. before orthodontic treatment, during canine retraction, and in retention, to relate them to tooth movement. Studies concluded that the increase in GCF volume during OTM and the decrease during retention were only partly due to changes in the severity of gingival inflammation (Pender et al). The pyridinium derivatives, pyridinoline (Pyr), and deoxypyridinoline (dPyr), are structural elements that bind together collagen chains. Pyr is abundant in skeletal tissues, whereas dPyr is a minor component found predominantly in bone and dentin.These two molecules are used as markers to evaluate bone resorption in such cases as Paget's disease and primary hyperparathyroidism.[5] Pentraxin3 (PTX3), also known as tumor necrosis factor (TNF) stimulated gene 14 (TSG14), is a 45kDa glycoprotein with a 202 amino acids Surlin *et al.*[12] measured the levels of PTX3 in GCF in orthodontic young and adult patients in the first 2 weeks after the orthodontic appliance showing an increased GCF levels of PTX3 suggesting PTX3 involvement in periodontal orthodontic remodeling and the aseptic inflammation induced by the orthodontic forces. N-telopeptide (NTx) is a specific marker of bone resorption because of its crosslinked a2 (I) NTx. When multiple biochemical markers of bone turnover were compared, NTx was found to be a more sensitive measure of bone resorption. Hence, NTx might be an important marker of active periodontal bone loss and could be useful for analyzing site specific responses to periodontal therapy. Osteocalcin is a noncollagenous matrix protein of calcifying and calcified tissue. It is produced by osteoblasts and has been described as the most specific marker of osteoblast function. Matrix metalloproteins (MMPs) are chemokines may contribute to differential bone remodeling in response to orthodontic forces through the establishment of distinct microenvironments in the sites of both compression and tension.[6] MMPs are enzymes that play a central role in PDL remodeling, both in physiological and in pathological conditions.

Inflammatory mediators

Prostaglandin E (PGE2), specially, is able to mediate inflammatory responses and induce bone resorption by activating osteoclastic cells.[7] Prostaglandins (PGs) are a group of chemical messengers and are derivatives of arachidonic acid. It has been found that PGs have an important role in promoting bone resorption. Although the exact role of PGs in bone resorption is not clear, it is thought to do so by stimulating cells to produce cyclic adenosine monophosphate, which is an important chemical messenger for bone resorption. Research proved that the application of orthodontic force increased the synthesis of PGs, which in turn stimulated osteoclastic bone resorption. The peripheral sensory nervous system contributes to the development of acute and chronic inflammatory processes through the local release of neuropeptides. [20,21,22] With the application of physiologic orthodontic force, SP increases production of proinflammatory cytokines and formation of osteoclasts in dental pulp fibroblasts in patients with severe orthodontic root resorption.[8] Transforming growth factor is a family of polypeptides produced by cells within the periodontium involved in many biologic activities, including cell growth, differentiation, and apoptosis, as well as in developmental processes and bone remodeling.[9] Epidermal growth factor (EGF) is another cytokine possibly associated with bone remodeling. Fibroblasts and stromal cells produce it. [10] Uematsu *et al.* in a study reported a transient elevation of EGF levels in GCF after application of mechanical stress of an experimental tooth. Alfa-2 microglobulin (α2MG) enhances the biologic action of insulinlike growth factor I (lGF). [11] They are a family of peptides that promote cell proliferation and differentiation and have insulin like metabolic effects. They have been associated with stimulation of the osteoblasts and its functions. [12]

Interleukin1 (IL1) are cytokines that affect bone metabolism and OTM, has 2 forms – á and â– that code different genes have similar actions. It was recently found that the concentration of leptin in GCF is decreased by orthodontic orthodontic tooth movement and this conclusively proved that leptin may have been one of the mediators responsible for orthodontic tooth movement. IL-17 has been found to be increased in patients with periodontitis, while it was barely detectable in sera from periodontally healthy individuals. Tumor necrosis factor-α, another proinflammatory cytokine, was shown to elicit acute or chronic inflammation and stimulate bone resorption. TNF-α is a pro-inflammatory cytokine that is often overexpressed in periodontitis and is responsible for alveolar bone resorption during periodontal breakdown. TNF-α plays a pivotal role in the bone resorption process, thus helping in orthodontic tooth movement. Colony stimulating factors are specific glycoproteins, which interact to regulate production,

maturation, and function of monocyte macrophages CSF (MCSF) as well as granulocytes CSF (GCSF). They might have implications in bone remodeling and thereby during tooth movement.[13] An important implication in tooth movement is played by the MCSF through an increased early osteoclastic recruitment and differentiation.[14] In the future, optimal dosages of MCSF already correlated with measurable changes in tooth movement and gene expression will provide a great potential in accelerating clinically the rate of tooth movement. The TNF related ligand receptor activator of nuclear factor kappa ligand (RANKL) and its two receptors, receptor activator of nuclear factor kappa (RANK), and osteoprotegerin (OPG), are known for involvement in bone remodeling process. In the bone system, RANKL is expressed on osteoblast cell lineage and exerts its effect by binding the RANK receptor on osteoclast lineage cells. This binding leads to rapid differentiation of hematopoietic osteoclast precursors to mature osteoclasts. Osteoprotegerin is a decoy receptor produced by osteoblastic cells, which compete with RANK for RANKL binding. The biologic effects of OPG on bone cells include inhibition of terminal stages of osteoclast differentiation, suppression of the activation of matrix osteoclasts, and induction of apoptosis. Myeloperoxidase (MPO) is an enzyme found in polymorphonuclear neutrophil (PMN) granules and can be used to estimate the number of PMN granules in the tissues. Mean MPO activity increased in both the GCF and saliva of orthodontic patients 2 h after appliance activation and they might be a good biomarker to assess inflammation in orthodontic movement.

Enzymes and enzyme inhibitors

Cathepsin B, an intracellular lysosomal enzyme is known to play an important role in the initiation and perpetuation of inflammatory processes. The accumulation of cathepsin B in GCF has been shown to increase with OTM. They were increased around osteoclasts and played a role in the decomposition of exposed collagen fibers and collagen degradation byproducts.[15,16] Alkaline phosphatase and acid phosphatase have been examined as bone turn over markers in orthodontic tooth movement.[17] Bone metabolism is associated with alkaline phosphatase (ALP) and acid phosphatase (ACP), expressed, respectively, by osteoblasts and osteoclasts. Alkaline phosphatase is a ubiquitous tetrameric enzyme, localized outside the cell membrane. [18] A biomarker of primary granule release from polymorphonuclear leukocytes is the lysosomal enzyme β glucuronidase (β G). Increased levels of this enzyme have been found in the GCF of adolescents treated with the rapid maxillary expander. Moreover, β G, as other biochemical mediators like IL1β, responds to direct and indirect application of mechanical force to teeth, with an increased level that is higher than following stronger forces. [19,20] Aspartate aminotransferase (AST) is a soluble enzyme that is normally confined to the cytoplasm of cells, but is released to the extra-cellular environment upon cell death. The activity levels of AST in the GCF are considered to be important in regulating alveolar bone resorption during orthodontic tooth movement. Aspartate aminotransferase (AST) and lactate dehydrogenase activities in GCF have been measured to confirm the biological activity, which occurs in the periodontium during orthodontic treatment. They are soluble enzymes normally confined to the cytoplasm of cells then released to the extracellular environment after cell necrosis.[21] Lactate dehydrogenase, an enzyme normally limited to the cytoplasm of cells, signals an increase in LDH during orthodontic tooth movement due to changes in the periodontal ligament.[22] Lactate dehydrogenase (LDH), an enzyme normally limited to the cytoplasm of cells, is only released extracellularly after cell death.

Conclusion

The orthodontic displacement of a tooth is the result of a mechanical stimulus, generated by a force applied to the crown of a tooth, which results in an acute inflammatory response in periodontal tissues, which in turn may trigger the cascade of biological events associated with bone remodeling. Orthodontic force application could be based on individual tissue responses. The problem of relapse can be solved upto some extent by considering bone turnover rates around each experimental tooth, however a simple noninvasive method is required for achieving these possibilities. The gingival crevicular fluid alkaline phosphatase levels in can be used as a diagnostic biomarker to assess the health and pathology of the periodontium during orthodontic treatment. It can be used in early detection of changes in the periodontium and can assess the efficacy and prognosis of orthodontic treatment.

Ethical clearance: Not needed

Source of funding: self

Conflict of interest: Nil

References

1. Krishnan V, Davidovitch Z. Cellular, molecular, and tissue level reactions to orthodontic force. Am J Orthod Dentofacial Orthop. 2006;129:469.
2. Dolce C, Malone JS, Wheeler TT. Current concepts in the biology of orthodontic tooth movement. Semin Orthod. 2002;8:6–12.
3. Bartzela T, Türp JC, Motschall E, Maltha JC. Medication effects on the rate of orthodontic tooth movement: A systematic literature review. Am J Orthod Dentofacial Orthop. 2009;135:16–26.
4. Burstone CJ. The biomechanics of tooth movement. In: Kraus BS, Riedel RA, editors. Vistas in Orthodontics. Philadelphia: Lea and Febiger; 1962.
5. Pilon JJ, KuijpersJagtman AM, Maltha JC. Magnitude of orthodontic forces and rate of bodily tooth movement. An experimental study. Am J Orthod Dentofacial Orthop. 1996;110:16–23.
6. Van Leeuwen EJ, Maltha JC, Kuijpers Jagtman AM. Tooth movement with light continuous and discontinuous forces in beagle dogs. Eur J Oral Sci. 1999;107:468–74.
7. Taba M, Jr, Kinney J, Kim AS, Giannobile WV. Diagnostic biomarkers for oral and periodontal diseases. Dent Clin North Am. 2005;49:551–71.
8. Last KS, Donkin C, Embery G. Glycosaminoglycans in human gingival crevicular fluid during orthodontic movement. Arch Oral Biol. 1988;33:907–12.
9. Samuels RH, Pender N, Last KS. The effects of orthodontic tooth movement on the glycosaminoglycan components of gingival crevicular fluid. J Clin Periodontol.1993;20:371–77.
10. Pender N, Samuels RH, Last KS. The monitoring of orthodontic tooth movement over a 2year period by analysis of gingival crevicular fluid. Eur J Orthod. 1994;16:511–20.
11. Griffiths GS, Moulson AM, Petrie A, James IT. Evaluation of osteocalcin and pyridinium crosslinks of bone collagen as markers of bone turnover in gingival crevicular fluid during different stages of orthodontic treatment. J Clin Periodontol. 1998;25:492–8.
12. Surlin P, Rauten AM, Silosi I, Foia L. Pentraxin3 levels in gingival crevicular fluid during orthodontic tooth movement in young and adult patients. Angle Orthod. 2012;82:833–8.
13. Alfaqeeh SA, Anil S. Osteocalcin and Ntelopeptides of type I collagen marker levels in gingival crevicular fluid during different stages of orthodontic tooth movement. Am J Orthod Dentofacial Orthop. 2011;139:e553–9.
14. Garlet TP, Coelho U, Repeke CE, Silva JS, Cunha Fde Q, Garlet GP. Differential expression of osteoblast and osteoclast chemmoatractants in compression and tension sides during orthodontic movement. Cytokine. 2008;42:330–5.
15. Cantarella G, Cantarella R, Caltabiano M, Risuglia N, Bernardini R, Leonardi R. Levels of matrix metalloproteinases 1 and 2 in human gingival crevicular fluid during initial tooth movement. Am J Orthod Dentofacial Orthop. 2006;130:568.e11–6.
16. Grieve WG, 3rd, Johnson GK, Moore RN, Reinhardt RA, DuBois LM. Prostaglandin E (PGE) and interleukin1 beta (IL1 beta) levels in gingival crevicular fluid during human orthodontic tooth movement.Am J Orthod Dentofacial Orthop. 1994;105:369–74.
17. Dudic A, Kiliaridis S, Mombelli A, Giannopoulou C. Composition changes in gingival crevicular fluid during orthodontic tooth movement: Comparisons between tension and compression sides. Eur J Oral Sci. 2006;114:416–22.
18. Groeneveld MC, Everts V, Beertsen W. Alkaline phosphatase activity in the periodontal ligament and gingiva of the rat molar: Its relation to cementum formation. J Dent Res. 1995;74:1374–81
19. Klein DC, Raisz LG. Prostaglandins: Stimulation of bone resorption in tissue culture. Endocrinology. 1970;86:1436–40.
20. Olgart L, Gazelius B. Effects of adrenaline and felypressin (octapressin) on blood flow and sensory nerve activity in the tooth. Acta Odontol Scand. 1977;35:69–75.
21. Perinetti G, Paolantonio M, D'Attilio M, D'Archivio D, Dolci M, Femminella B, et al. Aspartate aminotransferase activity in gingival crevicular fluid during orthodontic treatment. A controlled short term longitudinal study. J Periodontol. 2003;74:145–52.
22. Luthman J, Dahllöf G, Modèer T, Johansson O. Immunohistochemical study of neuronal markers in human gingiva with phenytoininduced overgrowth. Scand J Dent Res. 1988;96:339–46.

Effect of Kinesiotaping on Diastasis Recti in Post-Partum Women

Pournima A. Pawar[1], Ujwal L. Yeole[2], Manasi Navale[3], Komal Patil[3]

[1]Assistant Professor, [2]Principal, [3]Student, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune 37.

Abstract

Background: Diastasis recti is a separation of rectus abdominis muscles in the midline at the linea alba. Diastasis recti may occur in pregnancy as a result of hormonal effects on the connective tissue and the biomechanical changes of pregnancy.The kinesio taping results shows increased fluid flow through an injured area, better control over muscle contractions, reduced pain, and ultimately faster healing. **Methodology:** Permission was taken from institutional ethical committee. Subjects were selected by convenient sampling method. Patients were evaluated pre and post for diastasis recti using finger-width test and for disability assessed by using modified oswestry disability index. **Result:** The analyzed data showed that it was not a normal distribution using shapro -Wilk test hence Non parametric test-Wilcoxon sign rank test was performed to analyze the data within the groups. Diastasis recti of group A above umbilicus level pre-intervention mean was 3.040±0.4643 and post-intervention mean was 0.2350±0.3986. At umbilicus level pre-intervention mean was 3.100±0.3482 and post-intervention mean was 0.2950±0.4026and below umbilicus level pre-intervention mean was 2.435±0.4802 and post-intervention mean was 0.035±0.1466. In group B above umbilicus level pre-intervention mean was 2.965±0.5088 and post-intervention mean was 0.365±0.4542. At umbilicus level pre-intervention mean was 3.215±0.4988 and post-intervention mean was 0.4100±0.4626 and below umbilicus level pre-intervention mean was 2.115±0.5461 and post-intervention mean was 0.1350±0.3397. Comparison between the groups was done using Mann-Whitney U Test above umbilicus p value is 0.0059 which is very significant, at umbilicus p value is 0.9072 which is not significant, below umbilicus p value is 0.1124 which is not significant.

Conclusion: Our study shows that kinesio taping with exercise shows greater effect on diastasis recti than only exercises in post-partum women.

Keywords: *diastasis recti, kinesio taping, finger-width test, modified oswestry disability index*

Introduction

Post-partum is period following the childbirth or period after pregnancy. Women after childbirth there is physiology and structural changes in their appearance and shape that may require repair in order to restore their physical and psychological well- being. There is increase in abdominal girth during pregnancy that causes stretching and thinning of the midline abdominal fascia, thus aggravating preexisting diastasis of the rectus muscle that can result muscle that can result in herniation or protrusion of abdominal contents.[1]

The condition of diastasis recti may produce musculoskeletal complaints, such as low back pain, it result of decreased ability of the abdominal musculature and thoracolumbar fascia to stabilize the pelvis and lumbar spine.[2]

It has been claimed that Diastasis recti abdominis may changes posture and give more back strain due to reduced strength and function, leading to low backpain.[3]

Corresponding Author
Dr. Pournima Pawar
Department of Physiotherapy'
Tilak Maharashtra Vidyapeeth,
Gultekadi, Pune 37, Mobile No. 07972913284
Email id: pawarpournima@gmail.com

Kinesio tapeis acomparatively new technique used in rehabilitation programs. It is increasingly become an adjunct treatment option for the other musculoskeletal impairments, correcting muscle function by strengthening weakened muscles and improving circulation of blood and lymph by eliminating tissue fluid and skin by moving the muscle, decreasing pain through neurological suppression and repositioning sublaxed joints by relieving abnormal muscle tension, helping to return the function of fascia and muscle.

There are total five different corrective applications of KT which include the following : mechanical correction fascia correction; space correction; ligament / tendon correction; functional correction, that provide several potential effects of KT, depending which technique is used and degree of tape stretch, providing the sensory stimulation, aligning fascia tissues, reposition of sublaxed joints, minimizing pain/inflammation, assisting in the reduction of edema in the addition to inhibit muscle function.[5]

The elastic quality and proprioceptive input as well as subtle biomechanical factors of kinesio taping may account for the functional changes observed. When the application procedure is correct, the taped area can be used to facilitate a weakened muscle or to relax an overused muscle. The method for applying the tape varies depending on the specific goals such as improve active range of motion, relive pain, adjust misalignment, or improve lymphatic circulation.[4]

Method

Permission was taken from institutional ethical committee. Different hospitals were approached and permission was obtained prior to the study. 200 subjects were selected by convenient sampling method. Post-partum women were selected who had normal delivery, after 1 month of women who had caesarian section. Women who were having sensitivity of taping, open wounds, any recent abdominal surgery and abdominal hernia were excluded for the study. The study was explained to the patient. The pre and post intervention assessment were done for diastasis recti with finger-width test. The abdominal strength were assessed by sphygmomanometer anddisability were assessed by modified oswestry disability index. The exercise program was given 45 minute of session 3days/week for 4 weeks. In group A kinesio taping was applied for 6days/4week with exercises. The exercises includes the corrective exercise for diastasis recti, stabilization exercises with progressive limb loading for abdomen and trunk.

Exercise program:

Week 1: In conventional therapy

1. Corrective exercise of diastasis recti:

- Head lift: Patient position and procedure: Hook-lying with her hands crossed over midline at the level of the diastasis for support. Have the woman exhale and lift only her head off the floor or until the point just before a bulge appears. At the same time, her hands should gently approximate the rectus muscles toward midline. Then have the woman lower her head slowly and relax. 5 repetition without hold.

- Head lift with pelvic tilt-Patient position and procedure: Hook-lying. The arms are crossed over the diastasis for support as above. Have the patient slowly lift her head off the floor while approximating the rectus muscles and performing a posterior pelvic tilt, then slowly lower her head and relax. All abdominal contractions should be performed with an exhalation so that intra-abdominal pressure is minimized. 5 repetition without hold

- Week 2: Correction exercise for diastasis recti-Head lift and head lift with pelvic tilt : 5 reps with 5sec hold

- Week 3: Correction exercise for diastasis recti-Head lift and head lift with pelvic tilt. Stabilization exercise for trunk and abdomen: Basic lumbar stabilization with progressive limb-loading exercise for abdominals. Procedure: Patient position hook lying. Begin exercise with drawing in maneuver for 5sec hold to activate core muscles. Determine level at which patient can maintain pressure constant (stable pelvis) while performing either A, B, or C limb load activity. A- Lift bend leg 90 hip flexion. B- Slide heel to extend knee. C- lift straight leg to 45. 5 repetitions. Basic lumbar stabilization with progressive limb-loading exercise for trunk extensors: Procedure: Patient position quadruped. Patient assumes neutral spine in lumbar and cervical regions (keeping eyes focused toward floor or exercise mat), performs drawing-in maneuver for 5 sec, and moves extremities. Motions are repeated for 5 times. A- flexion of one upper extremity. B- Extend one lower extremity by sliding along the exercise mat.

• Week 4: Correction exercise for diastasis recti- Head lift and head lift with pelvic tilt: 10 reps with 10sec hold. Stabilization exercise- For abdominals: 10 reps, For trunk: A, B, C, D: 10 reps, C- extend one lower extremity by lifting it off the mat, D- flexing one upper extremity while extending contralateral lower extremity and alternate to opposite extremities. 5 repetitions.

Statistics

The analyzed data showed that it was not a normal distribution using Shapro -Wilk test hence Non parametric test-Wilcoxon sign rank test was performed to analyze the data within the groups. Unpaired T-test was used to analyze the data between the groups.

Result

Table no.1: Comparison of Diastasis recti between groups

Diastasis recti	Above umbilicus pre	Above umbilicus post	At umbilicus pre	At umbilicus post	Below umbilicus pre	Below umbilicus post
Group A	3.04+0.4643	0.235+0.3986	3.1+0.3482	0.295+0.4026	2.965+0.5088	0.035+0.1466
Group B	2.965+0.5088	0.365+0.4542	3.215+0.4988	0.41+0.4626	2.115+0.5461	0.1350+0.3397
P value	0.0059		0.9072		0.1124	

Interpretation: Comparison between the groups was done using Mann-Whitney U Test above umbilicus p value is 0.0059 which is very significant, at umbilicus p value is 0.9072 which is not significant, below umbilicus p value is 0.1124 which is not significant.

Table no.2: Abdominal Strength

Abdominal Strength	Pre-intervention	Post-intervention	P value
Group A	59.220+15.167	129.44+20.303	0.1670
Group B	61.860+19.314	129.02+21.457	

Interpretation: The abdominal strength of group A pre intervention mean is 59.220±15.167 and post intervention mean is 129.44±20.303 and group B pre intervention mean is 61.860±19.314 and post intervention mean is 129.02±21.457 with p value 0.1670 which is not significant.

Table No.3: MODI score

MODI score	Pre-intervention	Post-intervention	P value
Group A	57.160+7.723	16.400+3.929	0.0977
Group B	57.500+9.300	15.600+3.856	

Interpretation: MODI score of group A pre intervention mean is 57.160±7.723 and post intervention mean is 16.400±3.929 and group B pre intervention mean is 67.500±9.300 and post intervention mean is 15.600±3.856 with p value 0.0977 is not quite significant

Discussion

Post-partum is period following the childbirth or period after pregnancy.[1] Diastasis recti is a separation of rectus abdominis muscles in the midline at the linea alba. The condition of diastasis recti may produce musculoskeletal complaints, such as low back pain, it result of decreased ability of the abdominal musculature and thoracolumbar fascia to stabilize the pelvis and lumbar spine.[2]

This study was conducted to investigate the effect of kinesio taping for diastasis recti. In our study, women were divided into two equal group- Group A treated by kinesio taping on abdomen and exercise for diastasis recti and Group B treated by exercises for diastasis recti for 4 weeks.

In our study, the diastasis recti was assessed pre and post values with finger-width test. In finger-width test, we measured diastasis recti at three levels above umbilicus, at umbilicus and below umbilicus. The abdominal strength pre and post values was assessed with sphygmomanometer. The disability was assessed by Modified Oswestry Disability Index (MODI) score.

In our study, group A mean of age group is 24.22$\pm$3.338 and in group B mean of age group is 24.2$\pm$3.62. The mean of BMI in group A is 25.09$\pm$3.069 and in group B is 24.65$\pm$2.884 as shown in table no.1.

In group A the diastasis recti results shows that (Graph no.1) there is significant difference between pre and post treatment on all three levels. Kinesio taping techniques focused on improving circulation, muscle activation, proprioception, function and decrease pain. The pressure directed away from the belly of a muscle and towards the Golgi tendon organs which produces relaxation of the muscle, while pressure toward the muscle belly, from the region of the Golgi tendon organs strengthens it; pressure directed near the belly of the muscle, towards the muscle spindle weakens it and while pressure away from the spindle near the belly strengthens it.Our study also support with the study conducted by Mohamed A. Awad et.al. concluded that Kinesio taping was effective in reducing diastasis recti in postpartum women.[4] Kinesio taping can increase the effect of exercise by stimulating muscle facilitation. Acute and chronic effects of Kinesio taping on neuromuscular performance and muscle activation and function, taping should be planned for patients as part of a rehabilitation program or in combination with exercise programs. This is also support with the study done by Ceren Gursen et.al. stated that addiction of kinesio taping with exercises in the postpartum physiotherapy program provides greater benefit for abdominal recovery in women.[6] In group B the diastasis recti results shows that , there is significant difference in pre and post treatment on all three levels. Exercise helps to maintain tone, strength and control of the abdominal muscles, consequently reducing stress on the linea alba. The transversus abdominis muscle is the deepest abdominal muscle. It has strong fascia links with the rectus abdominis muscle and the linea alba. Exercise of the muscle draws the bellies of the rectus abdominis muscle together, also improves the integrity of the linea alba and increases fascial tension which allowing efficient load transference and torque production. Our study also support with the study conducted by D.R.Benjamin done on theeffects of exercise on diastasis of the rectus abdominis muscle in the antenatal and postnatal periods.[8]

All corrective exercises had been in form of pulling in an abdominal muscles. Abdominal exercises can help to bring the left and right sides of rectus abdominis muscle, it will not cause extra stress on stomach or back. Abdominal muscle strengthening exercises continue to recommended during the postpartum period, particularly to reduce inter recti distance.

To obtain improvement of muscle strength following abdominal exercises via adoptive changes in the muscle caused by exercises as metabolic capabilities of the muscle are progressively overloaded. The muscle which is contractile tissue become stronger which is result of hypertrophy of muscle fibers and it increased recruitment of its motor unit. According to strengthening core control muscle of the abdominal region in postnatal period is very important as it help in creating a muscular corset to support the spine. This is also support the previous study done by Sanjeevani Khandale and Deepali Hande concluded that abdominal exercises are very effective in reducing diastasis recti in early postpartum women and inter recti distance.[9]

The result of abdominal muscle strength shows that, there is significant difference in values of pre and post treatment in group A and B. There is more improvement of abdominal muscle strength in group A women. The kinesio tape helps to correcting muscle function by strengthening weakened muscles and improving circulation of blood and lymph by eliminating tissue fluid beneath the skin by moving the muscle, decreasing pain through neurological suppression and helping to return

the function of fascia and muscle.This is also support to the previous study done by Mohamed A. Awad et.al. concluded that Kinesio taping was effective in reducing diastasis recti in postpartum women.[4]

Bycontracting the abdominal muscles makes it possible to reduce intra-abdominal pressure while exercising. It causes improvement of muscle strength and decreased rectus and increased intra-abdominal pressure which contributes to mechanical spine stability through the co activation of trunk flexors and extensors musculature. As abdominal muscle contract increased pressure and it converts the abdomen into rigid cylinder that increased stability of spine, improves abdominal strength. This is also support the previous study done by Sanjeevani Khandale and Deepali Hande concluded that abdominal exercises are very effective in reducing diastasis recti in early postpartum women and inter recti distance.[9]

The results of Modified Oswestry Disability Index (MODI) score shows the significant difference between the pre and post treatment in both group A and B. But there is more reduction of score in group A than B. The trunk stabilization exercises are aimed at improving the neuromuscular control, strength, and endurance of the muscles that are central to maintaining the dynamic spinal and trunk stability. It includes several groups of muscles particularly targeted the transversus abdominis and lumbar multifidi, but also other paraspinal, abdominal muscles. Thestabilization exercises may be useful in reducing pain and disability for all patients with nonspecific low back pain. Our study also support with the previous study done by Hye Jin Moon et.al. concluded that lumbar stabilization and dynamic strengthening exercise strengthened the lumbar extensors and reduced low back pain.[10]

Our study shows that the kinesio taping and exercise combine therapy is more effective than only exercise therapy in post-partum women. According to the Mann-Whitney test the difference between the pre and post values of group A and B above umbilicus level p value is 0.0059 which is very significant so the study shows that kinesio taping and exercises are effective for improving diastasis recti above umbilicus level. At umbilicus level p value is 0.9072 which is not significant and below umbilicus p value is 0.1124 which is not significant. The difference between the pre and post values of group A and B of abdominal strength p value is 0.1670 which is not significant.So study shows that for diastasis recti at umbilicus level, below umbilicus level the duration of intervention may be more. The difference between the pre and post values of group A and B of MODI score p value is 0.0977 which is not quite significant this signifies the exercises are effective for improving disability in post-partum women.

Conclusion

Study concluded that effect of kinesio taping and exercise on diastasis recti are more effective than only exercises in post-partum women.

Ethical Clearance- Taken from Institutional Ethical committee

Source of Funding- Self

Conflict of Interest - NIL.

References

1. Mady MM. Effect of Kinesio taping therapy on waist circumferences in postpartum women. Journal of Medicine in Scientific Research. 2018 Jan 1;1(1):48..
2. Carolyn Kisner, Lynn Allen Colby,Therapeutic exercise foundations and techniques (2013), sixth edition page no. 938.
3. Sperstad JB, Tennfjord MK, Hilde G, Ellström-Engh M, Bø K. Diastasis recti abdominis during pregnancy and 12 months after childbirth: prevalence, risk factors and report of lumbopelvic pain. Br J Sports Med. 2016 Sep 1;50(17):1092-6.
4. Awad M, Mahmoud A, El-Ghazaly H, Tawfeek R. Effect of Kinesio Taping on Diastasis Recti. Med. J. Cairo Univ. 2017;85(6).
5. Jill mantle, Jeanette Haslam, Sue Barton,Physiotherapy in Obstetrics and Gynaecology (2004), second edition page no.43, 206.
6. Sabbour A. The effect of kinesiotaping therapy augmented with pelvic tilting exercises on low back pain in primigravidas during the third trimester. Bulletin of Faculty of Physical Therapy. 2011;16(1).
7. Gürşen C, İnanoğlu D, Kaya S, Akbayrak T, Baltacı G. Effects of exercise and Kinesio taping on abdominal recovery in women with cesarean section: a pilot randomized controlled trial. Archives of gynecology and obstetrics. 2016 Mar

1;293(3):557-65.

8. Benjamin DR, Van de Water AT, Peiris CL. Effects of exercise on diastasis of the rectus abdominis muscle in the antenatal and postnatal periods: a systematic review. Physiotherapy. 2014 Mar 1;100(1):1-8.
9. Khandale SR, Hande D. Effects of abdominal exercises on reduction of diastasis recti in postnatal women. IJHSR. 2016;6(6):182-91.
10. Moon HJ, Choi KH, Kim DH, Kim HJ, Cho YK, Lee KH, Kim JH, Choi YJ. Effect of lumbar stabilization and dynamic lumbar strengthening exercises in patients with chronic low back pain. Annals of rehabilitation medicine. 2013 Feb;37(1):110.

Systematic Review in Dentistry: Awareness and Perception among the Faculty of Four Indian Dental Institutions

Pradnya Kakodkar[1], Revati Deshmukh[2], Shishir Singh[3], Alka Kale[4], Priya Joshi[5]

[1]Deputy Director, Dr D Y Patil Vidyapeeth,Pimpri, Pune, [2]Prof and HOD, Department of Oral Pathology, Bhartiya Vidyapeeth Dental College and Hospital, Pune, [3]Dean, Professor and Head, Department of Conservative Dentistry and Endodontics., Terna Dental College, Mumbai, [4]Principal, KLEVK Institue of Dental Sciences, Belgaum, [5]Prof and HOD, Department of Oral Pathology, Vasantdada Patil Dental College and Hospital, Sangli

Abstract

Context (Background): Systematic review (SR) is the key element of evidence based practice (EBP) and is especially important in today's dental practice.

Aim: To assess the awareness and perception about systematic review in dentistry among the dental faculty.

Method and Material: A cross-sectional survey was conducted among 122 dental faculty of the four dental colleges in India. A self-administered, structured, self-designed, validated and pilot tested 14 item questionnaire was used for data collection. Q1-2 assessed awareness and Q3-5 assessed the perception. The collected data was analyzed descriptively (number and percentages)

Result: Only 110 (90.16%) completed the questionnaire entirely. There were 72 females and 38 males aged between 27 years to 58 years. The knowledge about EBP terminologies was very low. Only 13.63% participants were able to complete the evidence based pyramid correctly, 60% reported that it is hard to relate SR findings to patient care, 72.72% agree that SR can be undertaken as library dissertation for postgraduate studies and 100% have preferred past clinical experience as first preference in clinical decision making. Lack of access to full text articles was reported as a major barrier by 81.81% participants followed by lack of skill to appraise scientific articles (78.18%).

Conclusion: The awareness about Systematic review among the dental faculty is low and there is a positive perception towards learning, undertaking training and practicing EBP.

Key words*: systematic review, EBP, dental, evidence pyramid.*

Introduction

Dentistry is the science and art of providing oral health services to the patient. A dentist's 'toolkit' is created during the five years of their professional training and in addition during the three years of post-graduation. Further, it may not be updated regularly[1]. "The current method of dental and medical training is dependent on Professors, obsolete text books and opinion of the seniors who are often dogmatic and unresponsive to new ideas"[2]. Today, the world is changing because of digitalization, leading to information explosion on the internet and consumer participation. The extra-ordinary advancement in internet has fortified the change of relationship between the patient and the dentist; patients are now partners in the decision-making process [3].

Evidence based dentistry (EBD) can be said to be the current best approach to provide interventions as it improves dentist's skills and knowledge as well as quality of treatment provided to the patients[1]. David Sackett laid the foundation of evidence-based practice by defining it as "integrating individual clinical expertise with the

Corresponding Author:
Dr Pradnya V Kakodkar
Deputy Director Research, Dr D Y Patil Vidyapeeth, Pimpri, Pune. Email:pradnya.kakodkar@gmail.com
Mobile: 9881409089

best available external clinical evidence from systematic research"[4]. Although, this concept of Evidence based practice (EBP) was born two decades ago its arrival is new in India and is in its developmental stages especially in dentistry[5] . Systematic review (SR) is a key element of EBP. It is defined as "a review of the evidence on a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant primary research, and to extract and analyse data from the studies that are included in the review."

As per the Dental Council of India, the three year post-graduation curriculum do not include any training in EBP in general and SR in particular[6]. Further, the perceived road blocks for India, whenever the idea of evidence base education is mooted are that " our teachers are not trained for this, we just don't have the time, or our universities will not allow it" [2] .

EBP is especially important in today's world of great scientific breakthroughs and achievement because it is directed at reversing an unsystematic clinical practice that is often based on intuition and pathophysiologic basis and replacing it with one that is evidence based and scientifically proven[5]. Owing to the background and the importance of EBP, post-graduation curriculum can be reinforced by including training in EBP and undertaking SR as Library Dissertation. Thus, the aim of this study was to assess the awareness and perception among the dental faculty about systematic review in dentistry.

Method

A cross-sectional survey was conducted among the dental faculty of the four dental colleges in India. Scientific and ethical approval was obtained before the start of the study . Those faculty who have completed their post-graduation (MDS) and were willing to fill the questionnaire were recruited for the study. A pool of questions was framed based on the review of the previous literature. The questions were shortlisted and distributed in 2 domains (awareness and perception). The questionnaire used for data collection was self designed, validated (face validity, content validity and reliability) and pilot tested. The self-administered, structured questionnaire had 14 items and was a combination of open and closed ended questions (Q1-2 assessed awareness and Q3-5 assessed the perception). Overall, 122 faculty participated in the study. The collected data was entered in Microsoft excel and descriptive statistics (number and percentages) were calculated.

Results

Out of the 122 participants, only 110 completed the questionnaire entirely. The response rate was 90.16%. There were 72 females and 38 males aged between 27 years to 58 years.

The awareness regarding the EBP terminologies is presented in Table 1. Out of the 15 terminologies, 100% participants were aware about 5 of them, while there were 8 other terminologies like Hierarchy of evidence, evidence based dentistry, evidenced based pyramid , systematic review, meta-analysis, Cochrane database, PRISMA guidelines and PICO whose awareness was very low among the participants (12.72% to 24.54%).

Fig 1 depicts the percentage distribution of the participants according to the correct knowledge of the appropriate study design in the evidence based pyramid. Overall, only 15 (13.63%) participants were able to complete the evidence based pyramid correctly.

Table 2 shows the perception of the faculty towards SR in dentistry. Majority participants have responded in agreement for the use SR in patient management(63.63%), improve clinical skills (89.09%), quality care (83.63%) and clinical decision making (54.54%) . 60% have reported that it is hard to relate SR findings to patient care. 72.72% agree that SR can be undertaken as library dissertation for postgraduate studies, 88.18% also agree that SR can be taken for Journal club discussion by the postgraduate students. 60.90% believe that the students should be trained in EBP.

Table 3 shows the faculty preference in clinical decision making. The participants have ranked their past clinical experience as first preference, followed by books, evidence from journal articles and lastly from SR.

Table 4 presents data of the perceived barrier for undertaking SR. Lack of access to full text articles was reported as a major barrier by 81.81% participants followed by lack of skill to appraise scientific articles (78.18%). A small number of participants also reported that SR is not useful for clinical practice (12.72%). Meager percentage of participants also reported Internet issues to be a barrier (5.45%).

Table 1: Awareness regarding certain terminologies about evidence based practice.

Terminologies	Number (%)
1. Expert opinion	96 (87.27)
2. Letter to editor	94 (85.45)
3. Case Report	110 (100)
4. Case series	110 (100)
5. Case control studies	110 (100)
6. Cohort study	110 (100)
7. Randomized control trial	110 (100)
8. Hierarchy of evidence	15 (13.63)
9.Evidence based dentistry	25 (22.72)
10. Evidence based pyramid	10 (9.09)
11.Systematic review	27 (24.54)
12. Meta-analysis	19 (17.27)
13. Cochrane database	21(19.09)
14. PRISMA guidelines	15 (13.63)
15. PICO	14 (12.72)

Table 2 .Perceptions about Systematic Review in Dentistry.

Statements	Strongly agree/ Agree N(%)	Don't know N(%)	StronglyDisagree/ Disagree N(%)
1.Systematic review findings are useful in daily patient management	70 (63.63)	2(1.81)	38(34.54)
2.Systematic review findings improve the clinical skills of doctors	98(89.09)	5(4.54)	7(6.36)
3.Systematic review findings improve the quality for patient care	92(83.63)	4(3.63)	14(12.72)
4. It is hard to relate systematic review findings to patient care.	66 (60)	17(15.45)	27(24.54)
5.Systematic reviews should be adopted by the dentist in clinical decision making in India	60 (54.54)	35(31.81)	15(13.63)
6.General attitude of Systematic Review as Library dissertation for postgraduate students	80 (72.72)	15(13.63)	15(13.63)
7. General attitude of systematic review to be discussed in Journal club for postgraduate students.	97(88.18)	3(2.72)	10(9.09)
8. Training the students in Evidence based practice is required.	67(60.90)	20(18.18)	13(11.81)

Table 3: Preference for clinical decision making

Past clinical experience	1
Books	2
Evidence from journal articles	3
Evidence from systematic review	4

Table 4 : Perceived major barriers for conducting systematic reviews.

Parameters	**Strongly Agree/ Agree N(%)**	**Don't know N(%)**	**Strongly Disagree/ Disagree N(%)**
Lack of time	74 (67.27)	-	36(32.72)
Lack of skill to appraise scientific articles	86 (78.18)	5(4.54)	19(17.27)
Lack of interest	57 (51.81)	2(1.81)	51(46.36)
Financial constrains	54 (49.09)	7(6.36)	49(44.54)
Difficult to understand	70 (63.63)	2(1.81)	38(34.54)
Lack of access to full text articles	90 (81.81)	-	20(18.18)
Systematic Reviews are not useful for clinical practice	14(12.72)	-	96(87.27)
Internet issues	06 (5.45)	-	104(94.54)

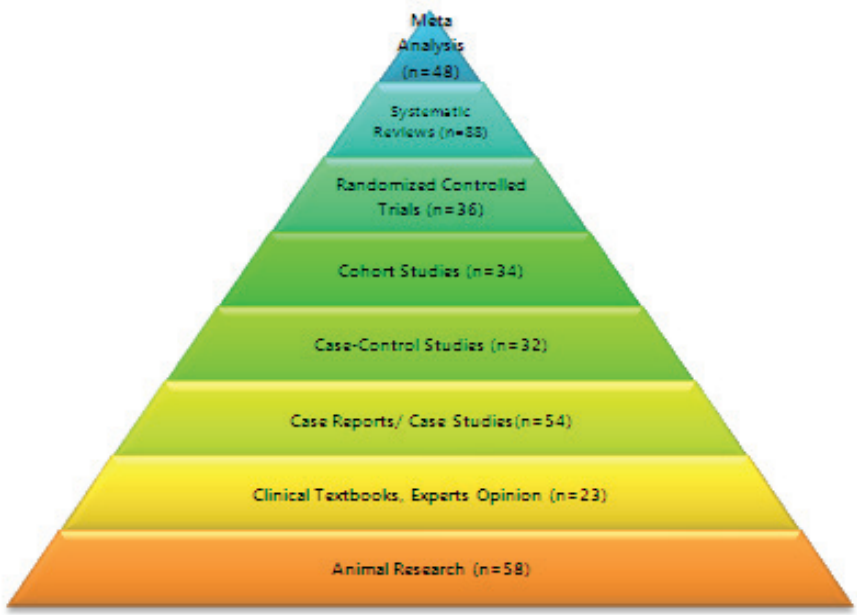


Fig1. Number of participants filling the appropriate study designs in the evidence based triangle .

Discussion

There are no studies reporting the awareness and perception of SR among the dental faculty in India, however a few studies [5,7-13] exist which have assessed the knowledge, perception and barriers regarding EBP. Further, majority of these studies have been carried out among clinical practitioners and also, there is variation in the assessment tool. Following is the summary of the studies undertaken in different parts of India.

In Bhopal[7], a study was conducted among 250 private dentists. It was evident that the participants have low knowledge about evidence based dental practices (EBDP) but they showed positive attitude towards adopting it in their future practice. The most commonly reported barrier was lack of time (79.5%) followed by lack of skill to appraise scientific journals (73.1%). Out of 141, who heard of EBDP, almost 50% of dentists favored evidence from scientific literature and 50% preferred "Past clinical experience". For guidance during treatment planning, they took help from dental practices expert, Textbooks, other professionals and 60.3% never checked electronic database like Pubmed.

In Jharkhand[8] , 94 private practitioners of Hazaribag participated in the study of which only, 44 of them had knowledge about EBP and 25 knew the EBP pyramid completely. 9.09% practiced EBD. 46.81 % used books and among the electronic source, most of the dentists preferred any website (39.36%) followed by PubMed (30.85%) to obtain information, while 10.64% knew about Cochrane database. All the dentists (n = 94) acknowledged that they never critically evaluated the evidence obtained but majority of them had positive attitude towards learning the concepts of EBP.

In Vadodara[9], 87 practicing dentist reported that the barrier for practicing EBP was lack of time (59.29%), difficulty in evaluation (37.04%) and lack of knowledge (33.3%).

In Jodhpur[10] , a study was conducted among 138 academician. Lack of personal time was reported as one of the major perceived barriers for EBP (72.4%), the academician believed that learning skills of evidence-based dentistry helped them to utilize evidence-based dentistry in daily practice (50.7%), 14.49% understood systematic review and were able to explain it to others, 36.23% felt they did not have the skill for critical appraisal and 31.88% did not feel the importance of SR .

In Davangere[11], a study among 117 private practitioners, reported that only 6.8% and 12.9% correctly knew that expert opinion and case report formed the base and systematic review formed the apex of evidence-based pyramid. Ninety percent of the dentist felt the need to be trained in EBP. When faced with clinical uncertainty, 37% preferred electronic source and 23.8% preferred asking a friend. Seventy-six percent practiced EBP in decision-making; however, only 56.4% felt that without EBP, their practice was inefficient. 78.6% critically analyzed the evidence. 38.5% were aware of the evidence based pyramid. Practitioner who were attached to institution and were also practicing had more correct knowledge regarding EBP.

In Bangalore[5], a study among 300 academician and practitioners revealed that EBP is possible only when there is access to information sources. Most of the respondents reported lack of time, training and access as barriers to practice EBD. Most of the participants chose to rely on their own judgment (92%) followed by referring textbooks (29.4%), dental journals (26.4%), and consulting colleagues (23.1%) to guide their primary care practice and support their clinical decisions. Very less number of dentists relied on Cochrane library as a reliable source for EBP.

In Pune[12], among the 150 dental academician, it was reported that lack of access to full text articles (60.6%), lack of time (58%), lack of application of evidence in patients(39.3%) , lack of interest(32%), lack of skill to appraise scientific journals (30.6%), lack of computer literacy (27.3%) and lack of internet connection (27.3%) are among the perceived barriers for EBP.

In Nagpur[13], a study was conducted in three teaching dental hospitals among the postgraduate students and the faculty regarding EBD. Positive attitude toward EBD was significantly lower among post graduate students than in the staff. The staff believed that patient care can be improved by EBD, whereas the post graduate trainees thought that EBD is of limited value in general practice and places an extra demand on the over loaded practitioners. The participants perceived that personal barriers and lack of training was the reasons for not practicising EBD.

Based on the present study results and literature reports [5,7-13], it is clear that the dental faculty need to update their tool kit in EBP and SR. The dentists (private clinician or academician) in different parts of India have

reported common barriers towards EBP. Lack of time appears to be a major barrier and every dentist must be informed and motivated to spend some time for EBP. Collectively all the dental colleges at the DCI level, must initiate steps for getting access to full text articles, because major crux of EBP lies on literature. They also have demonstrated a positive attitude towards learning, undertaking training and practicing EBP.

Recommendation

Including evidence based dental practice teaching in dental curriculum may prove to be a significant step in effective and efficient dental care delivery to the patients[7] . Therefore, strategies for enhancing EBD training and implementation should be delivered at the basic level for the growth and development of dental profession[13] . As recommended earlier[1] it is reinforced that post-graduate students need to be prepared on evidence based dentistry not only for the benefit of their patients but also to improve the quality of research work carried out by them. The DCI curriculum should make provision for mandatory training in EBD and voluntary provision for undertaking SR as Library dissertation.

Ethical Clearance: Clearance obtained from Institutional Ethics Committee (BVDU/128/2019-20).

Source of Funding: Self funding.

Conflict of Interest: Nil

References

1. Prabhu. S, Joseph John, Saravanan. S. Knowledge, Attitude and Perceived Barriers towards practice of Evidence Based Dentistry among Indian postgraduate dental Students. *IOSR Journal of Dental and Medical Sciences 2012. 2(1) 46-51*
2. Durgesh N Bailoor. Evidence based education in Dentistry: Can it be implemented in India? International Journal of Oral and Maxillofacial Pathology 2011; 2(2): 44-45.
3. Vinej Somaraj, Rekha P Shenoy, Ganesh Shenoy Panchmal , Praveen Jodalli , Laxminarayan Sonde. Evidence Based Dental Practice: A Review . Journal of Applied Dental and Medical Sciences. 2015;1(3):113-122.
4. Sackett DL. Evidence-based medicine. Semin Perinatol. 1997 ;21(1):3-5.
5. Rajagopalachari US, Puranik MP, Rajput S.Knowledge, attitude, and practices toward evidence-based dentistry among dentists of Bengaluru city. J Indian Assoc Public Health Dent 2017;15:239-43
6. Dental Council of India. See at http://dciindia.gov.in/Rule_Regulation/MDS_Course_Regulations_2017.pdf accessed on 25-9-2019.
7. Gupta M, Bhambal A, Saxena S, Sharva V, Bansal V, Thakur B. Awareness, Attitude and Barriers Towards Evidence Based Dental Practice Amongst Practicing Dentists of Bhopal City. J Clin Diagn Res. 2015 Aug;9(8):ZC49-54.
8. Sudhanshu Saxena, Ankur Bhargava, Sonia Tiwari, Sonal Saigal. Knowledge, attitude, and practice regarding evidence-based dentistry among dentists of Hazaribag, Jharkhand, India. Int. J. Adv. Res. 2019: 7(3), 808-814
9. Jay Patel, Monali Shah, Deepak Dave,Sujal Shah. Awareness on Evidence Based Dentistry amongst dental professionals in Vadodara city – An Questionnaire survey . The Journal of Integrated Health Sciences. 2013: 1;1: 27-31.
10. Rawat P, Goswami RP, Kaur G, Vyas T, Sharma N, Singh A. Knowledge, Attitude, and Behavior toward Evidence-based Dentistry among Dental Professionals in Jodhpur Rajasthan. India. J Contemp Dent Pract. 2018 Sep 1;19(9):1140-1146.
11. Bhate PM, Basha S, Goudar PM, Hirekalmath SV, Mohamed I, Allama Prabhu C R. Dentists' knowledge, attitude, and practice regarding evidence-based practice in Davangere, India. J Indian Assoc Public Health Dent 2017;15:359-67
12. Bhor KB, Shetty V, Garcha V, Vinay V, Nimbulkar GC. Knowledge, attitude, and perceived barriers toward evidence-based practice among dental and medical academicians and private practitioners in Pune: A comparative cross-sectional study. J Indian Assoc Public Health Dent 2019;17:48-53
13. Surekha Rathod, Ishita Wanikar, Anubha Raj. Perception of dental professionals towards evidence based dentistry. Journal of Education Technology in Health Sciences,2016;3(1):8-12

A Comparative Study to Assess Effect of Hypertonic Saline (3%Nacl) versus Salbutamol Nebulization Therapy on Breathing Pattern among the Children Suffering with Lower Respiratory Tract Infection Admitted to the Selected Hospitals of Central Gujarat

Prakruti Patel[1], Rameshwari Zala[2], Vipin Vageriya[3]

[1]Student, [2]Assistant Professor, [3]HOD of pediatric nursing, Manikaka Topawala Institute of Nursing, Charotar University of Science and Technology, Changa

Abstract

Background of the study: In the contemporary epoch, In India there is a rapid health transition with major and increasing burden of chronic non communicable diseases, supremely hypertension, cancer, diabetes mellitus, chronic lung disease and stroke and increased age was one the cardinal cause of elevated blood pressure. **Objectives:** 1) to assess breathing pattern of children suffering with lower respiratory tract infection after nebulization therapy with hypertonic saline (3%Nacl). 2) To assess breathing pattern of children suffering with lower respiratory tract infection after nebulization therapy with salbutamol. 3) To compare the effect of hypertonic saline (3%Nacl) and Salbutamol nebulization therapy on breathing pattern of children suffering with lower respiratory tract infection.4) To find out the association between selected demographic variables and breathing pattern of children suffering with lower respiratory tract infection after nebulization therapy with hypertonic saline (3%Nacl) and salbutamol. **Methodology:** A comparative study was carried out by selecting 86 children which were suffering with LRTI through non probability purposive sampling technique. Demographic data was collected by questionnaire as well as breathing pattern was assessed by modified clinical severity score. **Result:** The study finding shows that the mean clinical severity score 1.4283 with hypertonic saline nebulization therapy was lesser than the mean clinical severity score 1.8469 with salbutamol nebulization therapy with the mean difference of was 0.4186. ANOVA calculated; P value is 0.000which less than 2.91 (df 2, level of significant 0.05).so, that H_0 is rejected. This indicates that the hypertonic saline (3% Nacl) is effective to improve breathing pattern compare to salbutamol nebulization therapy.

Conclusion: The research study concluded that hypertonic saline(3% Nacl) nebulization therapy is more effective compare to salbutamol nebulization therapy.

Keywords: *3% Nacl, Hypertonic Saline, Salbutamol, Lrti, Children, Clinical Severity Score, Nebulization therapy.*

Introduction

Young children are precious in their own right and they are the future of the nation. Illnesses of the child engulf the whole family in a vicious cycle of apprehension, anxiety, helplessness and disturbed lifestyle. Lower Respiratory Tract Infection place a considerable strain on the health budget and are generally more serious than Upper respiratory infections.[1]

Lower respiratory tract infection is most commonly present in infancy period characterized by cough, wheezing, tachypnea and fever. Lower respiratory tract infection is the major reason of infant hospitalization in both developed and developing countries. Although it is common there is no current standard treatment. Supportive care is the only evidence based treatment option. Many studies focused on testing the effects of bronchodilators such as β2-agonsits, epinephrine,

glucocorticoids and magnesium sulphate with controversial results.[2]

The lower respiratory tract begins from the trachea and ends in the lungs. The tract enters into the lungs and divides in the bronchi. Then each bronchus divides further into smaller air pipes that are bronchioles. The bronchioles appear from the secondary and tertiary bronchi. These bronchioles end in small air sacs which known as alveoli. Many alveoli bunch up together and form the alveolar sac. From these alveoli the blood capillaries go out. The exchange of air occurs in every alveolus and the capillaries which go out of these alveolar sacs and spread throughout the body carry the blood which came in from veins spread in the body. The infection which occurs in the lower respiratory tract of human body is usually termed by the doctors as lower respiratory tract infection. The infections begin from the lower larynx and can also attack the bronchi and even the whole lungs. The common illnesses are bronchitis, pneumonia, bronchitis and flu.[1]

The primary cause of lower respiratory tract infection is various kinds of viruses that attack our system. The viruses that enter our body often take the shape of structural proteins and hence pass through unrecognized by the human immune system. Also viruses secrete some toxins which are stronger due to this immunity drops down and further humans are infected with the respective virus. After completion of incubation period the victim's body represents the clinical signs and symptoms.[5]

Bronchitis is a common lower respiratory tract infection. There are two kinds of Bronchitis; acute and chronic. The virus swells the bronchial tubes which causes difficulty in breathing, thus the infection affects the airways. About 4% of the people in a population of 1000 are affected by this virus. Acute or chronic disease is decided by the stage of the virus infection and the presentation of its structure.[3]

Pneumonia is another lower respiratory tract infection. It is caused by streptococcus pneumonia. The virus causes a great damage to the lung and the mortality rate is 25% of the patients affected by the virus. If a child below the age of 5 is affected, then he or she might not survive at all. Flu is caused by the influenza viruses and affects both the upper and the lower respiratory tracts. Bacterial meningitis caused by the virus Neisseria meningitides can cause lower respiratory tract infection. Scarlet fever causes by Group-A streptococcus. Tuberculosis caused by the bacteria mycobacterium tuberculosis which causes a consistent damage to the lungs. Bronchiolitis is also a lower respiratory tract infection. It is caused by RSV or respiratory syncytial virus. It mainly affects the respiratory tracts and the airways of little children. [3]

Lower respiratory tract infection (LRTI) are the third most important cause of mortality globally and are responsible for more than 4 million deaths annually.[4]

A nebulizer is a medical device which converts liquid medicine into vapor, mist or aerosol so that it can be inhaled directly into the air tubes or lungs. It uses electricity to generate compressed air which converts liquid form of medicine into vapors; much in the same way as an old style "Flit" sprayer does.[4]

Methodology

The study was executed by using quantitative research approach with comparative descriptive study design. The elected population for the study was children who are suffering with Lower Respiratory Tract Infection in selected hospitals of central Gujarat. Participants were selected by calculating power analysis with using the formula $n = 2(\sigma/\Delta)^2 (Z_\alpha + Z_{1-\beta})^2$. In that n = Sample size, σ = Standard deviation = 1, Δ = critical difference = 0.5, Z_α = Error (5%) = 1.96, $Z_{1-\beta}$ = Power (80%) = 0.84. So, 86 samples were selected and assigned in to two groups by using non-probability purposive sampling technique, the participants who elected in hypertonic saline group (3% Nacl) and salbutamol group were observed once a day for three days. Independent variable was hypertonic saline (3%Nacl) and Salbutamol nebulization therapy. as well as dependent variable was breathing pattern and demographic variables were age in month, gender, Is the baby on any medications for LRTI? Symptoms at admission, Duration of hospital stay, Oxygen requirement. All the data was collected by utilizing Demographic data was collected by questionnaire as well as breathing pattern was assessed by modified clinical severity score. Pilot study was conducted from 7th April to 20th April 2019 among 10 patients Hypertonic nebulization therapy (3%nacl) (5) &Salbutamol nebulization therapy (5) in baby children hospital, Ahmedabad to identify feasibility of the samples and reliability of the tool. The main study was conducted in different children hospitals .Moreover, the data was analysed and interpreted by using descriptive

and inferential statistics.

Results

1. **Breathing pattern of children suffering with lower respiratory tract infection after nebulization therapy with hypertonic saline (3%Nacl).**

Clinical severity score	f	%	Mean	SD	Median	T value	P-Value
Mild	06	13.95					
Moderate	31	72.09	1.4283	0.4737	1.500	18.94	0.000
Severe	06	13.95					

2. Breathing pattern of children suffering with lower respiratory tract infection after nebulization therapy with salbutamol. N=43

Clinical severity score	f	%	Mean	SD	Median	T Value	P-Value
Mild	01	2.33					
Moderate	17	29.53	1.8469	0.3387	1.9167	15.64	0.000
Severe	21	48.84					

3. **Effect of Hypertonic saline (3% Nacl) nebulization therapy (ANOVA)**

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Mean of 3 days
Factor	2	281.2	140.583	158.44	0.000	2.2674
Error	513	455.2	0.887			1.5465
Total	515	736.3				0.4709

Table value p= 2.91(df 2, level of significant 0.05)

4. **Effect of salbutamol nebulization therapy (ANOVA)**

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Mean of 3 days
Factor	2	179.5	89.7684	112.83	0.000	2.5407
Error	512	407.3	0.7956			1.9006
Total	514	586.9				1.0988

Table value p= 2.91(df 2, level of significant 0.05)

There is a no significant association between selected demographic variables and breathing pattern of children suffering with lower respiratory tract infection after hypertonic saline(3% Nacl) and salbutamol nebulization therapy except symptoms at admission.

Disscussion

In this study it is found that majority of the participants 31(72.09%) were having moderate clinical severity score 6 (13.95%) were having mild and severe clinical severity score among the children suffering with lower respiratory tract infection after nebulization therapy with hypertonic saline.

In this study, majority of the participants 21(48.84%) were having severe clinical severity score, only 1 (2.33%) were having mild clinical severity score and 17(29.53%) were having moderate clinical severity score among the children suffering with lower respiratory tract infection after nebulization therapy with salbutamol.

During assessment it is noted that the mean clinical severity score 1.4283 with hypertonic saline (3% Nacl) nebulization therapy was lesser than the mean clinical severity score 1.8469 with salbutamol nebulization therapy with the mean difference of was (0.4186). ANOVA calculated P value is less than 0.05, it is 0.000. So, we can strongly reject our H_0. This indicates that the hypertonic saline (3% Nacl) is effective to improve breathing pattern compare to salbutamol nebulization therapy.

There is a no significant association between selected demographic variables and breathing pattern of children suffering with lower respiratory tract infection after hypertonic saline (3% Nacl) and salbutamol nebulization therapy except symptoms at admission.

Conclusion

The research study concluded that hypertonic saline (3% Nacl) nebulization therapy is more effective compare to salbutamol nebulization therapy. The common side effects of salbutamol nebulization therapy are fine tremor, anxiety, headache, muscle cramps, dry mouth, and palpitation. Other symptoms may include tachycardia, arrhythmia, flushing of the skin, myocardial ischemia (rare), and disturbances of sleep and behaviour.

Ethical Clearence : The study was approved by the research committee, IEC – 10/05/2019- ARIP/IEC/19/19 and a formal written permission was gathered from the authority of.

Statement of Informed consent : Informed consent was obtained from the parents.

Funding: Nil

References

1. Catherine R and Manju Bala Dash. "Effectiveness of Salbutamol vs. Hypertonic Saline Nebulisation on Breathing Pattern among the Children with Lower Respiratory Tract Infection Admitted to the Selected Hospitals, Puducherry. 2011[cited on 23th April 2019]. EC Paediatrics 7.2: 58-63. Available form : https://www.ecronicon.com/ecpe/pdf/ECPE-07-00196.pdf
2. Syed Abid Asghar, Mrinal R. Srivastava, J. P. Srivastava, at, el. Prevalence of acute respiratory infections among children under five years of age attending rural health training centre of Era"s Lucknow Medical College and Hospital. 2017. [cited on 10th may 2018] . International Journal of Community Medicine and Public Health Vol 4;Issue10; Page 3752. Int.J. of Community available form: https://www.researchgate.net/publication/320001978_Prevalence_of_acute_respiratory_infections_among_children_under_five_years_of_age_attending_rural_health_training_ce ntre_of_Era's_Lucknow_Medical_College_and_Hospital
3. Pramod Kerkar, MD, FFARCSI Causes & Symptoms of Lower Respiratory Tract Infection. [cited on 10th may 2018]; Available form: https://www.epainassist.com/chest-pain/lungs/causes-and-symptoms-of-lower-respiratory-tract-infection
4. Kendig & Chernick's Disorders of the Respiratory Tract in Children (Eighth Edition), 2012.[cited on 9th may 2018];Available form: https://www.sciencedirect.com/topics/medicine-and-dentistry/lower-respiratory-tract-infection
5. E-bulletin.HCDCP. Guidelines for the management of adult lower respiratory tract infections (LRTIs). published on :January 23,2013.[cited on 11th may 2018]; available form: http://www2.keelpno.gr/blog/?p=3320&lang=en

Pattern and Convergence in Access to Individual Household Latrine Facility in Indian States and the Impact of Swachh Bharat Intervention

Prasant Kumar Panda[1], Pavithra. S[2], Anjali Elsa Skariah[3]

[1]Associate Professor and Head, [2]Integrated Master Scholar,Department of Economics, Central University of Tamil Nadu, Thiruvarur, [3]Research Assistant, ICSSR funded Research Project, Department of Economics, Central University of Tamil Nadu

Abstract

Backgorund: Access to improved sanitation facility for all is an essential to maintain good health and well-being. However in India, millions of people suffer from diseases and infections due to lack of adequate sanitation. Realising the importance of sanitation and hygiene, Government of India announced the flagship programme Swachh Bharat Mission (SBM) in 2014. One of the important features of SBM is to provide financial assistance to construct individual household latrine facility. It is important to understand the impact of SBM on pattern and access of households to latrine facility in Indian states.

Objective: This paper tries to examine the pattern and trends in access to individual household latrine facility from an inter-state perspective and convergence in access to latrine facility among the states after the implementation of SBM.

Methods: Data have been obtained from Census, reports from Ministry of Drinking Water and Sanitation, GOI and Swachh Bharat Mission Gramin website for the period 2011 to 2018. Sigma and beta convergence techniques have been employed to analyse the convergence in access to toilet facility and percent and ratios are employed to analyse the pattern.

Results: The findings of the study confirmed the positive impact of SBM in increasing the access to toilet facility in rural India and convergence in access to toilet facility among Indian states in post SBM implementation. During the period 2014-2018, ie, after implementation of SBM, the increase in sanitation coverage at national level is four times higher than the progress made during the decade of 2001 to 2011. Many of the States have reported 100 percent open defection free Villages in the year 2018. So Implementation of SBM not only improves the share of households having latrine facility, but it has widely reduced the gap between high and low income states in access to the sanitation facility.

***Key Words**: Rural sanitation, Swachh Bharat Mission, SBM, Access to Toilet facility, Convergence, Rural House hold Infrastructure, Impact of SBM.*

Introduction

Access to safe water, improved sanitation along with good hygiene is of paramount importance because of their implication on people's health and socio-economic development. Lack of access to improved sanitation is one of the main reasons for the existing disease burden in the form of diarrhoeal diseases, undernourishment, other infections and tropical diseases. The cost of poor sanitation is often measured in economic terms as the direct cost associated with the treatment of diseases related with poor sanitation, but loss of income , productivity and loss of work hours due

Corresponding author
Prasant Kumar Panda
Associate Professor and Head, Department of Economics, Central University of Tamil Nadu, Thiruvarur, Email: prasantkumar@cutn.ac.in

to distant and inadequate sanitation facility also have severe implications. Considerable improvement in all of these factors can reduce mortality rates, morbidity and improve quality of life of people, especially infants and children in developing countries. Hence, water and sanitation remain the fundamental requirement of human beings.

Open defecation is the main challenge for healthy hygiene and sanitation. One of the main reasons for open defection is lack of adequate and proper sanitation infrastructure like individual household toilet facility. Globally, 2.3 billion people lack basic sanitation facilities, 892 million practice open defecation; and nearly 80% of the people residing in rural India lack improved sanitation facilities [1]. Over the past few years, countries have made commendable progress in sanitation facilities but the benefits are not evenly spread. It is observed in several studies that, there exists inequality between rural- urban, rich- poor, educated-uneducated, and men-women [2-3]. Most developing countries, including India, have excessive pressure on infrastructure facilities that is required to meet the "healthy living needs" of growing population. The challenge to provide sanitation facilities to people in the rural areas, as well as, urban areas are aggravated by rapid urbanisation and dwindling social sector investments [4], with millions of people falling in short of basic facilities.

Despite the staggering figures, continuous efforts are being made by the Government of India (GOI) to effectively address the problem of sanitation and water. In 1980's, GOI introduced Central Rural Sanitation Programme (CRSP), with focus on rural sanitation. The survey on drinking water, sanitation and hygiene carried out by National Sample Survey Organisation in 1998 and a similar report by Central Bureau of Health Intelligence in 1998-99, revealed shocking disparities across people living in rural and urban areas. Total Sanitation campaign (TSC) was introduced in 1999 as a restructure to existing programme, i.e, CRSP, to curtail the widening gap and worsening situation of sanitation, water and hygiene in rural India. Later in 2012, TSC was renamed as Nirmal Bharat Abhiyan and subsequently, in 2014, it was relaunched as Swachh Bharat Mission. The mission is aimed to fulfil universal coverage and to bring about a change in perception and attitude towards use of latrines, thereby, translating into use of the facilities.

In Indian context in spite of many initiatives by the government, people lack basic facilities like toilet at home. This is the basic requirement and first step towards checking open defecation and improved sanitation, though change in behaviour in adopting the use of toilet is also important. Findings from different studies show that unavailability and lack of facilities are the reasons for open defecation in India.[5] Also, functioning toilets[6], electricity facility, proximity and in- house water connections [7] can affect the effective and persistent use of latrine among members of household. Therefore, creation of toilet facility is definitely the first step coupled with complementary facilities (like electricity, availability of water, proper drainage etc.) will reduce open defecation.

Studies pertaining to analysis of sanitation facilities are usually at household levels. In literature many studies have tried to identify the important determinants that affect sanitation facilities of households. A study conducted in Ghana revealed that, economically active people are more likely to afford the facility.[8] There is prevalence of deplorable sanitation conditions of labourers in textile firms.[9] A study highlights uneven progress of sanitation in India.[10] Studies acknowledge a positive relation with the sanitary facility and wealth. [8] It is suggested to increase share of health spending as per cent of state GDP in the states for better health indicators.[11] Similarly a study observes that health is not luxury in Indian context as income elasticity of public health expenditure is less than unit.[12]

Even with access to latrine facility open defecation is still rampant in different parts of the country.[2] It is observe from a study that latrine access doesn't not always result in use of the facility.[13] Poor governance and lack of appropriate spending and on other side traditional practices and cultural factors influence health outcomes in India.[14]

There have been very limited studies in regard to analysis of the pattern of sanitation coverage, and convergence at state level in India. Besides it is important to observe the influence of Swachh Bharat Mission on increasing pattern of access to sanitation and convergence across states. In this paper we have confined our analysis to access to individual household toilets in Indian states from a macro perspective. The main objectives of the paper are (i) to analyse the level of infrastructure facility like households having individual toilets from an interstate perspective; (ii) to examine the convergence or divergence in access to household toilet in Indian states and (iii) to verify the impact of

SBM on increasing access to household toilets and on convergence across states. Rest of the paper is structured with the following sections: data and methodology, empirical results and discussion and conclusion.

Data And Methodology

2.1 Data

The data pertaining to sanitation coverage have been obtained from Census 2001 and 2011. Sanitation coverage data for 2014-2018 have been obtained from Ministry of drinking water and sanitation, Government of India. The criteria used in Census for sanitation coverage is "Availability of latrine facility within household premises". The data for the same have been taken from Swachh Survekshan conducted by Ministry of Drinking Water and Sanitation (GOI) under SBM. As the nature and pattern of resource generating financial development activities are different for special category states (SCS) than the same in general category states (GCS), we have separately analysed SCS and GCS.

Our findings reported in this paper are observed on the basis of data provided by SBM through Swachh Sarvekshan. So findings are subject to the limitation of data reported in these Swachh Sarvekshan.

2.2 Methodology

The data has been analysed using percentage – ratio methods. Sigma and beta convergence tools have been employed to understand the convergence or divergence among states. For convergence, log linear trend growth rate of households having latrine has been computed by using the following regression equation:-

$$\ln(Y) = \alpha + \beta t + e$$

Where Y is the share of households having individual latrine;

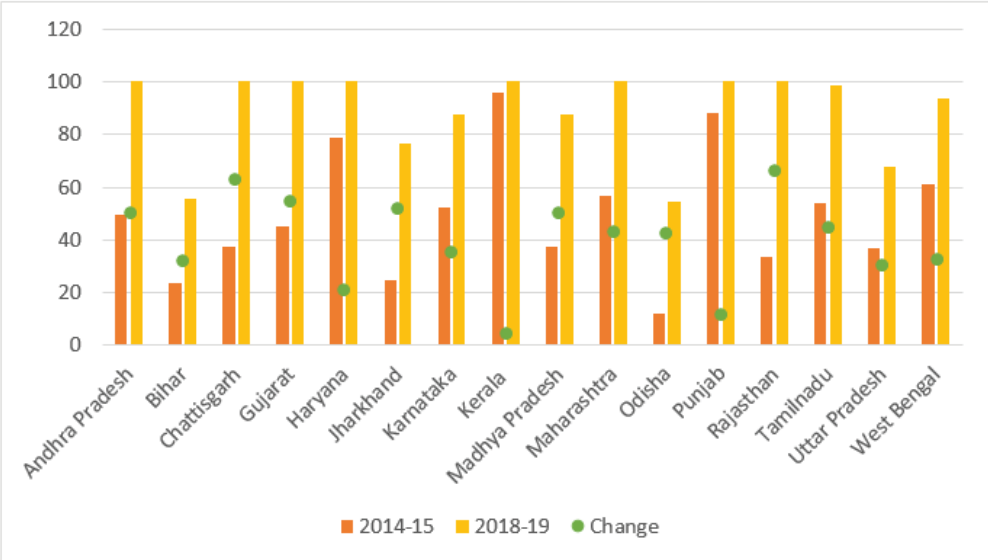
The estimated value of β is regressed on initial level of share of households having latrine facility to find the convergence.

Empirical Results And Discussion

This section provides findings of the study.

3.1 Patterns and trends of sanitation coverage

The figure -1 shows the change in sanitation coverage, i.e, share of households having latrines for 2014 and 2018 for the major states of India. Overall, there has been an improvement in the coverage for all major states over the span of four years. States like Andhra Pradesh, Chhattisgarh, Gujarat, Haryana, Kerala, Maharashtra, Punjab, Rajasthan, and Tamil Nadu, have reported 100 % coverage in 2018. Rajasthan, Gujarat, Andhra Pradesh and Chhattisgarh have shown significant progress with an increase in coverage of more than a half, while Bihar, Odisha and Uttar Pradesh are still lagging behind.



Source: Authors compilation from SBM data

Figure .1: Sanitation coverage for major states in India

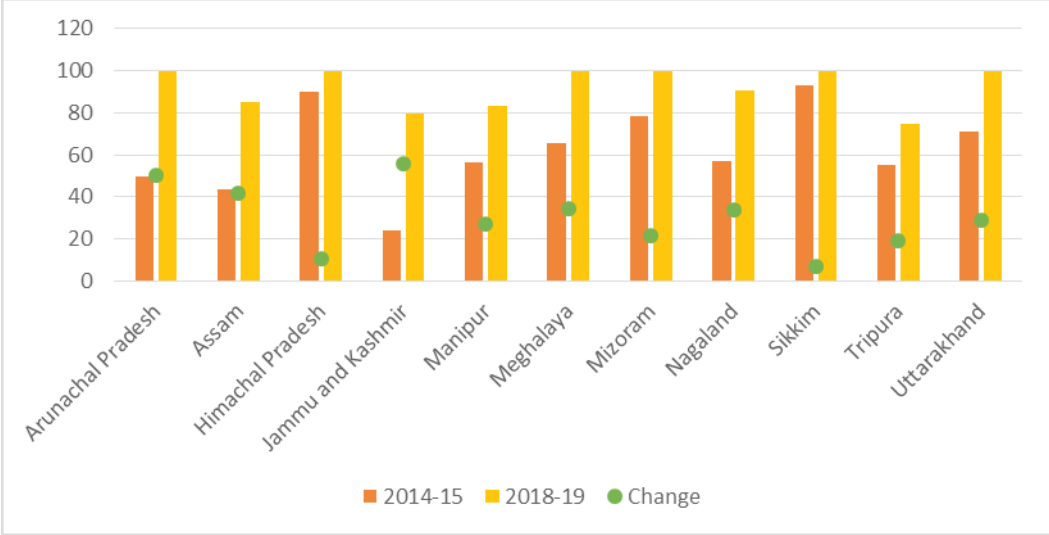


Figure 2: Sanitation coverage among the Special Category states in India

Source: Authors Compilation from SBM data.

The figure 2 shows the sanitation coverage among the special category states for 2014-15 and 2018-19. Six out of the 11 states have attained 100% sanitation coverage in 2018-19. A similar trend of improved sanitation coverage can be observed for the special category states. States of Jammu Kashmir, Assam, and Arunachal Pradesh have made marking difference in sanitation coverage. Tripura is the only state which is has coverage share less than 80% in 2018.

Table .1: Percentage Change in Sanitation Coverage

	2014	2018	% Change	2001	2011	% Change
India	42.56	83.71	41.15	36.40	46.90	10.50
Major States	49.71	88.82	39.11	35.43	47.05	11.63
Special category states	62.55	92.16	29.61	62.75	73.35	10.60

Source: Authors compilation from Census and SBM data

The table 1 shows the percentage of change in share of households having latrine facility in 2018 over 2014, and between 2001 and 2011. It is quite interesting to note the progress made in the past 4 years compared to past 10 years. During the period 2014-2018, the increase in sanitation coverage at national level is 4 times the progress made in previous decade. A striking similar trend can observed for major states and special category states. The whopping increase could be attributed to the implementation of Swachh Bharat Mission.

3.2 Convergence of sanitation facilities in Major States

Individual household latrine facility and its coverage are important for states irrespective of their income status. If the growth in the share in access to toilet facility among the deficient states can grow at faster rate than the states where majority of households have access to toilet, then convergence in access to toilet facility across Indian states will be achieved. So a larger intervention is required through policy for low income states or sanitation deficient states in order to improve

their sanitation facility to converge them with high income states. So it is important to analyse how SBM has helped in converging the access to toilet facility in Indian states.

The figure-3 shows the pattern of convergence or divergence of states in coverage of individual household latrine facilities. It has been observed that the in the initial years, there is divergence among states until 2014. But after 2014, there is steady decline in standard deviation of states of sanitation coverage across states, indicating convergence of major states. The figure 4 below also depicts a similar trend and establishes that the states converge with the high performance states in due course of time.

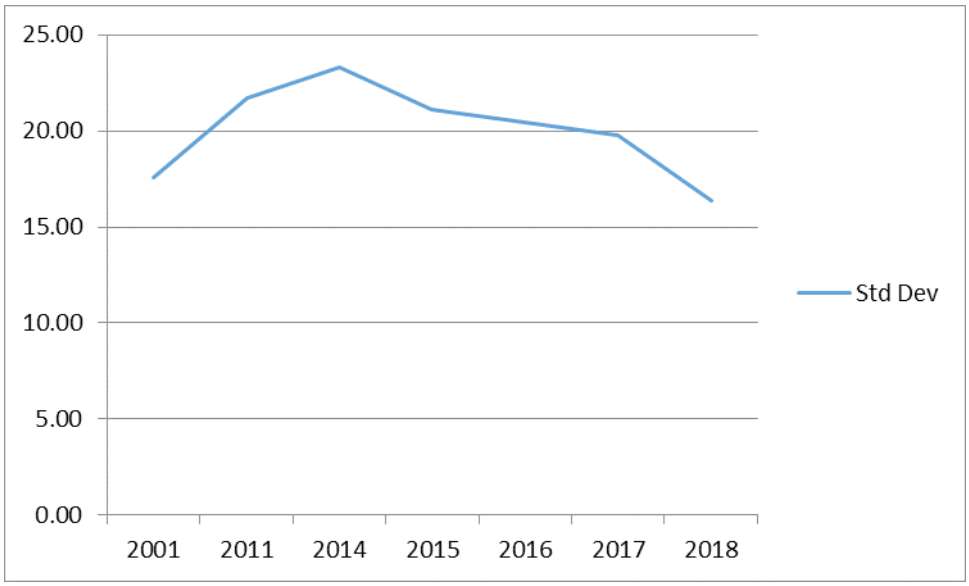


Figure 3: Pattern of convergence across states.

Source: Authors calculations based on Census and SBM data

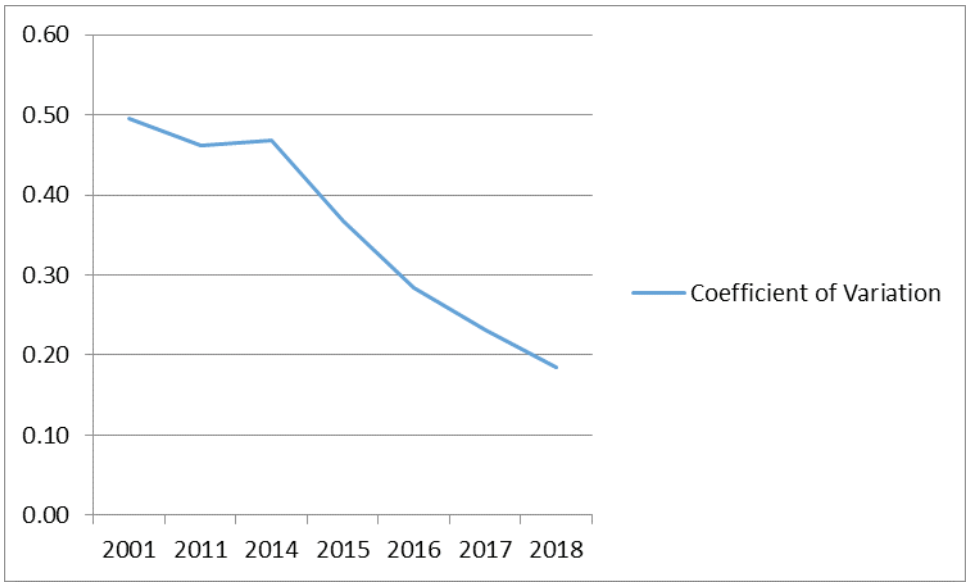


Figure 4: Coefficient of variation in Access to toilet facility among Indian states during 2001 to 2018

Source: Authors calculation based on data from Census and SBM

From the table-2, it's observed that the beta convergence coefficient is significant and negative for all three cases, i.e, major states, special states category and the all states taken together. Comparing years of implementation of SBM, i.e, 2014 to the current year 2018, there is convergence to access to individual household latrine facility. This suggests that the implementation of SBM not only help to improve percentage of people having toilets but it has widely reduced the gap between low and high income states. Low income states have constructed the toilets at a faster rate to achieve the convergence with the higher income states.

Table 2: β- Convergence coefficient for Indian States

	Major states	**Special category States**	**Combined**
b	-3.25**	-4.20*	-0.83*
	(-2.95)	(-4.79)	(-5.80)
constant	83.49	95.48	59.24
	(-6.7)	(12.33)	(10.02)
R2	0.42	0.72	0.59
F	8.71	22.95	33.63
	(0.01)	(0.00)	(0.00)
N	14	11	25

Note: ** indicates significant at 5% and * indicate significant at 1%.

Source: Authors calculations based on data from Census and SBM

Conclusion

The paper is an attempt to look into the pattern and trends of sanitation facilities at state level, to understand the convergence or divergence over the years after the implementation of SBM. Indeed, the country has made striding progress in the years after the implementation of SBM. Our findings also suggest that the poor performing states in terms of facilities, are catching up with the well-off states, as well as, this progress is taking place at a faster pace. There is convergence in access to individual household latrine facility across India states after implementation of SBM. So implementation of SBM helps in improving the share of households having toilet facility in Indian states and it also widely reduces the gap in the same between high and low income sates.

Acknowledgement: The paper is developed as a background work to the ongoing ICSSR funded project in rural sanitation in the Department of Economics, CUTN. Funding Assistance of ICSSR is highly acknowledged. However for error or omissions, if any remains, authors are solely responsible for the same.

Ethical Clearance- Not applicable

Source of Funding- ICSSR under its Research Programme.

Conflict of Interest -NIL

References

1. World Bank. Sanitation Overview, [Internet]. NW Washington: World Bank, 2018. Available from https://www.worldbank.org/en/topic/sanitation,

2. World Health Organization, UNICEF.. Progress on sanitation and drinking-water.[Internet]. World Health Organization; 2013.Available from https://books.google.co.in/books?hl=en&lr=&id=zrEXDAAAQBAJ&oi= fnd&pg=PP1&dq=2.%09World+Health+ Organization,+%26+UNICEF.+(2014).+ Progress+on+ sanitation+and+drinking+water:+ 2014+update.+ World+Health+Organization.&ots=8Cb3okS-3q&sig=cquss YGI26Ty8m3t-jESQ6Mn_qQ#v=onepage&q&f=false
3. Mulenga JN, Bwalya BB, Kaliba-Chishimba K. Determinants and inequalities in access to improved water sources and sanitation among the Zambian households. Int. J. Dev. Sustain. 2017;6(8):746-62.
4. Ayee, J., Crook, R.. Toilet wars": urban sanitation servicesandthepoliticsofpublic-privatepartnerships in Ghana. IDS working paper 213[Internet]. Brighton: Institute of development studies; 2003. Available from, https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/4008/Wp213.pdf?sequence=1&isAllowed=y
5. Spears D. Height and cognitive achievement among Indian children. Economics & Human Biology. 2012 Mar 1;10(2):210-9.
6. Hajra G, Dutta A. The gap between construction and usage of toilets: An under-identified problem. Arthaniti-Journal of Economic Theory and Practice. 2017 Jun;16(1-2):1-26.
7. Banerjee AN, Banik N, Dalmia A. Demand for household sanitation in India using NFHS-3 data. Empirical Economics. 2017 Aug 1;53(1):307-27.
8. Akpakli DE, Manyeh AK, Akpakli JK, Kukula V, Gyapong M. Determinants of access to improved sanitation facilities in rural districts of southern Ghana: evidence from Dodowa Health and Demographic Surveillance Site. BMC research notes. 2018 Dec;11(1):473.
9. Panda PK, Komalavalli P. Health, Social Security and Earnings of Labourers in Informal Sector: Primary Data Evidence from Textile Firms of Tirupur, Tamil Nadu. InHealth, Safety and Well-Being of Workers in the Informal Sector in India 2019 (pp. 13-21). Springer, Singapore.
10. Ghosh A, Cairncross S. The uneven progress of sanitation in India. Journal of Water, Sanitation and Hygiene for Development. 2013 Dec 12;4(1):15-22.
11. Lakshmi TS, Panda PK, Rout HS. An Analysis of Pattern and Determinants of Public Expenditure on Health in Andhra Pradesh, India. IUP Journal of Public Finance. 2012 Feb 1; 10(1): 22-35
12. Panda PK, Panda AD. Determinants of state level financing of health: Panel data evidence from Southern Indian states. The Empirical Econometrics and Quantitative Economics Letters. 2013 Jun;1(2):41-52.
13. Sinha A, Nagel CL, Schmidt WP, Torondel B, Boisson S, Routray P, Clasen TF. Assessing patterns and determinants of latrine use in rural settings: a longitudinal study in Odisha, India. International journal of hygiene and environmental health. 2017 Jul 1;220(5):906-15.
14. Rout HS, Panda PK, editors. Health Economics in India. New Delhi; New Century Publications; 2007.

Awareness about Role of Physiotherapy Management During Labour among Obstetricians and Gynacologists

Pratik Goyekar[1], Ruchita Shah[2]

[1]Final Year Physiotherapy, [2]Assistant Professor, Department of Community Health Sciences, Faculty of Physiotherapy, Krishna College of Physiotherapy, Krishna institute of Medical Sciences, Karad

Abstract

Background- Pregnancy is the period where a woman goes through many physiological changes, this changes are physical and also emotional. To make this phase comfortable during pregnancy and at labour is important concern. Various measures are available for this purpose one of this is physiotherapy. Breathing Exercises, relaxation, swiss ball etc. This study is conducted to find if this is been practised and till what extend and find the awareness about role of physiotherapy management during labour pain among obstetricians and gynaecologists. This will also help us to overcome the problems**. Objectives**- To assess the knowledge of obstetricians about physiotherapy management in labour pain. To determine the awareness about role of physiotherapy in managing labour among obstetricians and gynaecologists**. Method**- total 144 obstetricians and gynaecologist was taken in this study, they were explained about the purpose of the study. Each of them was given a self-made questionnaire. Data was recorded. Later statistical analysis was done in accordance to awareness about physiotherapy management during labour**. Result**- The present study showed that the awareness among obstetricians in less regarding role of physiotherapy in managing labour due to lack of knowledge and also due to unavailability of a qualified physiotherapist in that particular area. **Conclusion**- On the basis of result it can be concluded that there is need for better interaction and communication between physiotherapist and obstetricians and gynaecologists, which can done through journals, seminars, UG/PG curriculum, social media, workshops.

Key Words- *Physiotherapy, labour, awareness, obstetricians, gynaecologist.*

Introduction

Apart from allopathy, India is blessed with different indigenous system of medicine. Where each system aims at encouraging good health; out of it Physiotherapy is one.

Physiotherapy offers service that maintain, repair, and expands people's maximum functional ability. It can be beneficial to people at any stage of life.

Correspondance author:
Mr. Pratik Goyekar
Final year Physiotherapy, Krishna College of Physiotherapy, Krishna Institute of Medical Sciences, Karad, Maharashtra, India, 415110.
Contact number: 9421279564
Email id: hatkarpratik@gmail.com

Pregnancy is a period when a women undergoes many physical and psychological changes in the body. These all changes are normal and because of growing foetus mainly changes are noticed in abdominal and thoracic regions. (1)

Labour: Labour is defined as series of events that take place in the genital organs in an efforts to expel the viable product of conception (foetus, placenta and membranes) out of the womb through the vagina into the outer world. (2)

There are 3 stages of labour:-

· **First Stage-** It begins with the onset of contractions and ends when the cervix is fully dilated.

Duration: In Primigravida = 8-12hrs.

In Multigravida = 6-8hrs

· **Second Stage-** It begins after the cervix has fully dilated and baby's head has moved down in to the birth canal. It ends when the baby is born.

Duration: In Primigravida = 1-2hrs

In Multigravida = ½ hrs

· **Third Stage-** It involves the expulsion of the placenta from the body.

Duration: Up to 30 minutes, however the average length of the third stage of labour is 10 minutes. (2)

The control of labour pain and prevention of suffering are major concerns of clinician and pregnant lady. So management of labour pain is the most important goals of maternity care. (3) This management includes pharmacological as well as non-pharmacological approach. In non-pharmacological ways "PHYSIOTHERAPY TREATMENT" is one of them.

Obstetric physiotherapy is subspecialty in physical therapy which deals with the promotion of health throughout the child bearing phase. Utilization of physical therapy depends upon knowledge of obstetrician and their attitude towards physiotherapy. (1)

Early bird classes are conducted for reducing the discomfort during child bearing phase. This antenatal classes are conducted by the team consisting of obstetricians, gynaecologists and physiotherapists.

In this classes women's are encouraged to bring their partners or some other person of their choice.

In early bird classes physiotherapist helps patient with following things:-

Pregnancy back care

Pelvic floor and pelvic tilting exercises

Exercises for circulation and cramps

Fatigue

Effects of stress on body and mind

Emotional reactions

Advice of lifestyle

At the end of 'Early bird classes', the mothers have sufficient knowledge about relaxation techniques, ergonomically correct positions etc. which will help her for preparation of labour without discomfort. (4)

Role of physiotherapy in obstetric conditions like pregnancy, labour, puerperium, pre-operative period is important. (5) Postural re-education, strengthening of pelvic floor muscles helps during pregnancy. While TENS (Trans cutaneous nerve stimulation), positioning, relaxation techniques, heat and cold, ball exercise, massage and breathing techniques help during labour pain.

For the management of the labour there are several techniques and approaches are used by physiotherapists according to the stage of labour.

Physiotherapy management includes:-

1. TENS (Trans cutaneous nerve stimulations)
2. Positioning
3. Massage
4. Relaxation techniques
5. Breathing techniques
6. Hot water bath
7. Swiss ball exercises. (3)

Generally in first stage we start with breathing exercises which help to maintain ventilation and helps mother to push. TENS is used for back pain management, then patient is made to sit, stand or lying in different positions for pain relief. Relaxation techniques are given to relax mother and prevent fatigue. Massage can also be given for relaxation. Hot water bath is given for relaxing the pelvic floor muscles. Swiss ball exercises are also included in first stage of labour.

In second stage of labour relaxation techniques are given along with breathing exercises to keep mother calm and relaxed which also helps in easy vaginal delivery.

In third stage breathing exercises are given. (6)

Child bearing is the most important and crucial time for any women; physiotherapy helps for the betterment of the mothers health. As there are various methods for managing the labour pain, so the present study intended to find the awareness about the management by physiotherapy for labour pain among Obstetrician and gynaecologists.

Material and Methodology

This study was to find the awareness about role of physiotherapy management during labour among obstetricians and gynaecologists. The study was carried out in Dhule district. An approval for the study was obtained from the protocol committee and ethical committee of KIMSDU. Individual were approach and those fulfilling the inclusive criteria were selected. The purpose was explained and written inform consent was taken prepared in accordance with the Helsinki Declaration from those who are willingly to participate. The total 144 participants were taken from different hospitals in and around Dhule. The Inclusion criteria was Obstetrician and gynaecologists male and female, Rural and sub-urban practitioners, New and old practitioners, Government and Private doctors of Dhule. The Exclusion criteria was Obstetrician and gynaecologist residents and Metro city practitioners. Demographic information of the subjects was taken. The individuals were explained about the purpose of the study. Each of them was given a self-made questionnaire. Data was recorded. Later statistical analysis was done in accordance to awareness about physiotherapy management during labour.

Statistical Analysis

Statistical analysis of the recorded data was done by using the software SPSS version 20. The p value is less than 0.001 which is significant.

Result

The present study showed that the awareness among OBG in less regarding role of physiotherapy in managing labour due to lack of knowledge and also due to unavailability of a qualified physiotherapist in that particular area.

Table No 1- Gender Distribution:

Gender	No. of Participants	Percentage %
Male	64	47
Female	71	53
Total	135	100

INTERPRETATION- The table shows the gender wise distribution of the participants of this survey; there are 47% of males and 53% of females participated in the study.

Table No 2- Distribution of Question Wise Percentage of Awareness:

QUESTIONS	ANSWERS				
ARE YOU AWARE THAT PHYSIOTHERAPY CARE IS REQUIRED DURING LABOUR?	YES (68%)	NO (32%)			
WHAT DIFFERENT TREATMENT OPTIONS OF LABOUR MANAGEMENT FROM PHYSIOTHERAPY YOU AWARE OF?	relaxation techniques (10%)	Breathing exercises (8%)	Kegel's exercises (10%)	Yoga (10%)	Don't know (62%)
DO YOU REFER OR CONSULT PHYSIOTHERAPIST DURING LABOUR PAIN MANAGEMENT?	Yes (33%)	No (67%)			
DID YOU EVER CONDUCTED EARLY BIRD CLASSES WITH THE HELP OF PHYSIOTHERAPIST FOR ANC PATIENTS?	Yes (13%)	No (87%)			

Cont... **Table No 2- Distribution of Question Wise Percentage of Awareness**:

ACCORDING TO YOU WHY ANC PATIENTS ARE NOT REFERRED TO PHYSIOTHERAPISTS?	Lack of Knowledge/ Poor Awareness /Don't Know (79%)	Unavilability Of physiotherapist (10%)	Lack of Councilling of Patients (5%)	Don't find it Necessary (1%)	Ignorance (5%)
WHAT IS YOUR FEEDBACK FOR PHYSIOTHERAPY SERVICES PROVIDED IN LABOUR PAIN?	Positive Feedback (50%)	Negative Feedback (8%)	Lack of Awareness (12%)	Lack of Availability (5%)	Don't Know (25%)

Interpretation:

The table shows the question wise responses of the participants.

When we ask them if they are aware that physiotherapy care is required during labour 68% Obstetrician and gynaecologist are aware about physiotherapy care is required during labour and 32% says that they are not aware about this practice.

From this participants 67% participants don't know about any treatment options of labour management from physiotherapy remaining 10% knows about relaxation techniques, 10% yoga, 10% Kegels exercises and 8% knows about the breathing exercises.

33% of participants says they refer or consult physiotherapist during labour pain management and 67% participants says they don't refer/consult physiotherapist during labour pain management.

13% participants conducted early bird classes with physiotherapist for ANC patients and 87% never done this for there ANC patients.

When we try to find out the exact reason for not referring ANC patients to physiotherapist we found lack of knowledge/poor awareness is the one of the most important reason for this 79% participants finds this option correct, 10% says unavailability of OBG specialised physiotherapist is the reason, 5% participants find lack of counselling of patient is the correct option and remaining 1% says they don't find physiotherapy necessary during ANC period.

When they share their feedback for physiotherapy services provided in labour pain then 50% participants says positive things, 8% says negative things, 12% says there is need to make patients and doctors aware about physiotherapy during labour management, 5% says unavailability of OBG specialised physiotherapist is the reason and 25% don't know about it.

Discussion

The study was conducted with the primary aim to find awareness about role of physiotherapy management during labour among obstetricians and gynaecologists. Many doctors were approached but only 135 responded and were willing to participate in this study. From that 135 people there are 64 males and 71 females which is 47% of male and 53% females.

In this study maximum doctors were between the age group of 36-45 years, that is 49 which means 36% of all the participants. There were 42 doctors between the age of 46-55 years which makes 31% of all the participants. 38 young doctors participated in this study they were between the age group of 25-35 years which makes 28%. Senior most doctors also participated in this study but the made only 5% of all the participants they were 6 doctors from age group of 56-65 years.

Differentiation by the practice in field like government and private practitioners there were 44% of government practitioners and 56% are private practitioners also in this study.

From this 135 doctor 112 doctor said they had physiotherapist nearby them and 23 of them said there was no physiotherapist nearby them.

81% of participants were aware about post-graduation courses in physiotherapy reimaging 19% says they are not aware about the post-graduation courses.

Doctors who are aware about physiotherapy care during labour are 68% and 32% were not aware about it.

34% of doctors says they came to know about physiotherapy role in management of labour during their under graduation degree and 16% says they came to know about it in post-graduation degree. Were seminars and journals makes awareness in 36% of doctors and remaining 14% says they come to know about it from internet, social media, colleagues, physiotherapists and by experience. In this study 60 participants from government sector and out of them 39 means 65% practitioners are aware about the physiotherapy role during labour pain management and reaming 21 means 35% practitioners are not aware of physiotherapy role during managing labour pain. There are 75 practitioners are from private sector and out of 75 53 are aware about the physiotherapy role during labour pain management and remaining 22 participants means 29% are not aware about the physiotherapy role during labour pain management. In this study out of 135 participants 38 were know at least one exercise for labour pain management which means 97 participants were less aware about physiotherapy during labour pain management. Which makes 38% participants are aware about at least single exercise in labour pain management reaming 62% participants don't know about it. This study shows that there are 33% participants which refer or consult physiotherapist during labour pain management and 67% participants are not aware about it or they are not working with physiotherapists. 45 participants says that they were working with physiotherapist for labour pain management from that 45 participants 43 says they are satisfied with the post physiotherapy outcomes of labour pain management were 2 people says they are not satisfied with the outcomes which means 96% are satisfied with outcomes and 4% are not satisfied with it. From this 135 participants 121 participants which makes it 90% of study population says they will now suggest physiotherapy for labour management to their colleagues and patients remaining 14 participants 10% of study population says they don't want to suggest physiotherapy to colleagues and patients. Which shows that maximum participants are welcoming the physiotherapy services for the betterment of the patient and they want it to help them during labour pain management. Which means they are willing to promote and utilize physiotherapy for better results.

In this study we ask them to tell us about why they are not referring ANC patients to the physiotherapists and all of them responded. They share their valuable opinions. Maximum participants which means 79% of them says it's because of lack of knowledge and poor awareness; 10% of them says that there is unavailability of the OBG specialised physiotherapist. 5% of them says there is lack of counselling to the patient is a reason; were 5% says ignorance towards the non-pharmacological approach. 1% participants don't find it necessary for their patients. During this study lots of suggestions are taken from them. Most of participants are willing to improve their services by utilizing physiotherapy and make it better for their patients. They also says there is lack of knowledge about it in their filed and lack of awareness about physiotherapy during management of labour pain. As previous literature also says that there is lack of awareness about the OBG physiotherapy in comparison to Musculoskeletal physiotherapy, Neuro physiotherapy, Cardio respiratory and sports physiotherapy.

Conclusion

This study also shows that maximum participants are come to know about physiotherapy management during labour pain from journals and seminars so it may be the best and easy way to communicate with them and make them aware about this. As well as we can aware them during their UG/PG degree curriculum. There is need for better interaction and communication between physiotherapist and obstetricians and gynaecologists, which can done through journals, seminars, UG/PG curriculum, social media, workshops. Which needs to be done properly.

Conflict of Interest: The authors declare that there are no conflicts of interest concerning the content of present study.

Source of Funding: Self-Funded

Ethical Clearance: Taken

References

1. Aqsa Tahir, Umer Maqsood, Hafiz sheraz Arshad : Awareness of obstetricians and gynaecologist regarding role of physical therapy in managing obstetric and gynaecological patients in private and government hospital. J .Soc. Obstet. Gynaecol. Pak. 2017;7(3).
2. Priti Agni, Sneha Battin:- Awareness of physiotherapy among general practitioners: A Pilot

study. Int. journal of physiotherapy 2017;4(4):253-261.

3. Nse A Oduniya, Temitayo llesanmi, Adeniran O Fawole, Oluwafemi O Oguntibeju:- Attitude and practices of obstetricians and gynaecologists towards involvement of physiotherapists in management of obstetric and gynaecologic conditions 2013;5:109-114.
4. Barlow B, Colgan A, Cox J. The work of the obstetric physiotherapist. Physiotherapy 1978;64(8):229-30.
5. Journal of midwifery and women's health update on Non pharmacologic approaches to relieve labour pain and prevent suffering.

J Midwifery Womens Health. 2004 Nov-Dec;49(6):489-504.

6. Margaret Polden and Jill Mantle editor. physiotherapy in obstetrics and gynaecology, 2nd ed. New delhi. The Elsevier publishers,1990.

Study of Awareness of Ergonomic Principles in Small Scale Industrial Workers

Pratik Patil[1], Radhika Chintamani[2]

[1]Final Year Student, [2]Assistant Professor of Department of Musculoskeletal Sciences, Faculty of Physiotherapy, KIMS " Deemed To Be University" Karad, Maharashtra, India

Abstract

Background : Industrial workers due to their long working hours which exposes them to various musculoskeletal and cardiopulmonary disorders. Long working hours and lack of proper health related guidelines to be followed during work they often overuse themselves which hampers their body mechanics and quality of life. studies have proved that ergonomic advice for low back pain and neck pain have improved satisfactorily the work capacity of the individuals. As far as authors knowledge, there is paucity in the literature targeting the awareness of ergonomic advice for industrial workers in rural areas, hence this study is been undertaken.

Objectives : To identify ergonomic awareness of musculoskeletal disorders in small scale industrial workers and To identify ergonomic awareness towards respiratory disorders during work in small scale industrial workers.

Results : 42% of people are aware about the necessary workplace health and safety training when starting job and there is a regular communication between employees and management about safety issue, 50% people are clear about their rights and responsibilities in relation to workplace health and safety and 47% people fell free to voice their concerns or make suggestions about workplace health and safety

Conclusion : After carrying out a study of awareness of ergonomic principles in small scale industrial workers, we found out that industrial workers in small scale industries in india lack awareness about the occupational hazards and various safety regulations that are enacted in the betterment of employees.

***Key words** : Awareness, Ergonomics, Industry, Workers*

Introduction

The 'ergon' means work and 'nomos' means law. [1] Ergonomics means right person at right place for maximum output of person. Ergonomics, a relatively new science, looks at the application of physiological, psychological and engineering principles to interactions between people and machines. Ergonomics attempts to define working conditions that enhance individual health, safety, comfort and productivity. This can be done by recognizing three things: the physiological, anatomical and psychological capabilities and limitations of people, the tools they use and the environments in which they function.

Ergonomics has gained attention and take into consideration by the workers in the different fields of works recently. It has given a huge impact on the workers comfort which directly affects the work efficiency and productivity. The workers have claimed to suffer from the painful postures and injuries in their workplace.

Corresponding Author:
Pratik Patil
Final year student, Faculty of physiotherapy, KIMS "Deemed To Be University, Karad, Maharashtra, India.
Pin 415110. Phone number – 8888585847
Email id: pratikpatildr@gmail.com

Methodology

An approval for the study was obtained from the Protocol committee and the Institutional Ethical

Committee of KIMSDU. An observational study was conducted for a duration of 6 months at Physiotherapy department of Krishna college of Physiotherapy**. Individuals were approached and those fulfilling the inclusive criteria were selected.**

Sample size – 100

Statistical analysis -: Data will be analyzed using SPSS version 20 computer software.

Duration of study -: 6 month

Type of study -: Observational study

Place of study -: in and around Karad

Study design -: analytical

Study population -: laborers in Industries

- Sample size – n = 100

$n = 4.pq/L^2$

- Study duration – 6 months

Results

Table no. – 1: Gender Wise Distribution in the Study

FEMALE	32
MALE	68

Interpretation : 32 female and 68 male participated in the study.

Distribution of awareness of ergonomic principles in small scale industrial workers

Table no. - 2 : Occupational Health and Safety awareness

Question Occupational Health and Safety awareness	Strongly Agree	Agree	Disagree	Strongly Disagree	DK/NA
I am clear about my rights and responsibilities in relation to workplace health and safety	10	50	30	5	5
I am clear about my employers' rights and responsibilities in relation to workplace health and safety	0	55	40	5	0
I know how to perform my job in a safe manner	14	66	20	0	0
If I became aware of a health or safety hazard at my workplace, I know who (at my workplace) I would report it to	10	55	20	10	5
I have the knowledge to assist in responding to any health and safety concerns at my workplace	0	60	30	0	10
I know what the necessary precautions are that I should take while doing my job	15	41	19	0	25

Table no. - 3 : Participation in occupational health and safety

Question Participation in occupational health and safety	Strongly Agree	Agree	Disagree	Strongly Disagree	DK/NA
I feel free to voice concerns or make suggestions about workplace health and safety at my job	15	55	30	0	0
If I notice a workplace hazard, I would point it out to management	10	50	40	0	0
I know that I can stop work if I think something is unsafe and management will not give me a hard time	10	50	35	0	5
If my work environment was unsafe I would not say anything, and hope that the situation eventually improves (reverse scored)	10	56	24	5	5
I have enough time to complete my work tasks safely	10	49	31	0	5

Disscussion

Occupational health is essentially preventive medicine. Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in occupations. Preventive medicine and occupational health have same aim. Occupational health, therefore, is the application of preventive medicine in all phases of employment.

In the past it was customary to think of occupational health entirely in relation to factories and mines hence the term 'industrial health' or 'industrial hygiene' were in vogue. Modern concept of occupational health now embrace all types of employment including small scale industries and includes the subjects of industrial hygiene, industrial disease, industrial accidents, toxicology in relation to industrial hazards, industrial rehabilitation and occupational psychology. Occupational environment is the sum of external conditions and influences which prevail at the place of work and which have a bearing on the health of the working population.[1]

Ergonomics is now a well recognized discipline and constitutes an integral part of any advanced occupational health service. It simply means 'fitting the job to the worker'. The objective of ergonomics is 'to achieve the best mutual adjustment of man and his work, for the improvement of human efficiency and well being'. The application of ergonomics had made a significant contribution to reducing industrial accidents and to the overall health and efficiency of the workers.

42% of people are aware about the necessary workplace health and safety training when starting job and there is a regular communication between employees and management about safety issue. Workplace health and safety is considered as importantas production and quality. Also there is an active and effective health and safety committee which communicates about workplace healthand safety procedures.[1]

50% people are clear about their rights and responsibilities in relation to workplace health and safety. They know how to perform their job in a safe manner and are also aware of health or safety hazards at their workplace. They are also enlightening how to

assist in responding to any health and safety concerns at their workplace. They also have initial brefining about necessary precautions that need to be taken while doing their job.[2]

47% people feel free to voice their concerns or make suggestions about workplace health and safety. They would point a workplace hazard to the management if they notice any. They feel free to stop work if they feel something is unsafe.

Conlusion

After carrying out a study of awareness of ergonomic principles in small scale industrial workers, we found out that industrial workers in small scale industries in India lack awareness about the occupational hazards and various safety regulations that are enacted in the betterment of employees.

Conflict of Interest: Do not have any conflicts ofinterest to declare.

Ethical Clearance: Ethical clearance granted from the ethical committee of Krishna Institute Of Medical Sciences Deemed to beUniversity(KIMSDU), Karad.

Source of Funding: This study is funded byKrishna Institute Of Medical Sciences Deemed to be University (KIMSDU), Karad.

References

1. Deros BM, Daruis DD, Basir IM. A study on ergonomic awareness among workers performing manual material handling activities. Procedia-Social and Behavioral Sciences. 2015 Jul 3;195:1666-73.
2. Cagnie B, Danneels L, Van Tiggelen D, De Loose V, Cambier D. Individual and work related risk factors for neck pain among office workers: a cross sectional study. European Spine Journal. 2007 May 1;16(5):679-86.
3. Noonari AA, Mahar RB, Sahito AR. Assessment of air pollution and its effects on health of workers of steel Re-Rolling mills in Hyderabad. Mehran University Research Journal of Engineering & Technology. 2016 Apr;35(2):293.
4. Olabode SO, Adesanya AR, Bakare AA. Ergonomics Awareness and Employee Performance: An Exploratory Study. Economic and Environmental Studies. 2017;17(44):813-29.
5. Fazi HM, Mohamed NM, Ab Rashid MF, Rose AN. Ergonomics study for workers at food production industry. InMATEC Web of Conferences 2017 (Vol. 90, p. 01003). EDP Sciences.
6. Deros BM, Daruis DD, Basir IM. A study on ergonomic awareness among workers performing manual material handling activities. Procedia-Social and Behavioral Sciences. 2015 Jul 3;195:1666-73.
7. Mustafa SA, Kamaruddin S, Othman Z, Mokhtar M. Ergonomics awareness and identifying frequently used ergonomics programs in manufacturing industries using quality function deployment. American journal of scientific research. 2009;3:51-66.

Effectiveness of ANATOMY QUIZ for Improvement of Academic Performance in First MBBS Students

Priya P. Roy[1], Swapna A Shedge[2], M.A.Doshi[3]

[1]Associate Prof, [2]Assist. Professor, [3]Professor & HOD, Department of Anatomy, KIMS, Karad, Maharashtra

Abstract

Teaching and learning are the two important components of education.Quiz as an additional method of teaching will definitely improve the knowledge about the subject. It will serve as a method of self directed learning which is added in new curriculum. It will make the subject interesting and adds to critical thinking by the students. The present study was undertaken to observe the effectiveness of anatomy quiz for improvement of academic performance in first MBBS students. A total of 400 willing male and female first MBBS students of 2016-17 and2017-18 batchesatKrishna Institute of Medical sciences, Karad were included in the study. Three quizzes are taken in one academic session. Questions areof MCQ with negative marking,one line answers and two marks questions and image based questions, At the end feedback of students was also taken.Results of quizzes were correlated with the final university results. It was seen that results were improved compare to previous year . 80 % of the students selected in quiz scored distinction marks in university exam.The study results support the importance of quiz in the medical education. Most of the students recommended in feedback that the anatomy quiz should be held routinely in coming years

Key words: *Quiz, MCQ, Academic performance, Medical students, Medical education*

Introduction

The medical council of India published the policies andstrategies of medical education every year with the objectiveto improve quality and standards of medical educationand training. It is also to make an Indian graduate medicaldoctor skilled to maintain the standards in graduationcomplied according to strategies mentioned in vision 2015.[1]Teaching and learning are the two important componentsof education. So, there were considerable changes in theeducation system at the medical workplace because ofstrong correlation between the methods used in deliveringthe information by the lecturers and the assimilation of thatknowledge by the students. So we can change the way forteaching and learning the process in a better way to bothhow and what is taught. "Deep learning"[2]requires higherorder cognitive skills such as analysis and synthesis, while"surface learning" consists primarily of comprehension andreproducing knowledge." This requires the acquisition offour main domains of competencies defined by the MedicalCouncil[3] as: (1) Knowledge, skills, and performance;(2) safety and quality; (3) communication, partnership, andteamwork; and (4) maintaining trust.

The MCI Vision 2015 states that lectures are not adequateas a method of teaching and training also a poor methodof transferring or acquiring information.[4]The lectureshave less impact at skill development and attitudes andcompetence-based education, and we encountered largeclasses, for example, 120 approximate per class. So, there isneed of innovation in the form of active learning opposeto passive learning.[5]The didactic lectures have certain drawbacks such as lossof interest or limited attention span, less retention ofsubject, passive learning. There is lack of development ofany logical or analytical skills because the students are onlylistening and not actively participating during lecture. Thereis no active interaction or feedback from the students.[6,7]The purpose of interactive teaching methods aregeneration of interest in the subject and acquirementof more knowledge in general, active and participatorylearning, development of life-long learning habits andattitudes, acquire, retain and apply the knowledge, activeinvolvement of students, thorough understanding of thesubject, use of internet and other options at disposal forbetter understanding of matter, promote group learning,heightened motivation, and enthusiasm.[8] Active listeningof opinions of others and asking questions.

In the medical professional course, Anatomy is one of the basic sciences of medical school. Anatomical knowledge is traditionally tested by means of summative examination, providing information for pass/fail decisions.[9]A quiz is a form of game or mind sport, in which the players (as individuals or in teams) attempt to answer questions correctly. In some countries, a quiz is also a rief assessment used in education and similar fields to measure growth in knowledge, abilities, and/or skills. The results of a well designed quiz often provide valuable insight on how effectively the course material is being presented based on previous university question paper. In addition to keep finger on the pulse about students' learning progress, quiz results help you assess your own teaching accomplishments as well. Earlier studies by Leonieke N. Palmen et al., reported that Participation of students in formative quizzes in an anatomy course is correlated to the scores on the final summative exam. [10]Hence the present study was conducted To observe the effectiveness of anatomy quiz for improvement of academic performance in first MBBS students.

Materials and Method

Study Participants: A total of 400 willing male and female first MBBS students of 2016-17 and 2017-18 batches were included in the study after obtaining voluntary informed consent.

Study setting: The present study was conducted at Krishna Institute of Medical sciences, Karad, Maharashtra.

Method: After completion of each region for the academic years, students were trained regarding quiz and three quiz was conducted for students. Each quiz comprises of MCQ questions with negative markings , one line answers and two mark questions. Maximum marks was 50. Quiz questions were prepared by senior faculty in the department under the supervision of HOD. Quiz questions were projected by using LCD and each student was provided answer sheet to fill the answers for projected questions. At the end of the quiz answer sheets were collected for evaluation. At the end of third quiz feedback was taken from the students by using a questionnaire. Participants were requested to give their opinion about the 10 statements pertaining to the Quiz which were conducted in the department of Anatomy. Each statement should be ranked on five point scale

Data analysis: The data was collected using standard proforma. The data was entered using Microsoft Excel spreadsheets. The collected data was presented in the form of tables and graphs for frequerncy analysis and it was further analyzed by SPSS 20.0. The overall performance between the students who performed well in anatomy quiz and those who did not performed well in quiz were compared with the help of Chi-square test. P-value less than 0.05 was considered to be significant.

Results

The present study was conducted among first year medical students of KIMS Karad among students of 2016-17 and 2017-18 batches. The students were evaluated using quiz method in the present study and the results were compared with their final university examination marks. Quiz questions were projected by using LCD and each student was provided answer sheet to fill the answers for projected questions. At the end of the quiz answer sheets were collected for evaluation. At the end of third quiz feedback was taken from the students by using a questionnaire.

In this study, various responses regarding importance of quiz in academic curriculum and overall understanding of the subject were noted and are mentioned in figures 1 to 10.

In this study we compared the quiz results with the final results of the university examination during the undergraduate course for the same year (first year MBBS). We observed that in the present batch of students total 10 students participated in third round of anatomy quiz competition. Out of them total 8 students passed the final university examination with distinction marks. We tested the observations using chi-square test and observed that the difference was found statistically significant (Chi-square statistic: 74.1419, p-value: <0.0005). (Table 2)

We conducted a post test to evaluate effectiveness of anatomy quiz in overall improvement of the students in their knowledge and attitude, at the end of anatomy quiz. We observed that majority of the students found the anatomy quiz effective. Majority of the students responded that the quiz is better for enhancing ability to work as a teamwork, it is helpful for self learning. Most of the students recommended that the anatomy quiz should be held routinely in forthcoming years.(Table 3).

Table 1: Overall statistics of the first year students appeared for university examination in June / july2018

Total students appeared for the university exam	**200**
Total students passed in the exam	198 (99%)
Passed with first class	119
Passed with distinction	12

Table 2: Comparison between academic performance and quiz performance

		Distinction		**Total**
Quiz selection		Yes	No	
	Yes	8	2	10
	No	8	182	190
Total		16	184	200

Table 3: Students responses over effectiveness of quiz

Sr No	**Questions**	**Strongly disagree**	**Somewhat disagree**	**Neither agree nor disagree**	**Somewhat agree**	**Strongly agree**
1	Quiz are an effective way to study Anatomy	4	6	23	64	94
2	Quiz have motivated you towards self study	4	6	23	64	94
3	Participating in Quiz improves self learning	2	10	13	71	115
4	Participating in Quiz enhances teamwork amongst students	8	6	15	71	111
5	Participating in Quiz helps you to develop time management skills	4	11	33	78	85
6	Participating in Quiz has increased your clinical anatomy knowledge	1	9	27	96	78
7	Participating in Quiz has helped you to use diagram to memorize anatomy more effectively	2	8	17	74	110
8	Quiz increase student teacher interaction	9	12	35	73	82
9	Quiz should be continued in the forthcoming years	6	2	19	62	122
10	Quiz should be incorporated in the university curriculum	14	9	37	65	86

Discussion

The undergraduate medical curriculum is vast and spread over several years. A major part of the teaching and learning takes place though the traditional lectures format. Creating innovative educational methods that enhance and supplement the lectures has been a challenge for medical educators. While students are taught material focused upon the functional aspects of the subject, there are many peripheral bits of information that lend colour and sparks interest in the subject. Medical quiz has been used as a method of teaching and learning. Studies have shown that medical Quizzes improve students comprehension and enhance interest levels in the subject Quizzes have been mostly on single subject, delimited by the curriculum and are really a traditional assessment in a new format. [11]

In India, a quiz approach ensured greater participation of students in the learning process. The students found the method very useful and interesting.[12] Active learning strategies have been shown to be helpful in improving retention of information and improving students conceptualization of systems and their functioning.[13]Goud el al in a comparative cross sectional study of 96 medical students to evaluate quiz competitions as teaching learning methodology found a statistically significant improvement in their performance.[14]Beylefild et al used a quiz type board game successfully to impact positively on students attitude and interest towards microbiology. They fell that the positive experience during learning enhanced team effort and communication in addition to enhancing recall of factual knowledge. [15] Also in their study, Vasan et al showed that student performance improved and students perceived it as motivational collective team learning that was self directed and fostered pear respect.[16]

The development of innovative methods is important toimprove student performance. The aim of this preliminarystudy was to ascertain the effectiveness of quiz as aninteractive teaching technique in lectures and implementvarious quizzing activities and evaluate their impact onlearning. This study highlights about teaching theorieswhich proved useful in the development of interest ofstudents in contrast to the traditional lecture method. Thedemographic data was collected in the two study groups tocontrol for confounding factors.

We conducted a post test to evaluate effectiveness of anatomy quiz in overall improvement of the students in their knowledge and attitude, at the end of anatomy quiz. We observed that majority of the students found the anatomy quiz effective. The study covered all competences regarding the topic,and the quiz was arranged to include all aspect. We had also obtained the summary of feedback from thestudents and faculties regarding the quiz method.The students responsewere encouraging, and they asked for the more quiz duringdifferent years.Majority of the students responded that the quiz is better for enhancing ability to work as a teamwork, it is helpful for self learning. Most of the students recommended that the anatomy quiz should be held routinely in forthcoming years.

The new innovative method of learning hadensured active participation of the students, interesting, interactive, informative, strong mode of teaching, more effective, helped to build healthy competition among groups, friendly and playful method of education.

Conclusion

Most of the students agreed and supported conduction of quiz in anatomy for better retrival skills. We recommend further studies in this area to recommend adoption of the quiz in the curriculum. The present study proved that quiz can be another method to improve the academic performance of the students.

Source of Funding: Self- funding

Conflicts of Interest: Nil

Ethical Considerations: The study protocol was approved by the institutional ethical committee of Krishna Institute of Medical sciences, Karad, Maharashtra.

References

1. Talsania N, Barot D, Chaudhari A, Patel S. Quiz versus Didactic Lecture on Undergraduate Students of BJ Medical College, Ahmedabad: A Cross Sectional, Comparative, and Interventional Study. Int J Sci Stud 2015;3(7):86-91.
2. Dongre AR, Deshmukh PR, Garg BS. Using the 'transect walk' as a public health teaching and learning tool. Med Educ 2009;43:1093-4.
3. Koh GC, Khoo HE, Wong ML, Koh D. The effects of problem-based learning during medical school on physician competency systematic review. CMAJ 2008;178:34-41.
4. Shulman L. Signature pedagogies in the professions.

Daedalus 2005;134:52-9.

5. Lockyer J, Gondocz ST, Thivierge RL. Knowledge translationhe role andplace of practice reflection. J ContinEduc Health Prof 2004;24:50-6.
6. Boud D, Feletti G. The Challenge of Problem Based Learning. London: Kogan Page; 1999.
7. Education Committee of the GMC. Tomorrow's Doctors: Recommendations in Undergraduate Medical Education. London: GMC; 1993.
8. Devi K. Quiz as an innovative approach in teaching community medicine to medical student. Natl J Community Med 2014;5:182.
9. Khan RA. Measuring Learning of Medical Students through 'Programmatic Assessment'. *Pak J Med Sci*. 2018;34(1):3–4. doi:10.12669/pjms.341.14606
10. N Palmen, Leonieke&Vorstenbosch, Marc &Tanck, Esther &Kooloos, Jan. (2015). What is more effective: a daily or a weekly formative test?. Perspectives on medical education. 4. 10.1007/s40037-015-0178-8.
11. Shankar PR, Sen PK, Dwaka S, Barthakur R. Student participants' perception about Medical quiz at the Manipal college of Medical sciences, Pokhara, Nepal. J Institute Med. 29,2007,1.
12. Webb TP, Simposon D, Denson S, Duthie E Jr. Gaming used as an informal instructional techquie: effects on learner knowl edge and satisfaction. J Surg Educ. 69(3) ,2012,330-4.
13. Rotti SB, Sudhir B. Danabalan M. Quiz as a method to teach family welfare and demography to medical undergraduate students. Ind J community Med , 29,2004,121-2
14. Modell HI. Preparing students to participate in an active learning environment. Am J PhysiolAdvanPhysiol Educ.15, 1996,S69- S77
15. Goud BKM, Begum GS. A Innovative Method of Teaching and Learning in Undergraduate First Year Medical Course at RAKMHSU, UAE. Br J Med Medical Res..4(20),2014, 3755-66
16. Beylefeld AA, Struwig MC. A gaming approach to learning medical microbiolgy; students' experiences of flow, Med Teach., 29(9), 2007,933-40.

Isolation and Identification of Pathogenic Bacteria from Soil Mixed with Hospital Wastes

Purna C. Mahapatra[1], Rabindra N. Padhy[2]

[1]Research Associate, Forest and Environment Department, Kharavel Bhawan (Secretariat Building), Government of Odisha, Bhubaneswar, Odisha, India, [2]Professor, Central Research Laboratory, Institute of Medical Sciences & Sum Hospital, Siksha 'O' Anusandhan University, K-8, Kalinga Nagar, Bhubaneswar, Odisha, India

Abstract

Objective: Hospital solid wastes when not incinerated (nor waste-waters are scientifically treated) remain as sources of a myriad of pathogenic microorganisms.

Methods: A total of 960 waste samples (soil mixed with waste) were collected from waste disposal site of the hospital. After successful growth, bacteria were sub-cultured in nutrient agar slants for preservation. Biochemical characteristics of isolated bacteria were done for identification of bacteria.

Results: A total of 150 collected waste soil samples yielded 103 bacterial colonies, as 65 single and 38 mixed colonies, while 47 samples had no microbial growth. Methicillin resistant *S. aureus* (MRSA), vancomycin resistant *enterococci* (VRE) and *Pseudomonas aeruginosa* isolates were in numbers, 28, 19 and 18, respectively. Of 103 colonies, 63 and 40 were from wastes of wards and ICUs. Invariably, MRSA strains were isolated, as single or mixed colonies. The average minimum inhibitory concentration (MIC) range against oxacillin was recorded as 16 µg/mL for MRSA, and Vancomycin 16 µg/mL for VRE and 8 µg/mL gentamicin for *P. aeruginosa*.

Conclusions: Site specific variation and seasonal variations underplay prevalence of different types of nosocomial spread of opportunistic pathogenic bacteria.

Keywords: *Hospital wastes, MRSA, VRE, Pseudomonas aeruginosa*

Introduction

Wastes are basically the source of pathogenic viruses, bacteria and fungi; especially, hospital solid wastes when not incinerated and waste-waters that are not scientifically treated, remain as sources of a myriad of pathogenic microorganisms. Overall soil-lots, leachates and hospital drains are the overwhelming sources of pathogens, since soil and flowing water are the immediate sink to wastes in dumpsites. Serious health problems of workers linked to places of waste generation and the collection till disposal at dumping sites are vulnerable to direct infections. In most developing countries, the concerned personnel hardly use protective devices for getting exposures. Particularly the indiscriminate waste disposal habits land at release mixed lots of ions, chemicals microbes detrimental to health from pollutes.[1] Due to faulty management of wastes, microbial pathogens from decomposing wastes get transmitted and cause emergence of community-acquired infections, contributing to the burden of morbidity and mortality from communicable diseases.[2] Moreover, pathogens resisting the typical climatic conditions of a place would be transmitted by direct contact with the skin or mucous membranes, through inhalation/ ingestion or by any suitable vector.[3] Often, soil-water interface provides niche that help survival of pathogens that cause infections in the next suitable season depending upon the types composition of hospital waste.[4] Indeed, about 5.3 million people die each year from waste related diseases.[5]

Corresponding author:
P. C. Mahapatra
E-mail: pcmbt007007@gmail.com

Commonly identified bacterial pathogens such as, *Pseudomonas* sp., *Corynebacterium diphtheriae, Escherichia coli,* and *Staphylococcus* sp. as methicillin resistant *S. aureus* (MRSA) or methicillin sensitive *S. aureus* (MSSA) and a few more have been reported to be part of the hospital wastes and community wastewaters.[6, 7] MRSA-colonized humans shed bacteria/spores to aerosol from nose, skin and faeces as body-wastes.[8] Furthermore, *Enterococcus faecalis* and *E. faecium* inhabit the gastrointestinal tracts of humans and animals and are the major causes of nosocomial infections worldwide. Vancomycin being the antibiotic of choice for enterococci, the prevalence of vancomycin resistant enterococci (VRE) has increased in the recent decades, presumably due to the high antimicrobial pressure in hospitals from wastewaters.[9] Antimicrobial resistance is one of the most serious public health concerns of the twenty-first century.[10] Hospitals are the main environment for multidrug resistant (MDR) bacteria and play a major role in the emergence and spread of these bacteria that thrive in wastewaters.[11] Moreover, large amounts of antimicrobials are discharged into wastewaters and exert a continuous selective pressure upon the survival of MDR bacterial strains. Heavy metals and disinfectants may also favor the persistence of MDR in the wastewater microbiome, by eliminating sensitive strains.[12] As known, antimicrobial selective pressure favours the intraspecific and interspecific transfer of resistance genes.[4] Particularly, hospital waste-dumping effluent could increase the prevalence of resistant bacteria in the recipient sewage/soil by mechanisms of introduction of resistant bacteria from biomedical waste dumping-site soil.[13] Similar surveillance work being in dearth in literature, this work was initiated, locally. The objective of this study is surveillance by isolation, identification and antibiotic profiling of bacteria from hospital-waste contaminated soil. Herein, quantitative and qualitative data of MRSA are summarized; MIC data of the commonly isolated bacteria isolated from waste-soil samples against representative antibiotics of the day were recorded, which is an extension of previous work on MRSA.[14] This work is expected to help to revision of the present antibiotic stewardship program of the hospital.

Materials and Method

Collection of waste soil samples and isolation of bacteria

A total of 960 waste samples (soil mixed with waste) were collected from waste disposal site of the hospital. Samples were collected in sterile zip-lock plastic maintaining aseptic conditions. The collected samples were used for isolation of pathogenic bacteria; if necessary, samples were stored at 4° C after marking resources or specific location. Serial dilution of soil samples were done for the isolation of bacteria. In this technique sample suspension was prepared by adding soil mixed with 1 gm waste, each. From each dilution tube 0.1ml of dilution fluid was transferred into nutrient agar (NA) culture media and incubated at 37^0C for 24 hours. After successful growth of bacteria, those were sub- cultured in NA slants; for vigorous growth and were preserved. Biochemical characteristics of isolated bacteria were done, as previously performed.[15]

Results

From 150 collected samples, 103 bacterial colonies grew as 65 single and 38 mixed colonies on agar plates and no microbial growth was seen with 47 samples. MRSA, VRE and *P.aeruginosa* isolates were 28, 19 and 18, respectively (Figure 1). Of 103 bacterial colonies, 63 and 40 were from wards and ICU. Of course, there were only 65 single- bacteria were isolated, as a single colony; while the remaining 38 bacteria were isolated as mixed colonies (Table 1). Furthermore, MRSA strains, as both single and mixed colonies were isolated. The minimum inhibitory concentration (MIC) range against Oxacillin was 16 µg/mL, the MIC range, for MRSA, Vancomycin 16 µg/mL for VRE and 8 µg/mL gentamicin for *P.aeruginosa* . These MIC values confirmed the presence of all strains, as the break point for being resistant (Table 2).

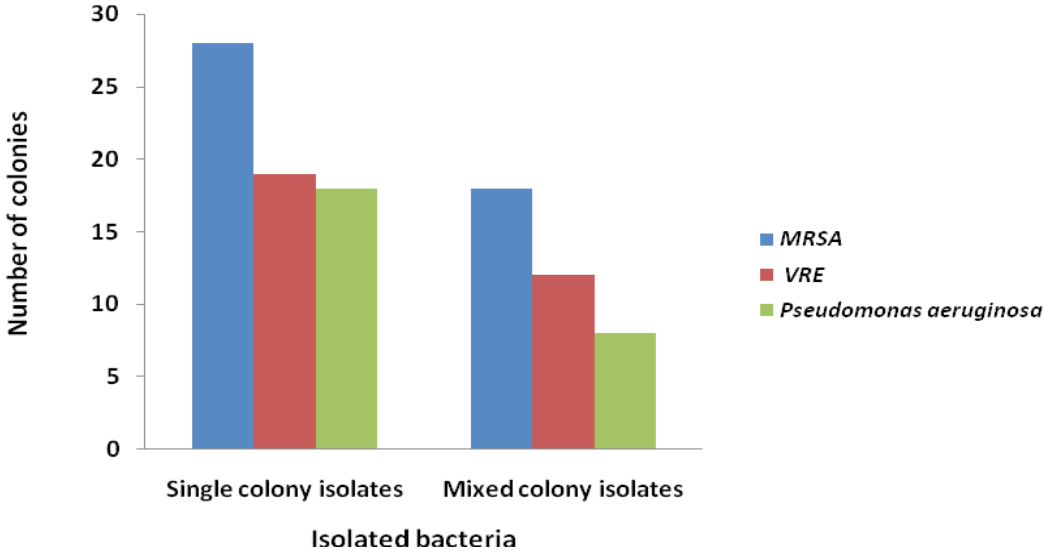


Figure 1 Growth of bacteria in cultures of waste water samples of hospital as single colony and mixed colonies. MRSA: Methicillin resistant *Staphylococcus aureus*, VRE: Vancomycin resistant *Enterococci.*

Table 1 Numbers of growing bacteria from cultures of hospital soil samples with waste.

Colonies	Wards	ICU	Total
Single colony	42	23	65
Mixed colonies	21	17	38
Total	63	40	103

Table 2 Detection of MRSA isolates based on MIC values due to oxacillin in a 12x8 micro-titre plate.

Well	Oxacillin (µg/ml)	Number of isolates MRSA = 28	Vancomycin (µg/ml)	VRE= 19	Gyntamycin (µg/ml)	P. aeruginosa = 18
1	0	28	0	19	0	18
2	≤0.25	–	≤0.25	11	≤0.25	09
3	0.5	–	0.5	17	0.5	12
4	1	–	1	–	1	11
5	2	–	2	–	2	17
6	4	–	4	–	4	18
7	8	–	8	–	8	10
8	16	08	16	11	16	–
9	32	11	32	17	32	–
10	64	19	64	19	64	–
11	128	03	128	18	128	–
12	≥ 256	07	≥ 256	17	≥ 256	–

Note: The oxacillin stock solution of 512 µg/ml was serially diluted at each successive well, from the 12th well for final concentration of 0.25 µg/ml oxacillin at the 2nd well; –, no growth; total *Staphylococcus* sp. = MRSA with123. Results of the second repeated experiment are presented.

Discussions

Since pathogenic bacteria can cause serious public health problems, which demands more research for creating public awareness. Due to irrational uses of antibiotics in last few decades, the numbers of antibiotic resistant bacteria are increasing day by day, and the condition is becoming worse in developing countries.[16] In addition, animal faecal wastes and particulate soil matter at polluted sites provide niches for pathogenic human viruses in addition to bacteria for dissemination and survival directly or as environmental vectors for the horizontal transfer pathogens and their genomes. Indeed, antibiotic resistance genes spread among bacterial consortia, which may be phylogenetically distant even.[17] The occurrence of Methicillin sensitive *S. aureus* (MSSA) and MRSA is on the rise, resulting in increased incidences of hospital-acquired and community-acquired infections worldwide, posing a major public health concern.[18] Basically, *S. aureus* is one of the most successful and adaptable human commensal-turned-pathogen, due to its proficiency in acquiring antibiotic-resistant mechanisms and pathogenic determinants, invading to nosocomial and community settings.[19] Nosocomial colonization of MSSA and MRSA can go undetected, and signs of infection may only appear months after a patient is exposed to the extent of some detectable traits of illness. In USA, MRSA and VRE were identified from a wastewater.[20] *P. aeruginosa* is ubiquitous within wastewaters, with higher concentrations in hospital than in urban wastewater. *P. aeruginosa* isolates resistant to ciprofloxacin or producing VIM-type metallo-β-lactamase, or ESBLs have been obtained from wastewater and hospital discharge sites.[21] Thus, hospital waste dumping effluent could increase the number of resistant bacteria in the recipient sewages by both mechanisms of introduction and selection of MDR bacteria isolated from biomedical waste dumping site soil. [22] Hospital wastewater, which receives high loads of antimicrobial agents and human pathogens, is considered a reservoir for antibiotic resistance and other genetic factors which promote the potential spread of AMR to the environment.

Conclusion

In this present study confirmed the presence of pathogenic bacteria in the hospital solid waste, in the different department/units of the hospital. It contains various types of nosocomial with opportunistic pathogenic bacteria were appeared in the hospitals sites variation and seasonal variation, confirmed that the prevalence types of bacteria vary based on seasonal and spatial variables.

Source of Funding: This research did not receive any specific grant from funding agencies**.**

Conflict of Interest: The authors have no conflict of interest to declare.

Ethical Clearance: In this research no cell-lines/ animals are used. So it's not applicable for ethical clearance.

References

1. Mishra M, RK Sahu, SK Sahu, Padhy RN. Growth, yield and elements content of wheat (Triticum aestivum) grown in municipal solid wastes amended soil. Environ Dev Sustain 2009; 11:115-26.
2. Dubey D, Padhy RN. Surveillance of multidrug resistance of two Gram-positive pathogenic bacteria in a teaching hospital and in vitro efficacy of 30 ethno-medicinal plants used by an aborigine of India. Asian Pac J Trop Dis 2012; 2: 273-81.
3. Twinch E. Medical waste management. International committee of the Red Cross (ICRC), Geneva, Switzerland, 2011.
4. Cantas L, Shah SQ, Cavaco LM et al. A brief multi-disciplinary review on antimicrobial resistance in medicine and its linkage to the global environmental microbiota. Front Microbiol 2013; 4:96.
5. Elizabeth A, Martin MA, Aggrewal R, Jobling JC, Taylor E. Oxford Concise Medical Dictionary. 6th edition Oxford University Press Hong Kong 2003; 754.
6. Nascimento TC, Januzzi WA, Leonel M, Silva VL, Diniz CG. Occurrence of clinically relevant bacteria in health service waste in a Brazilian sanitary landfill and antimicrobial susceptibility profile. Rev Soc Bras Med Trop 2009; 42: 415-19.
7. Plano LRW, Garza AC, Shibata T et al. Shedding of Staphylococcus aureus and methicillin- resistant Staphylococcus aureus from adult and pediatric bathers in marine waters. BMC Microbiol 2011; 11:5.
8. Wada M, Lkhagvadorj E, Bian L et al. Quantitative reverse transcription-PCR assay for the rapid detection of methicillin-resistant Staphylococcus aureus. J Appl Microbiol 2010; 108: 779–88.

9. Narciso-da-Rocha C, Varela AR, Schwartz T, Nunes OC, Manaia CM: Bla TEM and van A as indicator genes of antibiotic resistance contamination in a hospital eurban waste water treatment plant system. J Global Antimicrob Resist 2014; 2: 309-15.

10. World Health Organization. Antimicrobial resistance: global report and surveillance. Geneva: WHO. Available at: http://www.who.int/iris/bitstream/10665/112642/1/ 9789241564748_eng.pdf; 2016].

11. Rizzo L, Manaia C, Merlin C et al. Urban wastewater treatment plants as hotspots for antibiotic resistant bacteria and genes spread into the environment: a review. Sci Total Environ 2013; 447: 345-60.

12. Oberle K, Capdeville MJ, Berthe T, Budzinski H, Petit F. Evidence for a complex relationship between antibiotics and antibiotic resistant Escherichia coli: from medical center patients to a receiving environment. Environ Sci Technol 2012; 46:1859-68.

13. Caplin JL, Hanlon GW, Taylor HD. Presence of vancomycin and ampicillin-resistant Enterococcus faecium of epidemic clonal complex-17 in wastewaters from the south coast of England. Environ Microbiol 2008; 10:885-92.

14. Rath SN, Das SR, Padhy RN. Surveillance of bacteria Pseudomonas aeruginosa and MRSA associated with chronic suppurative otitis media. Brazilian J Otorhinolaryngol 2017; 83: 201-6.

15. Rath SN, Padhy RN. Surveillance of multidrug resistance in community acquired urinary tract bacterial infections in an Indian hospital. J Acute Dis 2015; 4:186-95.

16. Neupane S, Pant ND, Khatiwada S et al. Correlation between biofilm formation and resistance toward different commonly used antibiotics along with extended spectrum beta lactamase production in uropathogenic Escherichia coli isolated from the patients suspected of urinary tract infections visiting Shree Birendra Hospital, Chhauni, Kathmandu, Nepal. Antimicrob Resist Infect Control 2016; 5: 5. doi: 10.1186/s13756-016-0104-9. eCollection 2016.

17. Colomer LM, Imamovic L, Jofre J, Muniesa M. Bacteriophages carrying antibiotic resistance genes in fecal waste from cattle, pigs, and poultry. Antimicrob Agents Chemother 2011; 55: 4908-11.

18. Klevens RM, Morrison MA, Nadle J et al. Invasive methicillin-resistant Staphylococcus aureus infections in the United States. JAMA 2007; 298: 1763-71.

19. Zetola N, Francis JS, Nuermberger EL, Bishai WR. Community-acquired meticillin-resistant Staphylococcus aureus: An emerging threat. Lancet Infect Dis 2005; 5: 275-86.

20. Rosenberg Goldstein RE, Micallef SA, Gibbs SG et al. Detection of vancomycin-resistant enterococci (VRE) at four U.S. wastewater treatment plants that provide effluent for reuse.

Sci Total Environ 2014; 466-67: 404-11.

21. Slekovec C, Plantin J, Cholley P et al. Tracking down antibiotic resistant Pseudomonas aeruginosa isolates in a wastewater network. PLoS One 2012; 7: 49300. https://doi.org/10.1371/journal.pone.0049300.

22. Nunvar J, Elhottova D, Chronakova A et al. Draft genome sequence of Stenotrophomonas maltophilia strain 5BA-I-2, a soil isolate and a member of a phylogenetically basal lineage. Genome Announcements 2014; 2:134- 44.

Plastic Waste, Health & Climate Change: Issues & Challenges of Odisha

Purna C. Mahapatra[1], Basanta K. Sahu[1], Amit K. Mohanty[2]

[1]Research Associate, [1]Sr. Scientist, [2]Sr. Research Fellow, Climate Change Cell, Forest and Environment Department, Kharavela Bhawan (Secretariat Building), Government of Odisha, Bhubaneswar, Odisha

Abstract

The population of Odisha is near about 41 million according to the 2011 census. The total area is 155.707 square kilometer which is the 4.8% of total area of India. Various activities such as construction, packaging, infrastructure, communication, mines, entertainment, agriculture and textiles uses plastics because for its low cost, best choices for packaging, durability and easy availability. Last few years, the consumption pattern and life style of people of Odisha has gone up due to change in socio-economic conditions. This, in return generates huge quantities of plastic waste. This quantum of plastic wastes become dangerous to environment (have adverse effects on health and climate) and need to be handled properly for its disposal.

Key words: *Plastic, Waste, Health, Climate,Environment*

Introduction

Plastic is the great creation of human being which changed the whole world and made the life smooth. Because of its high strength, lightweight and lesser cost, this man made material became a part in every sphere of human existence. Variety of the sectors (Industry) such as construction, infrastructure, automotive, communication, entertainment, agriculture, packaging and textiles uses it because for its better benefits. Generally, plastics are the polymers produced by the conversion process of natural products or by chemical reactions of the monomeric unit primarily synthesized from oil, natural gas or coal joined together by chemical bond to form a long chain of polymer of plastic [13]. Due to rapid growth of urbanization, population & industrialization, the consumption of Plastic increased day by day tremendously [9] and this plastic products now becomes very popular both in rural and urban areas globally.

Plastic Production and Trends

The rapid rate of development has led to increase in consumption of plastic products. Much of the growth in plastic production is driven by single use or disposable applications. Nearly 50 % of plastic used are single used products. The use of plastic in packaging both as rigid and flexible forms has been increasing. In India, the average per capita consumption of Plastic is about 11 kg, which are considerably one tenth uses of USA and one sixth of Europe [1]. Whereas average consumption is 28 Kg Globally (Fig 1). Having an estimation by the Ministry (Petroleum and Natural Gas), Government of India suggests that the per capita consumption of plastic in India would be doubled annually by 2022. Further World Economic Forum suggest that the consumption and production of plastic would increase drastically which leads generation of large amount of plastic waste and Green house gases which effects directly or indirectly to climate change.

Corresponding Author:
Purna. C. Mahapatra
E-mail: pcmbt007007@gmail.com

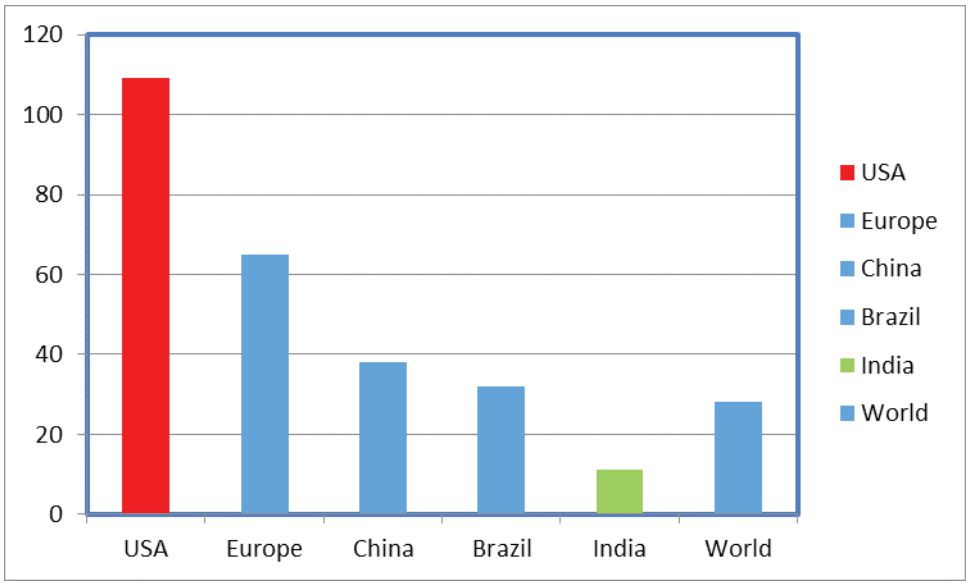


Fig 1 : Per capita consumption (Kg) of Plastics

Source: FICCI

Clasiffication Of Plastic

Basing upon the physical nature of plastic, it may be thermoplastic or thermosetting materials. Thermoplastic material can be softened or remolded by the application of heat where as thermosetting materials cannot be changed after their formation [6]. These are PET (Polyethylene terephthalate), HDPE (High-density polyethylene), PE (polyethylene), PVC (Polyvinyl Chloride), LDPE (Low Density Polyethylene), LLDPE (Linear Low Density Polyethylene), PP (Polypropylene), PS (Polystyrene) and PC (Polycarbonate).

Plastic and Environment

In spite of heavy demand, plastics are non-biodegradable and cause threat to the ecological system as they reduce the fertility of soil and thereby hamper the growth of plants, choke drains and sewer resulting in overflowing gutters and if swallowed by cattle, they may cause death by obstructing their intestine. The color pigments contaminate food products wrapped in them and cause health hazards and some of it are even carcinogenic. The plastic bags when discarded can get filled with rainwater offering ideal breeding ground for vector borne diseases like malaria and burning of plastics also releases most carcinogenic and toxic substances like dioxins, furans and hydrogen cyanide, which pollute air as well as cause severe and chronic health problems. Plastic products take hundreds of years for degradation [14], as they are not biodegradable like paper bags, they also block the rainwater infiltrating into the soil hindering recharge of ground water. In last decade, due to the widespread littering of plastics, which badly affects the quality of the environment by generating huge amount of waste on the land, has attracted attention of whole world [2].

Plastic and Its Adverse Effects on Human Health

It is estimated that, about 54 % of the world plastic production is Polyethylene and polypropylene [11], which is not only widely used for packaging but also for protecting, serving and disposing all kinds of consumers goods due to its non-biodegradable nature. There are several toxic materials are being secreted by the plastics and their additives. Among them, Bisphenol A (BPA) is most important. BPA has been associated with a number of health problems such as ovarian chromosomal damage, decreased sperm production, rapid puberty, rapid changes in immune system, type-2 diabetes, cardiovascular disorder, obesity etc. Some studies have also claimed that BPA increases the risk of breast cancer, prostate cancer, pains, metabolic disorders, etc. BPA in women and impaired health, including obesity, endometrial hyperplasia, recur-rent miscarriages, sterility, and polycystic ovarian syndrome [12 & 15]. Similarly PVC Causes Cancer, Birth Defects, Chronic Bronchitis, Ulcers, Skin diseases, Vision failure, Liver dysfunction. Polystyrene causes Eye, Nose and Throat

irritation, Lymphatic & Hematopoietic cancer for workers. Polyurethane Foam causes Bronchitis, Coughing, Skin & Eye Problem. Polyester causes acute Skin rashes, Eye & Respiratory tract infection and many more. The adverse effects of Plastics are enumerated in Fig (2).

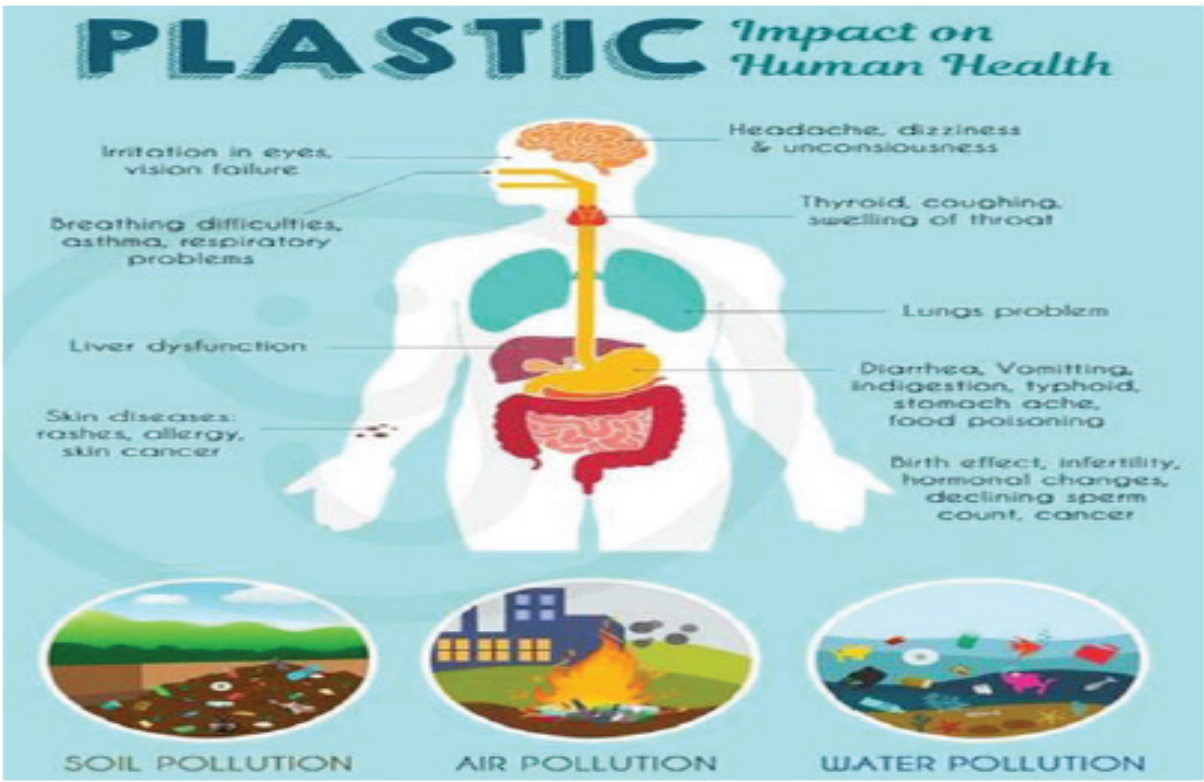


Fig 2: Impact of Plastics on Human Health

Plastic and Climate Change

Plastic when exposed directly to sunlight produces Green House Gases (GHGs) in to the atmosphere. Large volumes of plastic accumulating in Environment contribute to Change in Climate. In every stage of Plastic Life Cycle i.e. from manufacturing to decompose/ its management, emitting GHGs. Potential sources of GHGs from plastic to the environment are sludge of sewage treatment plants, waste water, leakage from plastic landfills, incineration fumes and global transport of chemicals from plastic. In addition to this, Methane is also emitted from waste dump and landfills, contributes largely for global warming [3]. Gradually the earth's and oceans atmosphere are getting warmer day by day. This warming makes worsen the climate variability. A report by the Tear Fund (2019) states that global plastic production emits 400Mt of greenhouse gases each year – more than the UK's entire carbon footprint. If the growth of plastic production continues at its current rate, by 2050 the plastic industry could account for 20% of the world's total oil consumptions which will indirectly/ directly contributes on Climate Change.

Climate Change Adaptation and Mitigation

Complete ban on plastic and its product is not going to solve the problem; efforts are required to get rid of the load already created in our environment. For this purpose, we can use the plastic waste in such a way which not only reduce the plastic waste load but also improve in quality of our environment. In this context, the plastic waste can be used for road construction, waste to oil, co- processing in cement kilns. The concept of 5'R principle i.e. Reduce, Reuse, Recover, Recycle and Refuse for plastic must have to be adopted in every sphere of our life- whether in home or in work place.

Management of Plastic Waste

Earth being the Home of thousands of living Organism, large amount of Plastic waste has increased the toxicity of the Environment which in turn leads to the death of Organisms. It is felt necessary that certain stringent steps are needed not only with regard to

regulating the use of polythene but also prohibiting the use of thermocol and similar plastic products in order to save the planet. Ministry of Environment, Forest and Climate Change, Government of India have enacted the Plastic Waste Management Rules, 2016 under the Environment (Protection) Act, 1986 (29 of 1986) restricting the use of certain plastic carry bags and containers and its management. The State Government, Odisha also having considered all the pros and cons of the issues have also restricted the indiscriminate use of certain types of plastic products in all municipal limits of the state. All Gram Panchayats in the state have adopted the "Bye Law on solid waste management in Gram Panchayats of Odisha 2019" which also includes management of plastic waste. It is a good sign that the State Government of Odisha has taken a proactive step to prohibit the use of single use plastics such as PET/PETE bottles, water pouch, and other single use disposable items in the premises of all the Departments.

Plastic Waste Management Rule, 2016

Government of India has noticed Plastic waste Management Rules, 2016 for effective management of Plastic waste in the country. The salient features are

i) Plastic waste, which can be recycled, shall be channelized to registered plastic waste recycler.

ii) Local bodies shall encourage the use of plastic waste (which cannot be further recycled) for road construction as per Indian Road Congress guidelines or energy recovery or waste to oil etc.

iii) Thermoset plastic waste shall be processed and disposed off as per guidelines issued from time to time by Central Pollution Control Board, New Delhi.

Role of various stakeholders in management of plastic waste in odisha

i) State Pollution Control Board, Odisha (SPCB, Odisha)

Ø Enforce of provisions of the said rule relating to registration, manufacture of plastic products, processing and disposal of Plastic wastes.

ii) State Government

Ø Creating awareness among all stake holders about their responsibilities.

Ø Discouraging to use of single use plastic among citizen of the state by sensitization / awareness campaigns programmes.

Ø Promoting the use of Plastic alternative materials such as jute & compostable bags.

iii) Associate Government Departments

Ø Ensuring segregation, collection, storage, transportation, processing and disposal of plastic waste.

Ø Ensuring channelization of recyclable plastic waste to registered recycler.

Ø Ensuring processing and disposal of non-recyclable plastic waste.

Ø Ensuring no open burning of plastic waste.

Ø Framing of bye-laws incorporating the provision of rules

Ø Setting up system, oprationalise and coordinate for waste management in the rural areas by ensuring segregation, collection, storage and transportation of plastic waste.

iv) Producer and Brand owner

Ø Ensure collection of used multi layered plastic sachets/ pouches/packaging material either through their own channel or concerned local body.

Ø Phase out manufacture and use of non recyclable plastic.

v) Waste Generators

Ø Minimize generation of plastic waste.

Ø Ensure segregation of plastic waste at source

Ø Hand over segregated waste to appropriate agencies.

vi) Non- Government Organizations

Organizing mass awareness campaigns in electronic media & print media.

Current status of management of plastic waste

The State of Odisha generates approximately 90138.98 (estimated by SPCB, Odisha for the year 2018-19) tons per annum (TPA) of plastic waste. Details, district wise plastic waste generation as for the year 2018-19 are enumerated in the Fig (3).

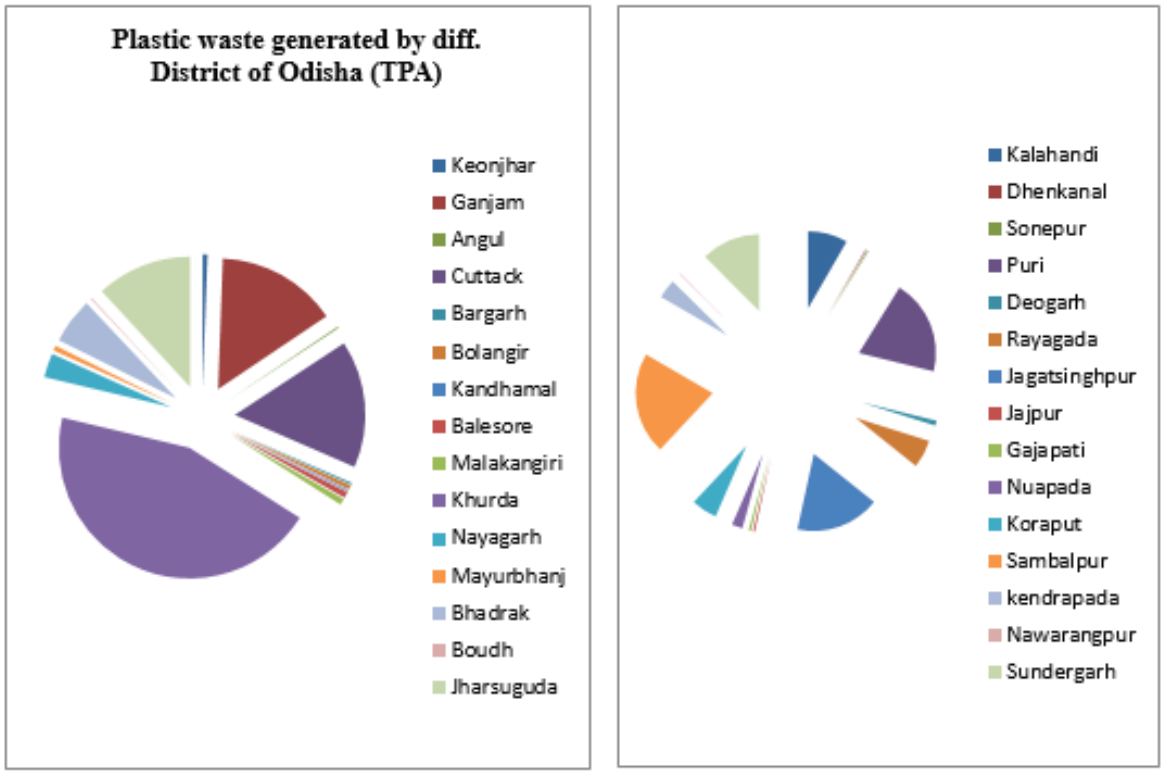


Fig 3 : District wise waste collection of the year 2018-19

Source: SPCB, Odisha

The status of registration of different category of plastic units is as under follows.

i) Recyclers

The SPCB, Odisha has issued registration under the Rule to one (1) number of plastic recycler as on 31st December, 2018.

ii) Producers / Manufacturer

The SPCB, Odisha has issued registration under the Rule to Seven (7) nos. of plastic product manufacturing units.

iii) Brand Owners

The SPCB, Odisha has issued registration under the Rule to Four (4) nos. of brand owners.

Status of utilization of plastic waste in odisha

48 Urban Local Bodies (ULBs), 132 Material recycling facilities (MRFs) have been set up in which plastic wastes are segregated and sent out for recycling.

A) In recycling –Plastic wastes are utilized daily by recycling process.

B) Road Construction-- 4.6 MT of Plastic waste has been used for construction of 9.6 K.M of road in Deogarh & Sambalpur districts of Odisha under Pradhan Mantri Gram Sadak Yojana by Rural Development Dept.

C) Waste to oil-- Consent to establish has been granted to M/s Hindalco Industries for establishment of polycrack converts of 0.5 MT/Day plastic to oil.

D) Co-processing of Plastic Waste in Cement Kilns–

Four cement plants have been identified for the purpose of co-processing and ULBs are advised to send the non-recyclable plastic waste to these cement plants. The quantity of plastics waste used by different cement plants is illustrated in Fig (4) in yearwise manner.

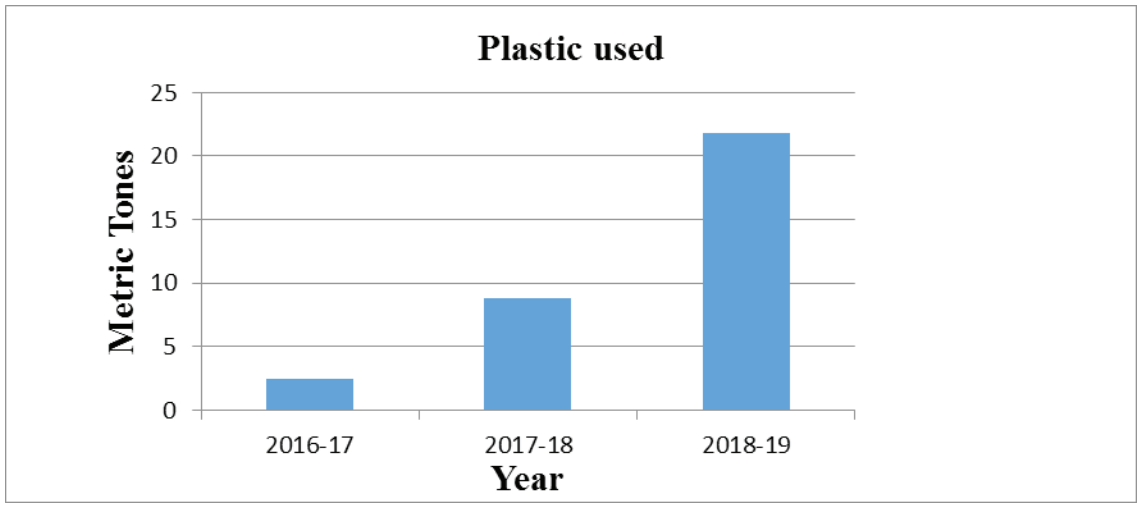


Fig 4: Year wise plastic used in cement plants in Odisha

Source: SPCB, Odisha

Discussion

Single use Plastics also often referred to as disposable plastics (use and throw items), are commonly used for packaging and include items intended to be used only once, before they are thrown away or recycled. Plastic bottles, jars, and container find their way into the reusing and recycling economy through informal chain of rag pickers and kabbadi wallahs or scrap dealers. But single use plastics such as bags, candy wrappers, tobacco and pan masala sachets, soap wrappers and shampoo sachets are either too difficult or not lucrative enough to collect. These plastic items then find their way into landfills, unauthorized garbage dumps or simply remain uncollected on road berms. Eventually, these single use plastic items clog rivers; pollute ground water and other water bodies [8]. They when consumed by animals find their way into our food systems.

It is well appreciated that while plastic is a much used material for a variety of products, it is the littered plastic waste that goes uncollected leading to an environmental hazard [5]. As we aware, these plastic wastes can be segregated and shredded to less than 4mm size and can be used for the construction of road with bitumen [7]. These roads have better resistance towards rain water and making road more durable. While on the other hand this will help to reduce plastic waste and reduce the use of bitumen 8 % resulting in major environmental benefits. Plastic waste can also be used in cement factories for co-processing as alternate fuel. So the option of utilizing plastic waste as alternate fuel may be explored.

Conclusion

The scientific way of management of plastic waste is highly essential to save our mother earth; otherwise its unscientific waste management practices would bring an unwarranted result to the environment. It is important that everyone should follow the mantra of 5 R's i.e. Refuse Reduce, Reuse, Recover and Recycle and in addition to this, should remember 6th R that is responsibility. Without understanding the term responsibility, effective plastic waste management is difficult to achieve.

Conflict of Interest: The authors have no conflict of interest to declare.

Ethical Clearance: In this research no cell-lines/ animals are used. So it's not applicable for ethical clearance.

Source of Funding: This is a part of climate change research and is being funded by DST, GOI.

References

1. Anonymous(2018):https://https://www.downtoearth.org.in/news/waste/an-indian-consumes-11-kg-plastic-every-year-and-an-average-american-109-kg-60745. Assessed, 4th Nov 2019.
2. Bhattacharya RR, Chandrasekhar K, Deepthi MV, Roy P, Khan A. Challenges and opportunities:

plastic waste management in India. Teri. 2016; 1-18.

3. Chandegara VK, Cholera SP, Nandasana JN, Kumpavar MT, Patel KC. Plastic packaging waste impact on climate change and its mitigation. Research gate, Book chapater.2015; 46: 404-15.
4. Anonymous(2019)http://www.cpcb.nic.in/waste/municipalwasteAssessed on 6thNov 2019
5. Gutberlet J, Uddin SMN. Household waste and health risks affecting waste pickers and the environment in low- and middle-income countries. International journal of occupational and environmental health. 2017;23(4):299-310. Epub 2018/06/21.doi: 10.1080/10773525.2018.1484996
6. Gwada1 B, Ogendi G, Makindi SM, Trott S. Composition of plastic waste discarded by households and its management approaches, Global Journal of Environ. Sci.and Management. 2019; 5(1): 83-94. DOI: 10.22034/gjesm.2019.01.07.
7. Jethwani S, Jha SA, Sangtiani D. Utilization & Specification of Plastic Waste in Bituminous Roads. International Journal of Engineering Research.2017; 6 (2): 91-94.
8. Kataoka T, Nihei Y, Kudou K, Hinata H. Assessment of the sources and inflow processes of microplastics in the river environments of Japan. Environ Pollut. 2019; 244: 958-65. Epub 2018/11/25 ,https://doi.org/10.1016/j.envpol.2018.10.111.
9. Mukhtar EM, Williams ID, Shaw PJ, Ongondo FO. A Tale of Two Cities: The emergence of Urban waste systems in a developed and a developing City. Recycling, 2016; 1: 254–270. doi:10.3390/recycling1020254.
10. http://ospcboard.org (Assessed on 5th. Nov. 2019)
11. Plastics Europe MRG (Marker Research Group). Business Data and Carts 2007, Status September 2008.
12. Proshad R, Kormoker T, Islam Md S, Haque MA, Rahman Md M, Mithu Md MR. Toxic effects of plastic on human health and environment: A consequences of health risk assessment in Bangladesh. International Journal of Health, 2018; 6 (1): 1-5. doi: 10.14419/ijh.v6i1.8655
13. Sangawar VS, Deshmukh SS. A short overview on development of the Plastic waste management: Environmental issues and challenges. Scientific Reviews and Chemical Communication. 2012; 2(3): 349-354.
14. Urbanek AK, Rymowicz W, Mironczuk AM. Degradation of plastics and plastic-degrading bacteria in cold marine habitats. Applied microbiology and biotechnology. 2018;102(18):7669-78. Epub 2018/07/12. doi: 10.1007/s00253-018-9195-y.
15. Verma SS. Roads from plastic waste.The Indian Concrete Journal, 2008: 43-44.

Various Disinfecting Methods of Orthodontic Pliers in Daily Clinical Practice: A comparative Study

Purva Verma, Arvind Sivkumar

[1]Postgraduate Student, [2]Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University

Abstract

Introduction: Orthodontic pliers are essential armamentarium in every orthodontic office and should be used once for one patient, then autoclaved before next use. Clinical orthodontics with higher volume of patients, requires a quick chair side disinfection method for pliers, also in rural centres with minimum infrastructure it is a challenge to maintain sterilisation protocols. Various disinfecting agents include alcohols , quaternary ammonium salts, formaldehyde, chloramine, sodium hypochlorite, spirit, glutaraldehyde etc. are available. Out of these we compared the commonly available disinfectants including ethyl alcohol, 5% glutaraldehyde, and 6% sodium hypochlorite to assess their disinfection efficacy after clinical use.

Materials and method: 20 orthodontic pliers were inoculated with Coagulase negative streptococci. The pliers were divided in 4 groups with 5 pliers in each group. Each group was subjected to different disinfectant solution with one group aiding as control. The disinfectants used were: spirit (group 1), 5% glutaraldehyde (group 2), 2% sodium hypochlorite (group 3) and distilled water (control group).

Results: spirit and 5% glutaraldehyde have shown to be potent disinfectants.

Conclusions: Based on these results, we concluded that among the tested methods, disinfection of orthodontic pliers with spirit and 5% glutaraldehyde are the efficient methods for chair-side disinfection.

Keywords: *Orthodontic pliers, Infection, Disinfectants, Disinfection*

Introduction

The practice of General Dentistry, and Orthodontics in particular, is characterized by plethora of patients with variety of infections and contagious diseases transmitted through various modes.(1)

Some orthodontists consider orthodontics as a non-invasive specialty. This thought is an underestimation of risk of contamination that an orthodontist subjects their patients to, the perilous part being most of the orthodontic patients are children and young adults who are easily susceptible to infection. An orthodontist encounters blood in the patient's mouth at an average of ten times a week, which is a significant number to ignore.(2)(3)

The main guide to achieve successful results in infection control is not to disinfect when you can sterilize. Sterilization is the destruction or removal of all forms of life, including spores, while disinfection is the inhibition or destruction of vegetative forms, not destroying spores and some resistant pathogenic microorganisms.(4)(5)

Orthodontic pliers are essential armamentarium in every orthodontic office. Ideally, each set should be used once for one patient and then autoclaved before next use. In order to follow this protocol of sterilisation we require multiple sets of pliers, repeated cycles of autoclaving and huge manpower to handle these procedures.

These protocols can be followed in most private clinical set-up but following these protocols in centres with heavy patient flow and rural setups will be difficult. Clinical orthodontics with higher volume of patients requires a quick chair side disinfection method for pliers.

Inadequate methods of infection control have been adopted in few orthodontic offices, especially the rural set-ups .The main reason for the lag of infection

control in orthodontic is that this procedure takes time and considerable amount of investment. Moreover, the heat or chemical substances damage most of the orthodontic pliers permanently, which are fundamental and invaluable inventory in an orthodontic office.[6]

There is a need to recuperate infection control practice in orthodontic practice, especially when it comes to pliers. Hence, in this study we aimed to evaluate the effectiveness of the commonly available disinfectants including 95% ethyl alcohol, 5% glutaraldehyde, and 6% sodium hypochlorite to assess their disinfection efficacy after clinical use by orthodontists for disinfection of pliers in their daily practice.

Material and Method

The efficacy of disinfection methods on orthodontic pliers used in everyday practice by orthodontists were evaluated, total 20 pliers were selected for the study with 5 pliers in each group. Each group had:

- Pin and ligature cutter

-Distal end cutter

-Weingart plier

-Posterior Band removing Plier

-Bracket positioning plier.

All the twenty pliers were subjected to Dry Heat Sterilisation in Hot Air Oven at a temperature of 250 C for 1 hour.

After the sterilisation was complete, the pliers were contaminated *in vitro* with coagulase negative staphylococci bacteria as this micro-organism is a part of normal flora of oral mucous membrane, is associated with various nosocomial and opportunistic infections, and also is resistant to many antibiotic. Suspension of coagulase negative streptococci was used for contamination of pliers. All pliers were immersed in the suspension for coating it with bacteria. The pliers were then set to dry.

Contaminated pliers were then segregated into their respective groups. Each group was subjected to treatment with one disinfectant as follows:

Group 1: 95 % Ethyl Alcohol

Group 2: 5% Glutaraldehyde

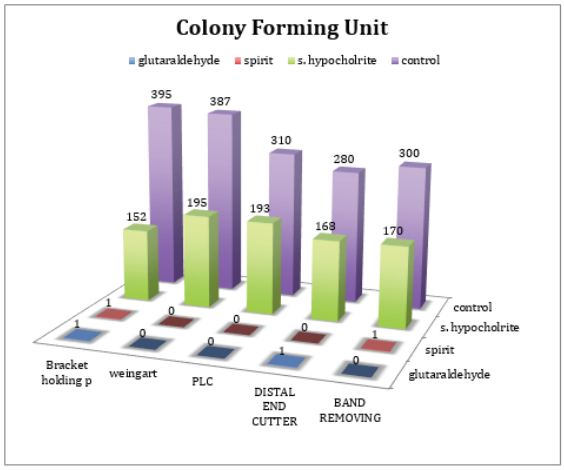
Group 3: 6% Sodium Hypochlorite

Group 4: Distilled water washing (control group)

Each plier was subjected to disinfectant for a treatment time of 2 minutes. Swab was taken from the beak/working end of the plier. The swab was rubbed and cultured on Nutrient Agar and evaluated for the colonies of coagulase negative staphylococcus, incubated at 37degree Celsius for 24 hours.

The effectiveness of disinfection was evaluated by number of Colony Forming Unit on the agar. The colony count was done using a colony counting software named EZEE COUNT. The picture of the incubated agar dish was taken through the app and count was generated.

Result and Statistics



GRAPH 1: The graph here indicates that CFU count is least following treatment with 5% Glutaraldehyde and 95% Ethyl Alcohol (Spirit). 6% Sodium Hypochlorite has shown a high CFU count which indicates its low efficacy as disinfectant.

Discussion

The disinfection methods tested in this study were 2% glutaraldehyde, spirit, 6% sodium hypochlorite and distilled water, which acted as control. Graph-1 shows that 6% sodium hypochlorite couldn't eliminate bacteria completely showing it is a low level disinfectant. It is contradicted by a study done by E. Steve Senia et al. [7] in 1975 who use 5.25% sodium hypochlorite for disinfection of gutta percha cones to eliminate Staphylococcus faecalis, E.coli, Corneybacterium Xerosis and Bacillus subtilis. With 30-seconds exposure all organism except B.subitilis were killed. However, in our study Sodium Choloride failed to eliminate CoNS from the surface of orthodontic pliers. [8] [9] [10] [11]

Spirit proved to be a high –level disinfectant by completely eliminating the CoNS bacteria from the orthodontic plier surfaces. This is in accordance with a study done by Carvalho et al [12], who achieved complete disinfection of rubber toys using spirit. Also, In a study by Klein and Deforest [13] , they concluded that viruses whose coat consists of both protein and lipid were susceptible to a variety of commonly used disinfectants, including spirit, among these lipid-free viruses are such important human pathogens as the polio, Coxsackie and ECHO groups (all enteroviruses) this suggests anti-viral activity of spirit. Similarly, in a study by Earle H. Spaulding [14] , they concluded spirit as effective germicidal, tuberculocidal, and fungicidal and virucidal agent. They also stated that spirit evaporates without leaving a residual chemical on the surface of instrument. This can be advantageous for longevity of orthodontic pliers. [15] [16]

The glutaraldehyde solution is an efficient disinfectant. Graph-1 shows that after the disinfection treatment with 2% glutaraldehyde, the bacteria were completely eliminated from the surfaces of orthodontic pliers. Results of this study showed the efficiency of 2% glutaraldehyde as a disinfectant agent when the objects are immersed for 2 minutes. This result is in agreement with Chapman et al [16], who disinfected rubber toys with the use of glutaraldehyde and Freitas et al [17] who, reported that glutaraldehyde at room temperature is effective in destroying vegetative forms of pathogenic microorganisms, influenza viruses, enteroviruses and tuberculosis bacilli when immersed for 10 to 30 minutes. The authors went further by claiming that glutaraldehyde is effective against highly resistant spores for a period of 6 to 10 hours. The 2% glutaraldehyde solution is chosen for disinfecting instruments. It is the only one who acts in the presence of organic matter.

It is fungicidal, virucidal and bactericidal in 30 minutes and sporicidal at 10 hours. However, it is believed that the 2% glutaraldehyde can destroy vegetative bacteria in less than two minutes and sporulated bacteria in three hours. Myers[19] disagrees, and says that glutaraldehyde is not recommended because the process takes ten hours of exposure, the efficiency is difficult to monitor, and it causes skin irritation, is toxic, discolors and has a corrosive effect on metals.

The need to improve control of infection in orthodontic practice, especially in relation to pliers, is indispensable. It is known that currently, the percentage of adult patients in orthodontic clinics is high, which drops the argument used by orthodontists that patients are very young and therefore have a low risk of inoculation of diseases. Besides, Orthodontics is an invasive specialty, differently from what some orthodontists say.

Conclusion

According to the results obtained from this study, it can be concluded that

a) Treatment with 5% glutaraldehyde and 95% ethyl alcohol is the most efficient of the methods used in this study.

b) 6% Sodium Hypocholrite is a low-level disinfectant and must not be considered as a disinfecting agent for orthodontic pliers.

In day-to-day clinical practice for quick chair side disinfection 5% glutaraldehyde and 95% ethyl alcohol can be used for disinfection of orthodontic pliers in case of unavailability or inaccessibility of sterilizing units.

Ethical Clearance- Not Required

Source of Funding- Self Funded

Conflict of Interest - Nil

References

1. Bates CM. The management of patients with inflammatory smear results in general practice [Internet]. Vol. 69, Sexually Transmitted Infections. 1993. p. 126–9. Available from: http://dx.doi.org/10.1136/sti.69.2.126
2. Jerrold L. Age-appropriate orthodontic treatment and orthodontic risk management concerns for the pediatric dentist and orthodontist [Internet]. Vol. 20, Seminars in Orthodontics. 2014. p. 128–32. Available from: http://dx.doi.org/10.1053/j.sodo.2014.04.004
3. Woo J, Anderson R, Maguire B, Gerbert B. Compliance with infection control procedures among California orthodontists. Am J Orthod Dentofacial Orthop. 1992 Jul;102(1):68–75.
4. Russell AD. The Destruction of Bacterial Spores [Internet]. Inhibition and Destruction of the Microbial Cell. 1971. p. 451–612. Available from: http://dx.doi.org/10.1016/b978-0-12-361150-5.50021-3

5. Shintani H. Current Progress in the Sterilization of Spores and Vegetative Cells by Exposure to Gas Plasma: Sterilization, Disinfection and Antimicrobial Activity [Internet]. Gas Plasma Sterilization in Microbiology: Theory, Applications, Pitfalls and New Perspectives. 2016. p. 75–90. Available from: http://dx.doi.org/10.21775/9781910190258.08
6. Runnells RR. Infection Control in the Orthodontic Office. 1986. 102 p.
7. Senia ES, Marraro RV, Mitchell JL, Lewis AG, Thomas L. Rapid sterilization of gutta-percha cones with 5.25% sodium hypochlorite. J Endod. 1975 Apr;1(4):136–40.
8. Ehrmann EH, Boqinst A, Falna S. The sterilization of gutta-percha points [Internet]. Vol. 20, Australian Dental Journal. 1975. p. 157–60. Available from: http://dx.doi.org/10.1111/j.1834-7819.1975.tb04360.x
9. Linke HAB, Chohayeb AA. Effective surface sterilization of gutta-percha points [Internet]. Vol. 55, Oral Surgery, Oral Medicine, Oral Pathology. 1983. p. 73–7. Available from: http://dx.doi.org/10.1016/0030-4220(83)90309-2
10. Marin PD. A Review Of The Sterilisation And Storage Of Gutta-Percha Points [Internet]. Vol. 22, Australian Endodontic Newsletter. 2010. p. 13–4. Available from: http://dx.doi.org/10.1111/j.1747-4477.1996.tb00011.x
11. Cohn SA. Sterilisation of Paper and Gutta Percha Points [Internet]. Vol. 14, Australian Endodontic Newsletter. 2010. p. 12–12. Available from: http://dx.doi.org/10.1111/j.1747-4477.1988.tb00785.x
12. Carvalho AS. Avaliação dos métodos de desinfecção de brinquedos utilizados em consultórios odontológicos [Monografia de Especialização]. Campinas: Centro de Estudos Odontológicos São Leopoldo Mandic; 2000.
13. Klein G, Klein E. Antigenic Behavior of Moloney Lymphomas: Independence of Virus Release and Imunosensitivity [Internet]. Vol. 145, Science. 1964. p. 1316–7. Available from: http://dx.doi.org/10.1126/science.145.3638.1316
14. Spaulding EH. Alcohol as a Surgical Disinfectant [Internet]. Vol. 2, AORN Journal. 1964. p. 67–71. Available from: http://dx.doi.org/10.1016/s0001-2092(08)70453-8
15. Smith CR, Richard Smith C. Alcohol as a Disinfectant against the Tubercle Bacillus [Internet]. Vol. 62, Public Health Reports (1896-1970). 1947. p. 1285. Available from: http://dx.doi.org/10.2307/4586265
16. Schaeffer, SCHAEFFER. Alcohol as a Disinfectant [Internet]. Vol. 125, The American Journal of the Medical Sciences. 1903. p. 739. Available from: http://dx.doi.org/10.1097/00000441-190304000-00055
17. Consolaro A, Pinzan A, Ursi WJS, Cuoghi OA, Pinto PRS, Diaz MCA. A hepatite B e a clínica ortodôntica. Ortodontia. 1991;Maio-Ago;24(2):53-8.
18. Reitas VMC, Roriz VC, Chiavini PCR, Young AAA, Bozzo RO, Telles EZ. Desinfecção e esterilização em ortodontia. RGO- Rev Gaúcha Odont. 2005 Out- Dez;53(4):335-8.
19. Myers R. Practical infection control in the dental office. Dent Today. 2000 Jun;19(6):88-91.
20. Woo J, Anderson R, Maguire B, Gerbert B. Compliance with infection control procedures among California orthodontists. Am J Orthod Dentofacial Orthop. 1992 Jul;102(1):68-75.
21. Wichelhaus A, Bader F, Sander FG, Krieger D, Mertens T. Effective disinfection of orthodontic pliers. J Orofac Orthop. 2006 Sep;67(5):316–36.

A Cost-Effective and Innovative Screening Approach, for Idiopathic Scoliosis in Girls, Before their Skeletal Maturity

Mudasir Rashid Baba[1], Ravindra Mohan Shenoy[2], Ajith Soman[3]

[1]Assistant professor, Yenepoya Physiotherapy College, Yenepoya (deemed to be) University, [2]Professor & Head Department of Orthopaedics, Yenepoya Medical College & Hospital Yenepoya (deemed to be) University, [3]Assistant Prof, College of Applied Medical Sciences, Dept of Health Rehabilitation Sciences, Shaqra University, Saudi Arabia

Abstract

Background: Adolescent idiopathic scoliosis is a three dimensional deformity of the spine with no identifiable causes. Early detection of scoliosis prevents progress into severe scoliosis in a growing child before the skeletal maturity**.** There are two critical stages in the development of body posture during the school years. These are the age when a child goes to school and the attainment of puberty. The growing children may show accelerated or retarded periods of growth at certain stages giving rise to a rapid or slow progression curve. In girls the pre-pubertal growth spurt falls in the age range of 10-13 years.

Objective: To identify high risk idiopathic scoliotic curve in pre pubertal school girls using non-invasive technique**,** Adams forward bending test (FBT), Scoliometer and I phone app.

Method: The present descriptive cross sectional study was conducted in pre pubertal girls aged 10-13 years enrolled in both the aided and unaided schools of Dakshana Kannada (Karnataka-India). All the willing students (n=600) were screened using physical examination (Adams forward bend test), Scoliometer device and Scoliometer application.

Results: A total of 24/600 of the pre pubertal girls were found to have asymmetrical back when physically examined in standing position with FBT, resulting in right thoracic level curve 3^0 , 5^0,7^0 . All 4% of the high risk identifiable participants had a reading $>5^0$ when screened using the Scoliometer device and I phone App i.e. similar results were obtained. Body mass index (BMI) was increased in some of the positive cases.

Conclusion: The study found that the inclination degree of 5° or greater is more acceptable in early detection of scoliotic curve before the skeletal maturity of the spine. This predictive value was satisfactory to advocate the school screening programme in early detection of scoliosis**.**

Key words: *idiopathic scoliosis, skeletal maturity, scoliometer, scolioguage, BMI*

Introduction

Adolescent idiopathic scoliosis (AIS) is defined as a three dimensional (3D) deformity of spine [1-3], with no recognizable causes,[4] in an otherwise healthy growing child. The children with AIS on inspection have a trunk asymmetry, which accentuates when bending forward. The accentuation results due to the prominence of the costal or lumbar hump in a forward bending position.[5] The reported prevalence of Idiopathic scoliosis is about 0.4 to 7% among adolescents in Asian countries.[6] Scoliosis can affect a child's appearance, may lead to symptoms of pain, and can lower a child's self-esteem due to a feeling of social isolation.[7] There has never been a universal agreement about scoliosis screening due to its controversial nature, therefore, the screening efforts vary considerably around the world.[8] Many countries

Corresponding Author:
Mudasir Rashid Baba
Assistant Professor & PhD Scholar, Yenepoya Physiotherapy College, Yenepoya (deemed to be) University, +917899466841
Email: mudasirrashid@yenepoya.edu.in

including USA, UK and Japan have legislated scoliosis screening programmes and have included screening in the health curriculum of their schools.[9] It is important that scoliosis be diagnosed between the ages of 10 and 15 years. The early identification of potentially progressive curves allows conservative management in the form of physiotherapy and bracing allowing the patient to avoid surgery for the correction of developing curve.[10] The human skeleton comprises of two periods of rapid growth, the first one between the birth to 5 years and the second one at the onset of puberty.[11] The body posture is influenced by two critical stages of development during the school years, when a child starts school, and at the attainment of puberty. The rapid or slow rate of progression in curve may result due to certain faster or slower periods of growth at certain stages during growth. The pre-pubertal growth spurt in girls falls in the age range of 10-13 years. The pre-pubertal girls have Risser 0 at standard, and are 0 before the onset of menarche with a progression factor at 2, which represents a risk for being progressive of 90%. The risk of progression can be calculated using Lonstein and Carlson (1984) formula.[12] They carry risks to the quality of the body posture, in the age range of 6-7 and 12-16 years old, i.e., during the puberty stage. The child is exposed to the vulnerability of various external features during this stage and the development of the muscular system does not follow the rapid growth of the bones.[13] The bone density and its metabolism have been correlated with the serum levels of tartrate-resistant acid phosphatase serum band, 5(TRAP5b). Lower bone density in AIS patients show higher rate of bone resorption.[14] High peak bone mass is directly related to high physical activity.[15-17] As a higher gain than the loss in the density of bone occurs during the pre-pubertal period, it is the perfect period for physical training compared to the rest of the lifetime.[18,19] The reported incidence of scoliosis was 0.2%, favouring girls more than the boys in the ratio of 2.2:1.[7] The scoliosis research society (SRS) considers scoliometer, used alone with Adams forward bending test (FBT) as a reliable and valid measure for trunk asymmetry.[20] The scoliometer identifies any rotational deformity, associated with scoliosis in a very dependable and a simple fashion. Although, scoliometer shows low correlation with the lateral curvature of the spine, yet it shows a good reproducibility.[21] Advanced technology like, iPhones have been used for the measurement of asymmetry in the trunk and results indicate that such advanced tools are equally efficient to measure trunk asymmetry similar to conventional tools like manual protector. Furthermore, the use of iPhones consumes 15% less time for measurements than the conventional tools. The Mobile phones (with inclinometer application) can store measurement data in updated versions of the software for measurement of angle, and thus make these modern tools useful for clinical measurement applications.[22] The evaluations of the Scoligauge, iPhone application, show outstanding intra and inter observer dependability and validity comparable to that of Scoliometer. This application renders itself as an effective means for assessing clinical measurements and does not require a special adapter.[23]

This study was carried out for a cost-effective approach of screening 10 to 13-year old girls and to identify pre-pubertal girls with a potential progressive scoliotic curve.

Materials and Method

A descriptive cross-sectional study involving a total of 600 school-going girls, aged 10-13 years, enrolled in both aided and unaided schools. The permission was taken from the regional block education officers. Ethical clearance was obtained from the University ethics committee before recruitment of the participants. Informed consent and accent was obtained from the students and their parents, prior to the screening. Based on the student population data provided by the block education officers in 2018, participants were recruited by cluster sampling technique from 6 randomly selected clusters out of the 15 clusters from Dakshina Kannada, Mangalore, India. The screening was conducted in the school premises with permissions from the concerned management. Each student was accompanied by her mother and class teacher during screening. Physical examination was carried and students with altered gait pattern and other deformities were excluded from the screening. The girls had light clothing and without footwear during the examination. The physical attributes (height, weight, and age) were recorded using stadiometer to calculate the Body Mass Index (BMI). The Adam's forward bending test (FBT) was applied for the scoliosis screening. The test considered positive when back asymmetry in the form of a hump was detected. Further measurement of inclination degree using scoliometer and scolioguage was conducted when FBT was positive. The girls with positive FBT and scoliometer/ scolioguage angle of 3 degree or more were considered to pose some risks to the quality of the body posture, occurring during the puberty stage. The parents

of these girls were notified of the potential for progressive curves and referred to the orthopedic and physical therapy departments of the University hospital for further evaluation and treatment recommendations.

Results

Six hundred school girls in the age range of 10-13 years were screened for potential curves for scoliosis. (Table I). Twenty four pre-pubertal girls were found to have an asymmetrical back (hump detected, resulting in a positive Adam's forward bending test and scoliometer test. Body mass index (BMI) was increased in some of the positive cases (Figure 2).

Table 1: Frequency of Axial Trunk Rotation (ATR)

Sl.No		Characteristics of based on age of the study participants					ATR1 (in degree)	Type of curve		BMI2	Referral for radiography	
	Age	0	3	5	7	suspected	mean±SD	no	Right thoracic curve	mean±SD	no	yes
1.	10	158	1	6	2	2	.28±1.20 .25±1.14 .14±.93 .21±1.19	160	9	15.4786±2.5449 15.2339±2.7502 15.7691±3.0827 15.7942±2.3745	164	5
2.	11	149	2	4	2	2		151	8		156	3
3.	12	162	0	2	2	4		166	4		165	5
4.	13	97	0	0	3	2		99	3		97	5

Abbreviations used: ATR-Axial trunk rotation[1] .BMI-Body mass index[2]

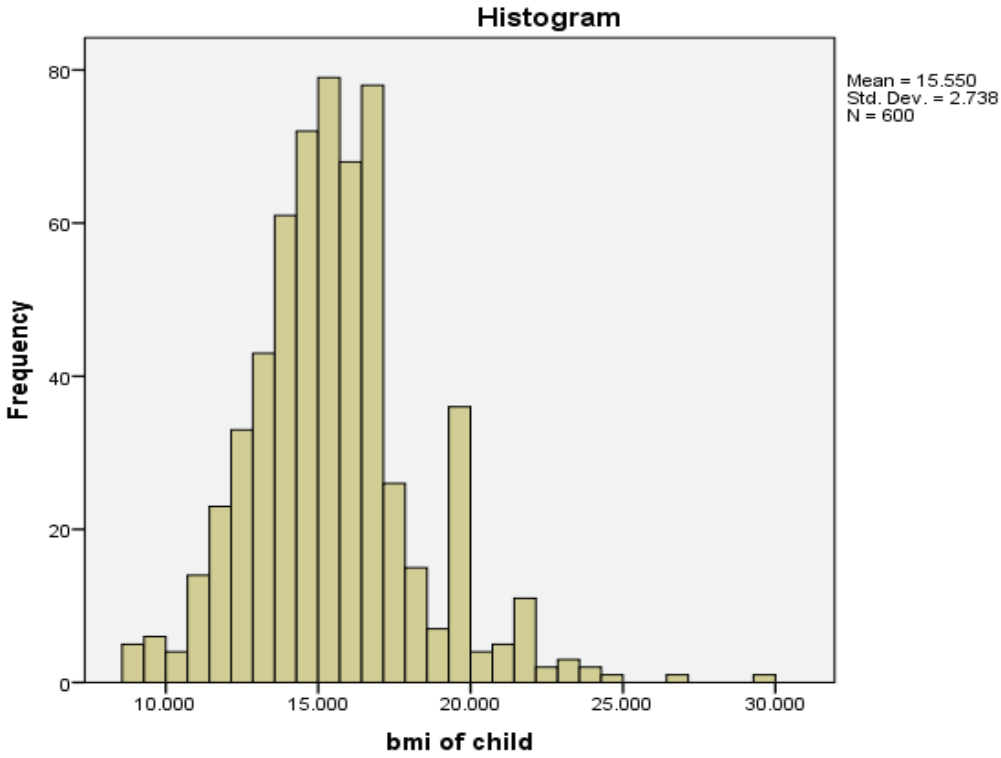


Figure 1: Body Mass Index (BMI) of 600 girls.

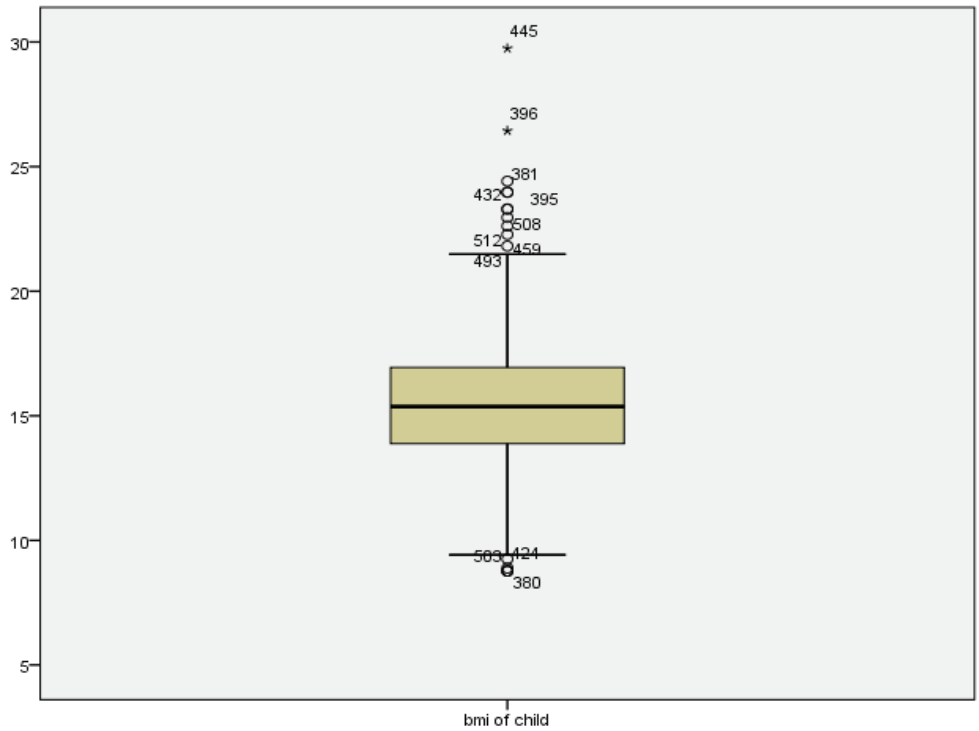


Figure 2: Body Mass Index (BMI) was increased in few of the positive cases.

Discussion

The overall prevalence of positive scoliosis cases among pre-menarche girls in the current study was 4%. The curvatures of 5°, 10° & 12° were witnessed at the thoracic level, inclined towards the right side when viewed from the backside. These findings are consistent with the epidemiological study from chongming island (china), which showed thoracic curves towards the right 60.3 %.[24] Another epidemiological study from Greece found that 75.5 % of thoracic curves were to the right side.[25] The current study showed increased BMI in some of the positive cases, in contradiction with a study by Chen JCY et al., (1999), which showed a significant relationship between severity of scoliosis and the BMI [26], while another study found no relationship between scoliosis and BMI.[27] American Academy of Orthopaedic Surgeons released a position statement that screening for spinal deformity should be part of the medical home preventive services visit. The screening is considered valuable in these domains: technical efficacy, clinical program, and treatment effectiveness. In order to identify high risk cases, scoliosis screening should be carried out and potential cases referred for further evaluation .[21] Screening is defined as 'the presumptive identification of unrecognised disease or defect by application of tests, examination or procedures, in a rapid manner.[28] The use of Scoliometer for the measurement of ATR is non-invasive, with no radiations and a cheap method of screening. It can be easily implemented and it has been proven to have a good correlation with radiological analysis ($r=0.7$, $p<0.05$) and a very good intra-rater reliability.[29,30] In this study a $>7^0$ scoliometer reading was taken as cut off which is in accordance with a study done by Raphael et al., in Norway.[31] The present study showed ATR $>7^0$ in the thoracic scoliotic curves. Similar findings >7 ^{0}application reading for thoracic scoliotic curves. The readings of the Sociometer device and Scoliometer HD application which are therefore similar. This is in agreement with a study done by Franko et al wherein the findings of the smart phone application were compared to those of the scoliometer device and thereby the application was validated as an efficient and cost effective tool for screening of scoliosis.[32] Therefore, the application was found to be more convenient due to its greater availability and cost effectiveness. We therefore suggest making the combination of FBT, scoliometer and scolioguage app as a screening tool.

Limitations of the study: The sample size was small and did not include both the genders. To obtain national prevalence rate, the authors suggest a regular nationwide screening of AIS. The data collected from a large population based screening could be used to

perform longitudinal study with minimum bias.

Conclusion

The prevalence rate of AIS in school going girls of age group10-13 years was evaluated in Dakshina Kannada region of India. The study also found that the inclination of 5° or greater is more acceptable in early detection ATR before the skeletal maturity of the spine. This predictive value was satisfactory to advocate the school screening programme for early detection of scoliosis.

Conflict of Interest: The authors declare no conflict of interest.

Acknowledgement: The authors thank Dr. Vinitha Ramanath Pai, Professor & Deputy Director, MPhil & PhD Program, Yenepoya University for spending her valuable time and lending her support during our work.

Funding: Yenepoya (Deemed to be University) Karnataka-India.

References

1. Heine J, Meister R. Quantitative analysis of the functions of the lungs and of blood-gases in young pa¬tients with scoliosis, using a "functionaldiagnostic minimal program". Z Orthop Ihre Grenzgeb 1972; 110:56-62.
2. Asher MA, Burton DC. Adolescent idiopathic scolio¬sis: natural history and long term treatment effects. Scoliosis 2006;1:2.
3. Weiss HR, Moramarco M. Scoliosis: treatment indications according to current evidence. OA Musculo¬skeletal Med 2013;1:1.
4. Perdriolle R, Vidal J. Thoracic idiopathic scoliosis curve evolution and prognosis. Spine (Phila Pa 1976) 1985;10:785-91.
5. Weiss HR, Lehnert-Schroth C, Moramarco M. Schroth therapy: advancements in conservative scoliosis treatment. Saarbruecken: Lambert Academic Publishing LAP; 2015.
6. Deepak AS, Ong JY, Choon D, Lee CK, Chiu CK, Chan C, et al. The Clinical Effectiveness of School Screening Programme for Idiopathic Scoliosis in Malaysia. Malaysian Orthopaedic Journal. 2017;11(1):41-46.
7. Saikia KC, Duggal A, Bhattacharya PK, Borgohain M. An epidemiological study of school children in Lower Assam. Indian J Orthopaedics. 2002;36(4):243
8. Grivas TB, Wade MH, Negrini S, et al: SOSORT consensus paper: school screening for scoliosis. Where are we today? Scoliosis 2007, 2:17.
9. Reamy Brian V, Slakey Joseph B. Adolescent Idiopathic Scoliosis: Review and Current Concepts. Am Fam Physician. 2001;64:111-6.
10. Spinal research foundation India, Screening procedure for spinal deformity. Available at http://www.srf-india.org/screeningprocedure.html. Accessed on 20 March 2017.
11. *Dimeglio A. Growth in pediatricorthopedics. In: Morrissy, R.T., Weinstein, S.L. (eds.) Lovell and Winter's Pediatric Orthopaedics, 6th edn, pp. 35–65. Lippincott Williams & Wilkins, Philadelphia (2006)*
12. Weiss HR: Physical therapy intervention studies on idiopathic scoliosis-review with the focus on inclusion criteria. Scoliosis 2012; 7:4.
13. Lizak D, Czarny W, Niewczas M. The problem of postural defects in children and adolescents and the role of school teachers and counsellors in their prevention. Scientific Review of Physical Culture 2016; 4:11-18
14. Ishida K, Aota Y, Mitsugi N, Kono M, Higashi T, Kawai T, et al. Relationship between bone density and bone metabolism in adolescent idiopathic scoliosis. Scoliosis 2015;10;19.
15. Goldberg CJ, Moore DP, Fogarty EE, Dowling FE: Adolescent idiopathic scoliosis: natural history and prognosis. Stud Health Technol Inform 2002;91: 59-63.
16. Asher MA, Burton DC. Adolescent idiopathic scoliosis: natural history and long-term treatment effects. Scoliosis. 2006; 1:2.
17. Hawes MC, O'Brien JP. The transformation of spinal curvature into spinal deformity: pathological processes and implications for treatment. Scoliosis 2006; 1:3.
18. Lonstein JE, Carlson JM: The prediction of curve progression in untreated idiopathic scoliosis during growth. J Bone Joint Surg Am 1984; 66:1061-71.
19. Weiss HR, Negrini S, Rigo M, Kotwicki T, Hawes MC, Grivas TB, et al. Indications for conservative management of scoliosis (SOSORT guidelines). Stud Health Technol Inform 2008; 135:164-70.

20. Labelle H, Richards S, De Kleuver M, Grivas T, Luk K, Wong H et al. Screening for adolescent idiopathic scoliosis: an information statement by the scoliosis research society international task force. Scoliosis. 2013;8(1).
21. Sanders JO, Polly DW, Cats-Baril W, Jones J, Lenke LG, O'Brien MF, et al. Analysis of patient and parent assessment of deformity in idiopathic scoliosis using the Walter Reed Visual Assessment Scale. Spine 2003; 28:2158-63
22. Shaw M1, Adam CJ, Izatt MT, Licina P, Askin GN. Use of the iPhone for Cobb angle measurement in scoliosis. Eur Spine J 2012; 21:1062-8.
23. Balg F, Juteau M, Theoret C, Svotelis A, Grenier G. Validity and reliability of the iPhone to measure rib hump in scoliosis. J PediatrOrthop 2014; 34 :774-9
24. Du, Q., Zhou, X., Negrini, S., Chen, N., Yang, X., Liang, J. and Sun, K. (2016). Scoliosis epidemiology is not similar all over the world: a study from a scoliosis school screening on Chongming Island (China). BMC Musculoskeletal Disorders, 17(1).
25. Koukourakis I, Giaourakis G, Kouvidis G, Kivernitakis E, Blazos J, Koukourakis M. Screening school children for scoliosis on the island of Crete, Greece. J Spinal Disord 1997;10:527-31
26. Chen JCY, Guo X. Persistent osteopenia in adolescent idiopathic scoliosis. A longitudinal follow up study. Spine. 1999;24:1218–22.
27. Burner WL, III, Badger VM, Sherman FC. Osteoporosis and acquired back deformities. J Pediatr Orthop. 1982;2:383–5.
28. Whitby LG. Screening for disease: Definitions and criteria. Lancet (London, England). 1974; 2(7884): 819-22.
29. Bonagamba GH, Coelho DM, Oliveira AS. Inter and intra-rater reliability of the scoliometer. Rev Bras Fisioter. 2010; 14(5): 432-8.
30. Coelho DM, Bonagamba GH, Oliveira AS. Scoliometer measurements of patients with idiopathic scoliosis. Braz J Phys Ther.2013; 17(2): 179-8
31. Adobor RD, Joranger P, Steen H, Navrud S, Brox JI. School screening and point prevalence of adolescent idiopathic scoliosis in 4000 Norwegian children aged 12 years. Scoliosis. 2011;6:23
32. Franko OI, Bray C, Newton PO. Validation of a scoliometer Smartphone app to assess scoliosis. J Pediatric Orthopedics. 2012;32(8):725

Household Health Care Expenditure and Utilization of Health Care Services: A Study in Dibrugarh District of Assam

Nilutpal Neog[1], Pranjal Protim Buragohain[2]

[1]Research Scholar, Department of Economics, Dibrugarh University, Dibrugarh, [2]Associate Professor, Department of Economics, Dibrugarh University, Dibrugarh

Abstract

Indian health care system is a complex one with the existence of high out of pocket health expenditure, low spending on health sector and also high cost of medical services etc. Increasing cost of medical services has become a serious concern over the years, heavy amounts of medical expenses creates financial pressure on households and the situation become more worse when they do not have any kind of financial protection and an even source of income. The aim of the present study was to investigate the utilisation and expenditure on health care services at household level. This study was conducted among 225 households of Dibrugarh district of Assam. There were 719 reported illness cases during the reference period, out of which 85.2% cases were treated at medical institutions, 9.3% cases were not treated due to financial constraints. The coverage of health insurance was found to be very low, only 12.45% households had any kind of health insurance. In the absence of any kind of financial support from any sources, some households had to borrow for medical expenditure. Expenditure per illness cases was highest in private hospital; sample households incurred average monthly expenditure of 11.35% of their income on health care. Regression analysis revealed that income, place of residence and educational qualification of the head of the household were the significant determinants of household health care expenditure. It is necessary for the government to improve health infrastructure, spending on health sector must be increase along with. Expansion of health insurance coverage particularly in rural and remote areas is much needed so that people can understand the benefits of being enrolled in health insurance.

Keywords*: Utilization, Expenditure, Health insurance, Health care services*

Introduction

For Economic growth, a wealthy workforce is recognized as an essential element. A healthy working population both physically and mentally can lead a nation to the path of sustainable development. Human capital formation can keep a country on a pillar of economic progress. Our country is featuring low spending on health care, unbalanced patient-doctor relation, problem of proper health infrastructure and all these lead to the popularization of the private health care sector. Providing proper health facilities has not been on the list of prime goal for the government. The country at present spending only 1.15-2% of its GDP towards medical sector. To be in a healthy state of mind with a sound body, government should take care of its people[1]. Development of private health care sector has made the cost of health care services expensive. Therefore it is difficult for the people to go for proper health care services or treatment who even find it difficult to fulfill basic needs. Due to some existing financial constraints govt. is not able to finance health services for the betterment of all and this compels the households to spend out of their pocket. High out of pocket expenditure put financial burden on households. MHFW, India figures out 70 % of total expenditure on health is out of pocket expenditure by households.

People can survive well in life when they are in a good health and to be in a good health, we should have access to health care services which is a fundamental right of every human being. The state should set the

Corresponding Author:
Nilutpal Neog
Research Scholar**,** Department of Economics
Dibrugarh University, Dibrugarh, Assam- 786001
Email: nilutpal900@gmail.com

prime objectives to ensure proper and productive health care facilities for its people. A large section of population from remote and rural areas still find it difficult to access medical services. Inadequacies of medical personals and poor infrastructure are the main drawbacks of public health system in India. According to the Rural Health Statistics 2017, almost 37% of health workers posts in India remain vacant, only 11% sub-centres and 13% primary health centres are functioning. Private health care services are such expensive today that households from lower income groups and even middle class often find it difficult to bear high cost of medical services, even it seen that some prefers treatment at home rather visiting a health institution.

Though government has taken initiatives in providing health services yet it is not able to succeed in it and huge out of pocket expenditure is also observed. It is evident that both expenditure on health care services and utilisation of health services have impact on health status.

In India utilisation of health care services has not good and this can be attributed to insufficient provision of health care services, ignorance, low level of household income. The problem of under utilisation of health care services is very severe in rural areas. The rural area doesn't have sufficient number of health institution and those that have also lack adequate equipments and infrastructure. In India more than 70 percent of its population still lives in rural areas and has limited access to health care services[2]. There exist wide gap between rural and urban population in terms of access and utilization of health care services. In case of health related issues high health care expenditure becomes a serious reason for poverty in poor households [3]. The performance of health system of a nation can be improved by properly delivering basic and quality health care services to its people.

Aim of the Study

In the phase of increasing health care cost and utilization of health care services, this study investigated the utilization and expenditure towards health care services. The study also examined the factors that have influence on determining health care expenditure at household level.

Method

The study investigated the choice and extent of utilisation of health care services. Along with this, expenditure towards health care services and the factors affecting the same have been analyzed. The study was conducted in Dibrugarh district of Assam. The district covers a wide network of health care institutions both private and public along with the only medical college in upper Assam division. A structured validated questionnaire covering information regarding socio-economic, demographic details, health care services utilisation and expenditure related information etc. was prepared to collect required information from 225 households. A multistage sampling method was used to select sample households. The reference period for the study was one year. The study was carried out during July 2016 to November 2016.Household information was collected considering one respondents from each households. The data were analyzed using Excel and SPSS Software.

Results

Utilization and expenditure on health care services depends upon socio economic condition of households. For socio economic information of households, types of house, religion, family type, religion, literacy, income and occupation were considered and analysed

Table 1 : Socio Economic Information

Household Characteristics	Variables	Frequency	Percentage
Types of House	Pucca	74	32.9
	Semi-Pucca	105	46.7
	Kutcha	46	20.4

Cont... Table 1 : Socio Economic Information

Religion	Hinduism	186	82.7
	Muslim	22	9.7
	Others	17	7.6
Family Type	Nuclear family	139	61.8
	Joint Family	86	38.2
Literacy	Illiterate	12	5.3
	Literate	213	94.7
Income	<5000	32	14.2
	5001-10000	68	30.2
	10001-20000	63	28.0
	20001-30000	32	14.2
	30001-40000	22	9.8
	>40000	8	3.5
Occupation	Salary	49	21.8
	Business	62	27.5
	Cultivators	85	37.8
	Self employment	16	7.1
	Others	13	5.8

Source : *Primary Survey*

Household's socio economic information revealed that (Table 1) majority 185 (46.7%) households had semi pucca house, Hinduism dominated 186 (82.7%) sample households, 139(61.8%) households belonged to nuclear family, 213 (94.7%) households head were literate. 68 (30.2%) households had monthly income in between ₹ 5001-10000, 85 (37.8%) households were engaged in agriculture activities.

Table 2 : Information on households health care services utilization	
Total reported illness cases	719
Not treated illness cases	67
Self treated illness cases	21
Treated using traditional medicine	18
Illness cases treated at medical institutions	613
Reasons for not seeking health care services	
Symptom is not severe	13
Long distance to health institutions	9
Lack of money	29
Not necessary (getting well without treatment)	16
Preferences towards health care providers (n=households)	
Public health care services	136
Private health care services	71
Others	18
Reason for choosing health care services (n=households)	
Cost	59
Distance	23
Quality of services	91
Facilities	34
Others	18
Responses on satisfaction of using Public health services	
Satisfied	186
Not satisfied	289
Responses on satisfaction of using private health services	
Satisfied	126
Not satisfied	12

Source : *Primary Survey*

There were 719 morbidity cases in the sample during the reference period. Majority of the illness cases, 613 (85.2%) were treated at medical institutions. Among the other cases, for 67 (9.3%) illness cases no medical treatment was sought, 21 (2.5%) illness cases were self treated. The most significant reasons that stand out for not seeking medical care was the lack of money, 29 (43.3%) cases remained untreated primarily due to financial constraints. Utilization of health care services involves preferences towards health care providers for medical services. As both public and private health care services exist and differs primarily in cost and quality of services, households can make choices for treating diseases. Majority 136 (60.4%) households preferred public health care services followed by 71 (31.6%) households towards private health care services and 18 (8.0%) households preferred indigenous or traditional system of health care services.

Health related expenditure is generally unpredictable. Expenditure involves in accessing and utilizing health care services made from direct income without any kind of financial assistance sometimes hampers household's day to day activities along with financial repercussions on households.

Table 3: information Relating Households health care expenditure	
Source of finance for health care expenditure (n=household)	
Income	115
Savings	68
Selling Assets	14
Borrowing	21
Insurance	7
Household covered under health insurance (n=household)	
Households with health insurance	28
Households without health insurance	197
Reasons for not having health insurance (n=household)	
No awareness	116
No illness	18
Financial constraints	23
Not necessary	31
No return for investment	9
Health expenditure and debt	
Number of households who borrowed	21
Total debt incurred (INR)	174000
Average amount borrowed (INR)	8285

Source : *Primary Survey*

It was observed that most of the households (51.11%) carried on their expenditure on health through disposable income only, 30.22% from savings, 6.22% households even sell their assets to meet their medical expenditure. Though health expenditure can help households to lower the financial burden, yet it was observed that only 12.44% households had any kind of health insurance. It was reported that 51.56% households were unaware of the benefits of health insurance, 13.78% households thought that they were not in the need of health insurance. 9.33 % households compelled to borrow for medical treatment.

Table 4 : Out of pocket expenditure per illness cases

Health Care Institution	No of treated illness	Mean expenditure per illness cases SD (INR)
Public	475	683.3±549.6
Private	138	1563.8±1290.2

Mean out of pocket health care expenditure per illness cases was highest in private health care institute, (1563.8±1290.2. INR). Majority of the reported illness cases (77.48 %) were treated at public health institute, 22.52% cases were treated at private health institute.

Table 5 : Descriptive statistics regarding health care expenditure

Variables	Mean	SD	Mini.	Max.
Monthly income	8864	9326.4	5500	40000
Food Expenditure	1954	2361.3	1000	3000
Non Food expenditure	3628	4137.2	2500	8000
Expenditure on Health care	11.3	16.2	7.0	22.0

Mean monthly income of the households was 8884 with a minimum of ₹ 5500 and a maximum of ₹ 40000, mean monthly food expenditure was ₹ 1954 with a minimum of ₹ 1000 and a maximum of ₹ 3000, mean non food expenditure was ₹3628 and it ranges from and it ranges from ₹2500 to ₹8000. The mean monthly expenditure on health care incurred by the households was 11.3% with a minimum of 7% to a maximum of 22%.

To identify the factors that may have significant association with household's health care expenditure, a multiple regression was conducted. Regression analysis of the influence of socio economic and demographic variables on household's health care expenditure is presented in table 6.

Table 6 : Multiple Regression showing variables influencing health care expenditure				
Variables	**Unstandardized Coeffiients B**	**Std. error**	**t**	**Sig.**
Income	.095*	0.26	4.278	0.03
Age	27.188	11.797	2.305	1.161
Occupation of the head of the household	-98.005	112.468	-.238	.812
Nature of disease	784.812	363.088	-1.057	.730
Place of Residence	618.047*	412.468	4.997	.001
Household Size	-29.630	373.708	-.153	.411
Educational qualification of the head of the household	538.246***	221.34	2.813	0.07
Choice of health care providers	168.706	93.29	1.008	0.95

R^2= .549

Variables income, place of residence, educational qualification of the head of the household was statistically significant determinants of household health care expenditure. Income, place of residence (dummy, 1= rural, 0= Urban), education level of the household head had positive impact on household health care expenditure.

Discussion

The study considered 225 sample households among which 129 households (57.33%) were from rural areas and 96 households (42.67%) were from rural areas. Majority 46.7% households had semi pucca houses, 61.8% households belonged to nuclear family. 30.2% households had monthly income in between ₹5001-10000 and 37.8% households were engaged in agriculture activities.

As fount in the study there were 719 reported illness cases during the reference period among which 67 illness cases were not treated, and the most reported reason that came out for the same was lack of money. Majority (60.45%) households preferred public health care services, 40.45% households gave importance on quality of medical services, 26.22% households on cost of health care services while choosing medical institute for health services. Out of 475 illness cases which were treated at public health institute, in 60.85% cases people were not satisfied with the services. The poor quality of services in public health institute were mainly attributed to non availability of medicines, laboratories insufficient medical personals [4]. In a study in Tamilnadu, Kumar and Sobajasmin found that 67.7% respondents were not satisfied with the services provided by the government hospitals, 53.7% reported that private hospitals were efficient for them and these findings were similar to this study [5].

The study also investigated the health care expenditure pattern of households towards medical services. Health care related expenditure is generally unpredictable and expenditure made on health services directly from income without getting any financial support from any party (termed as out-of-pocket expenditure) may sometime put financial pressure on households. There were 713 illness cases during the recall period. 51.11% households used current income, 9.33% households borrowed money to financed health care services payments. The coverage of health insurance was found to be very low among the sample households, only 12.45% households had at least one family member covered under any kind of health insurance. The most important reason for non enrollment of health insurance was no awareness (54.56%). In the study area people were not aware of the benefits of having health insurance and they were also unaware about various health insurance schemes and policies. A study carried out in Sikkim on 2018 found that 38% were unaware of health insurance [6]. A total of 21 households had incurred a debt of ₹17400 for health care services, 5 households borrowed from

financial institutions, 16 households borrowed from other sources. 77.48% illness cases were treated at government hospitals, 21.52% treated at private hospitals. Most of the government health care services are almost free, yet cost of private health care services is increasing day by day. This study found that expenditure per illness case was highest in private hospitals, (1563.8±1290.2, INR). The sample households incurred mean monthly expenditure of 11.3% of their income.

Though all variables namely income, age, education, nature of disease, place of residence and educational qualification of the head of the households have some effect on health care expenditure of households, only income, place of residence, educational qualification of the head of the household were statistically significant determinants of household health care expenditure. These findings were similar to study done in 2014 by Olowolabi which revealed that education and settlement were the significant determinants of household health care expenditure [7].

Conclusion

In this study an attempt has been made to study the utilisation and expenditure on health care services and related issues at household level in the study area. Lack of quality services, insufficient medical staffs and the lack of modern medical equipments in government health institutions forced households to go for private health care services by paying higher charges. This situation can improve when the households can get proper medical services by spending less from their own pocket, high out of pocket health care expenditure can never be good for households. It is upmost importance that investment in public health sector designed in such a way that people can get the quality health services without paying much. It is equally important for households to understand the role of health insurance that can play vital role in reducing financial burden associated with medical services.

Acknowledgement: We thank all the respondents of this study for their kind co-operation in providing information.

Ethical Clearance: There is no issue for taking ethical clearance; the research work is done on the basis of field survey.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Begashaw B, Tesfaye, T. Health Care Utilization among urban and rural households in Esera District: Comparative Cross-Sectional Study. America Journal of Public Health Research. 2016, 4(2):56-61.
2. Bhanderi DJ. An Evaluation of the utilization of reproductive and child health provided by government to the rural community of Anand District, Gujarat. Indian Journal of Public Health 2009; 53(4):250-258.
3. Salem D, Umakanta D. Catastrophic payments for health care among households in urban Tamil Nadu India. *J. Int.Dev.* 2009, 21:169-184.
4. Somitra G. Catastrophic Payments and impoverishment due to Out-of-Pocket health spending. *Economic and Political Weekly*. 2011, XLVI(47):63-70.
5. Kumar M J, Shobajasmin K,S. An Analysis on service quality of government and private hospitals in Tamilnadu. International Journal of Pure and Applied Mathematics. 2018,120(5):287-298.
6. Jathana P N R, Dhamala, J D. Awareness and utilisation of health Insurance among selected population of state of Sikkim, India. Online Journal of Health and Allied Sciences. 2018, 17(2):1-4.
7. Olowolabi, OL. Determinants of household health care expenditure in an African Country [Online]. December, 2014. Available from URL:http://ssrn.com/abstract=2543002.
8. Gill HS, Kansara P. Prospective growth of health insurance in India. Pacific BussinessReview International.2014, 7(1):17-22.
9. Binnedik E, Koren R, Dror CM. Can the rural poor in India afford to treat non-communicable diseases? Trop Med Int Health 2012; 17:1376-85.

Effect of Specific Skill and Drill Training Combined with Pranayama Practices on Physiological Variable among Women Hockey Players

R. Ramya[1], D. Rajalakshmi[2], K. Alaguraja[1], K. Selvakumar[1], K. Kaviyarasan[1]

[1]Research Scholar, [2]Associate Professor, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamilnadu, India

Abstract

The purpose of the present study was to investigate the Effect of Specific Skill & Drill Training combined with Pranayama Practices on Physiological variable among Women Hockey Players. To achieve the purpose of the study thirty women hockey players were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 18 to 25 years. The selected subjects were divided into two equal groups consists of 15 women players each namely experimental group and control group. The experimental group underwent combined concurrent strength training and yogasana practices programme for six weeks. The control group was not taking part in any training during the course of the study. Cardio respiratory endurance was taken as criterion variable in this study. The selected subjects were tested on cardio respiratory endurance was measured through coopers 12 min run/walk test. Pre-test was taken before the training period and post-test was measured immediately after the six week training period. Statistical technique't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to Specific Skill & Drill Training combined with Pranayama Practices given to the experimental group on cardio respiratory endurance when compared to control group.

Keywords: *Specific Skill & Drill Training, Pranayama practices, cardio respiratory endurance and 't' ratio.*

Introduction

Cardiac endurance is essential factor that can be determined the performance of the hockey players during the particular actives. Concurrent strength training made a unique method for promote the strength of an individual. Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations). To practising yoga regularly it can make you into sound body and sound mind. Yoga is the costless permanents treatment for more diseases[1]. It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole[2].

One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures)[3]. The science of Yoga Nidra is based on the receptivity of consciousness. When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical[4]. Training is a chain process that can be able to attain certain needs of the person's goal[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports[6]. Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy[7]. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person[8]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual[9]. Today's there is an escalating emphasis on

appearing smarter, feeling etter and living longer. In order to achieve these ideals as, scientific evidence tells us that one of the keys is high fitness and exercises[10]. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs of the person. It's a scientific process the person must be follow the basic principles yogasana practice[11]. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all[12]. Yogic action, or inner technique, such as breath control, parthasarathy., S[13].

Research Methodology

Selection of subjects

The purpose of the study was to find out the Effect of Specific Skill & Drill Training combined with Pranayama Practices on Physiological variable among Women Hockey Players. To achieve this purpose of the study, thirty women hockey players were selected as subjects at random. The age of the subjects were ranged from 18 to 25 years.

Selection of variable

Independent variable

Ø Specific Skill & Drill Training combined with Pranayama Practices

Dependent variable

Ø Cardio respiratory endurance

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as Specific Skill & Drill Training combined with Pranayama Practices (Experimental Group) and control group. The experimental group underwent Specific Skill & Drill Training combined with Pranayama Practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following physiological parameter namely cardio respiratory endurance was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable cardio respiratory endurance was measured through coopers 12 min run/ walk test at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis of the Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the pre and post tests of experimental and control group on Cardio respiratory endurance (Scores in meters)

Variables	Group	Mean		SD		Degree of freedom	't' ratio
		Pre	Post				
Cardio respiratory endurance	Control Group	1950.33	1952.66	76.21	71.99	14	1.05
	Experimental Group	1954	2047.33	67.23	58.85	14	17.75*

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on cardio respiratory endurance were 1950.33 and 1952.66 respectively. The obtained 't' ratio was 1.05, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on cardio respiratory endurance were 1954 and 2047.33 respectively. The obtained 't' ratio was 17.75* since the obtained 't' ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in cardio respiratory endurance. It may be concluded from the result of the study that experimental group improved in cardio respiratory endurance due to six weeks of Specific Skill & Drill Training combined with Pranayama Practices.

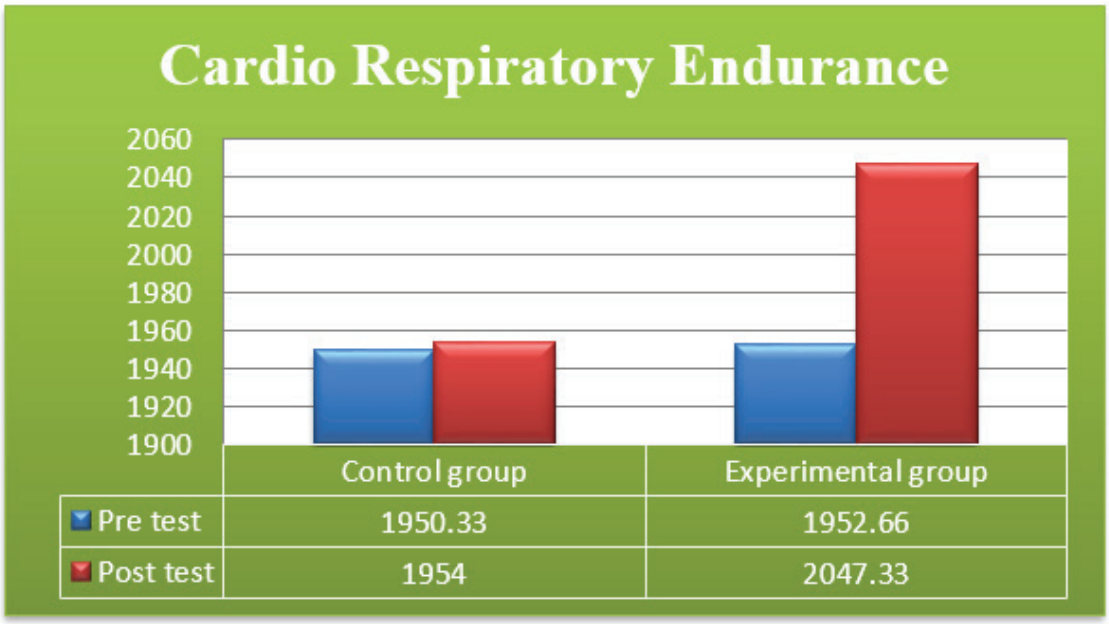


Figure-1: Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on cardio respiratory endurance

Discussions on Findings

The result of the study indicates that the experimental group, namely Specific Skill & Drill Training combined with Pranayama Practices group had significantly improved the selected dependent variable, namely cardio respiratory endurance, when compared to the control group. It is also found that the improvement caused by Specific Skill & Drill Training combined with Pranayama Practices when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on cardio respiratory endurance after the training period.

2. There was a significant improvement in leg explosive power. However the improvement was in favor of experimental group due to six weeks of Specific Skill & Drill Training combined with Pranayama Practices.

Source of Funding : Self funding

Conflict of Interest : Nil.

Ethical Clearance: With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state

that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research.* 2019; *9,* (10), pp. 73-74.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. *International Journal of Yoga, Physiotherapy and Physical Education.* 2017; *2*(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. *Indian Journal of Applied Research,* 2019; *9,* (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. *International Journal of Advanced Education and Research,* 2019; *4* (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research,2019; 9,* (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. *International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3* (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. *Journal of Information and Computational Science,*2019*; 9*(8), pp. 483-487.
8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 2019; 9* (10), pp. 73-74.
9. Alaguraja, K., & Yoga, P. Analyze of pranayama technique on physiological parameter among rural school students. *Journal of Information and Computational Science, 2019; 9*(8), pp.545-550.
10. Alaguraja, K., Yoga, P., James Rathinaraj, S., R., & Selvakumar, K. A study on yoga intervention on maximal oxygen uptake among stress patient. *Indian Journal of Applied Research,2019; 9* (9), pp. 38-39.
11. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 20019; 9*(10), pp. 73-74.
12. Selvakumar, K., & Yoga, P. (2019). Influence of yogic practice on flexibility among college students. *Indian Journal of Applied Research,2019; 9,* (7), pp. 45-46.
13. Parthasarathy., & Dhanaraj. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. *Indian Journal of Applied Research,2019; 9*(11), pp. 45-46.

Influence of Cognition Training on the Motor Skills of Infants Born Preterm at One Year of Age

R.Subbulakshmi[1], A.Rajarajeswari[2], R.Sivakumar[3]

Affiliation (Qualification, Designations With Institution Address) :

[1]Postgraduate – MPT (Neurosciences), [2]Associate Professor, [3]Professor, Faculty Of Physiotherapy, Sri Ramachandra Institute Of Higher Education & Research, Porur, Chennai, Tamil Nadu

Abstract

Background: The development of preterm infants differs widely than term infants and the these infants are at risk of developing neuro sensory, intellectual and behavioural disabilities. The neurodevelopmental growth of preterm infants constitutes 88.8% of cognitive disability and 84.4% of motor disability. Most of the interventions are physical in nature and doesn't seem to concentrate on cognitive aspects and little consideration is given at 1year of age.Cognitive rehabilitation therapies still exists but are not standardized, and left to the clinicians own design to arrive at scientific conclusion.

Aim: This study aims to find out the influence of cognition training on the motor skills of infants born preterm at one year of age.

Methodology: Infants born preterm around one year of age, of both genders who come under inclusion criteria were taken to the study. Prior informed consent was obtained from the parents. Infants were screened using Bayleys scale of infant development for cognition and motor skills. Cognition training was given for a period of one month.

Results: The analysis of this study concludes that cognition training improves motor skills that are affected in infants born preterm.

Conclusion: The analysis of this study concludes that cognition and motor skills are affected in pre term infants. Cognitive training improves motor skills in infants born preterm at one year of age.

Keywords: *Cognition training, preterm infants, gross motor function, fine motor function.*

Background of the Study

Recovery of preterm infants depends on plasticity which refers to good prognosis and vulnerability referring to poor outcomes. The immature brain lacks to do skills resulting in slow recovery.[1]

Corresponding Author :
A. Rajarajeswari
Associate Professor, Faculty of Physiotherapy,
Sri Ramachandra Institute of Higher Education &
Research, Porur, Chennai – 600116, Tamil Nadu
India**,** Email ID : rajarajeswari@sriramachandra.edu.in

The development of preterm infants differs widely than term infants and the these infants are at risk of developing neuro sensory, intellectual and behavioural disabilities. The neurodevelopmental growth of preterm infants constitutes 88.8% of cognitive disability and 84.4% of motor disability.[2]

Research suggests maximum synaptic density at 1 -2 years of life.[3] Increased production of the above leads to adaptation, leading to better recovery.

Also the first stage of psychosocial development occurs between birth and one year of age, which gets disrupted when infant born preterm.[4]

Cognitive and motor impairments are the major sequelae, in which innate ability of understanding environment constitutes higher order complex skills (cognition) and ability to interact with environment constitutes simple lower order skills (Motor).[5]

Even though the chronological growth of infants are fine, as infant ages ,the demands placed by the environment on them increases resulting in inability to manage the environment leading to deficits.[5]

An infant with deficits is often assessed for motor outcomes predominantly than cognition, that is often ignored.[6]

To understand an infant, motor aspects together with cognition should be considered and emerging trends should focus on these priorities.If not focused the brain will go for "use it or lose it" principle.Also double hazard, the problems with neural processes and environmental factors affecting the infants recovery can be ruled out.[7]

Early interventions refers to prevention focused programs occurring soon after birth when infant is plastic and the interventions are more likely to have maximal impact. Most of the interventions are physical in nature and doesn't seem to concentrate on cognitive aspects and little consideration is given at 1year of age.[7]

Cognitive rehabilitation therapies still exists but are not standardized, and left to the clinicians own design to arrive at scientific conclusion.[8]

Even in adult population, cognitive therapies are yet to meet perfection.

Some of the studies which developed as concepts are,

1.Attention is the foremost component to be projected and trained than advanced skills like memory and problem solving.

2.Presence of an action execution and observation matching system in 6 month old human infants and sensory motor cortex of infants was also activated during observation of a moving object on TV screen.

3 .22 week old fetuses shows an advanced level of motor planning compatible with execution of intentional action.

This study relies on interventions of cognitive aspects to the infants with developmental delay. They are designed, applied and assessed for the outcomes after a certain period of time and tried to exhibit the influence of cognition training on motor skills of infants born preterm at one year of age.[9]

Aim of the Study

To study the influence of cognition training on the motor skills of infants born preterm at one year of age.

Objectives:

To find out

1. Cognitive involvement
2. Motor involvement
3. Influence of cognition training on the motor skills

in infants born preterm at one year of age.

Methodology

Study Setting: Sri Ramachandra Medical center and hospital

Study Design: Interventional Study

Sample Size : 32 infants born preterm at one year of age

Sampling : Random sampling.

Inclusion Criteria:

- Infants born preterm around 1 year of age
- Both Genders

Exclusion Criteria:

- Congenital anomalies
- Un co operative infants.

Procedure:

Data collection was initiated following the approval of Institutional Ethical Committee (CSP/14/OCT/37/206).

Infants born preterm around one year of age of both genders who come under inclusion criteria were taken to the study. Prior informed consent was obtained from the parents. Infants were screened using Bayleys scale[10]

of infant development for cognition and motor skills pre & post cognition training.The techniques used in this study are based on evidences and good results have been obtained.The training programme include:

a. Identifying the reward, when hidden under a wash cloth done by the mother to the infant and the infant observes it and as a progression the infant does it after it adapts to the play.

b. When sat in a cot or holding infant in the hand, a toy is squeezed and put down on the floor and the child searches for the fallen toy towards the floor.

c. Moving an object horizontally and vertically to make the infant follow it.

The first exercise concentrates on executive function, and the other two exercises concentrates on attention. The exercises were taught to the mother and was asked to do it thrice a day for a month. The infants were assessed after a month with BSID.

Results

The collected data was analysed with SPSS 16.0 version.

TABLE: 1 Cognition distribution

Cognition			
		Frequency	Percent
Valid	Below Average	21	65.6
	Average	11	34.4
	Total	32	100.0

TABLE: 2 Gross motor function distribution

Grossmotor			
		Frequency	**Percent**
Valid	Below Average	13	40.6
	Average	17	53.1
	Superior	2	6.3
	Total	32	100.0

TABLE: 3 Fine motor distribution

Finemotor			
		Frequency	**Percent**
Valid	Below Average	13	40.6
	Average	17	53.1
	Superior	2	6.3
	Total	32	100.0

There is significant association between the gross motor skills and cognition with the p value =.031

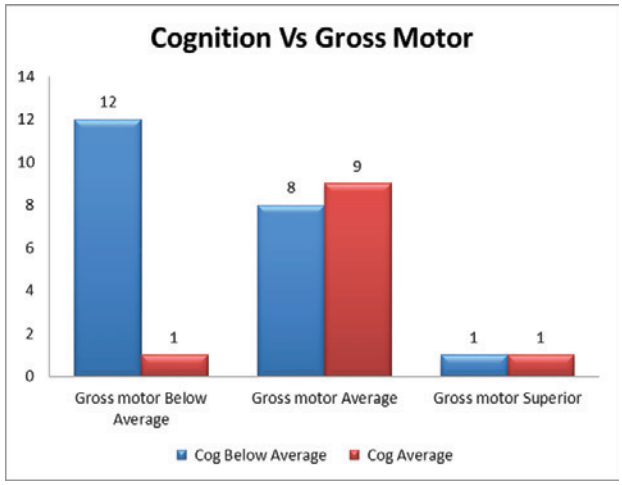


FIGURE : 1 Graphical representation of extensibility of relationship between cognition and gross motor skill

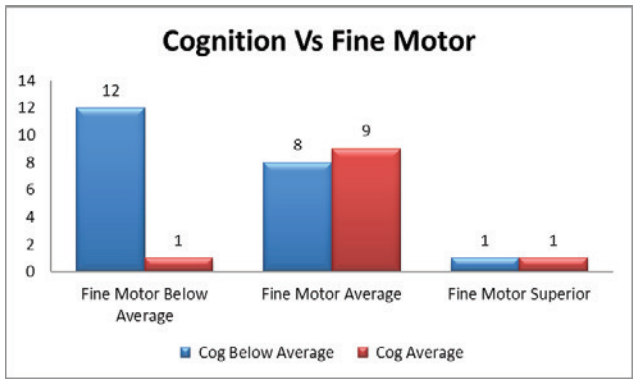


FIGURE: 2 Graphical representation of cognition and Fine motor relationship

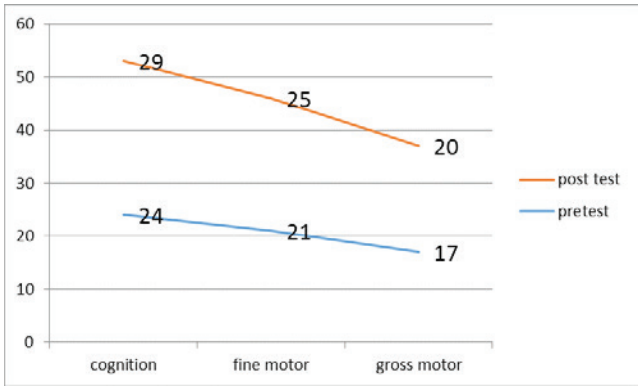


FIGURE : 3 Pre & post scores of cognition, fine motor & gross motor skills

Bayleys scale analysed the skills in infants and it comprised of raw score, scaled score and composite score.[10]

The interventions in this study gave a phenomenal prognosis in the preterm infants in the raw score of BSID which serves as back bone for the study. This result gave a sophisticated authentication that cognitive skills are influencing motor skills. Eventhough there was no change in the final score of BSID, the minute changes were evident from the performance aspect during reassessment.[11]

When trying to find out the relationship between the two, Jan piek discussed that, motor performance influences cognitive performance at later ages which made to think in vice versa which served as a background for this study, which also supports Vander Fels's view that motor skills are improving cognition.[9]

Authors like Roebers and Davis proved that motor and a executive function are highly correlated which supports our study that showed good significant association in both the skills.[12]

This helps to provide a new insight in the field of rehabilitation of infants, which paves the way for better outcomes.

To support strong evidence to support clinical practice and maximize the independence of infants, researches has to be carried out using the cognitive interventional programmes to promote overall skills improvements.

Conclusion

The analysis of this study concludes that cognition and motor skills are affected in pre term infants. Cognitive training improves motor skills in infants born preterm at one year of age.

Ethical Clearance : Taken from Institutional Ethical Committee of Sri Ramachandra Institute of Higher Education & Research.

Source of Funding : Self funded

Conflict of interest : NIL

References :

1. Blencowe H, Cousens S, Chou D, Oestergaard M, Say L, Moller A et al. Born too soon: The global epidemiology of 15 million preterm births. Reproductive Health. 2013;10 Suppl 1(Suppl 1):S2.
2. Pickler R, McGrath J, Reyna B, McCain N., Lewis M., Cone S et al. A model of neurodevelopmental risk and protection for preterm infants. The Journal of Perinatal & Neonatal Nursing.2010; 24(4):356–365.
3. Hasegawa M, Houdou S., Mito T, Takashima S, Asanuma K, Ohno T. Development of myelination in the human fetal and infant cerebrum: A myelin basic protein immunohistochemical study. Brain and Development. 1992; 14(1):1–6.
4. Rajagopalan V, Scott J, Habas P, Kim K, Corbett-Detig J, Rousseau F et al. Local Tissue Growth Patterns Underlying Normal Fetal Human Brain Gyrification Quantified In Utero. Journal of Neuroscience.2011; 31(8):2878-2887.
5. BOS A, ROZE E. Neurodevelopmental outcome in preterm infants. Developmental medicine & Child Neurology.2011;53:35-39.
6. Espy K, Stalets M, McDiarmid M, Senn T, Twik M. Executive functions in preschool children born preterm: application of cognitive neuroscience paradigms. Child Neuropsychol, 8(2), 83–92.8TH ed.Springler;2002.
7. Baroncelli L, Braschi C, Spolidoro M, Begenisic T, Sale A, Maffei L. Nurturing brain plasticity: impact of environmental enrichment. Cell Death Differentiation.2009; 17(7):1092–1103.
8. Spittle A, Orton J, Anderson P, Boyd R, Doyle L. Early developmental intervention programmes provided post hospital discharge to prevent motor and cognitive impairment in preterm infants. Cochrane Database of Systemic Reviews. 2015.
9. Bonnier C. Evaluation of early stimulation

programs for enhancing brain development. Acta Paediatrica, International Journal of Paediatrics. 2008;97(7):853-858.

10. Connolly B, Bengston J, Grice N, Dalton L, McCay B, Murphy W. Concurrent validity of the Bayleys Scale of Infant development II motor scale and the Peabody developmental motor scales - 2 in 12 month old infants. Paediatric Physical Therapy. 2005;17(1):76-78.
11. Cooke R W I, Foulder-Hughes L. Growth impairment in the very preterm and cognitive and motor performance at 7 years. Archives of disease in childhood.2003;88(6):482–487.
12. Robert G. Rates of early intervention services in very preterm children with developmental disabilities at age 2 years. Journal of Paediatrics and Child Health, 2008; 44(5): 276–280.

How Urbanization and Economic Growth affects the Health in East Asian Countries? Evidence from the VECM approach

Ramanpreet KAUR[1], TushinderPreet KAUR[2]

[1]Research Scholar, Lovely Professional University, Phagwara,
[2]Professor, Lovely Professional University, Phagwara

Abstract

The study targets to explore the answer to the question whether there exists any association between urban populations, GDP in East Asian countries and how does it affect the health of public. This research study analyses this concept using panel data of six East Asian countries China, Hong Kong Korea, Japan, Macao and Mongolia. The study has used World Bank indicators to fetch the data for the variables urban population and GDP for the time period 1990-2018. First of all, stationarity of the variables is checked by applying LLC, IP, ADF and PP unit root tests. Further, with the help of JFPC and VECM, the co-integration between these variables is checked. Hence, the results indicate that urban population and GDP in East Asian countries are related to each other in long run. The study could not found any short run co integration between variables. But increasing urbanization in these countries is also developing sustainable challenges in these countries. Thus, urbanization in East Asian countries is acting like a double edged sword. The relationship between urbanization and health varies for different levels of development. Thus the countries with high rate of urbanization need to develop such programs which can spur economic growth as well as environment sustainability in those countries.

Keywords: *Urban Population, GDP, Health, Johanson Fisher Panel Co-Integration, Vector error correction model, Panel Data*

Introduction

Urbanization is defined as the process of rural to urban migration and the concentration of people in urban areas. This process is playing a striking role in the expansion of the countries. Moreover, urbanization and economic development are considered as interdependent variables. Gallup et al (1999) in their study have mentioned that urbanization and economic development are inter-related. Both variables have cause and effect relationship with each other [(7)]. If we have a look at the global scenario of urbanization, in early nineteen's, only 10% population of the world was considered as urban. This percentage has now reached up to 55%. As per projections of UNDP, by the end of 2050, this ratio will be 68% of the total population of the world [(16)]. Asia and Africa are the two continents which are observing rapid urbanization. As per UNDP projections, it is expected that 90% of the total urbanization of the world will take place in these two regions.

In the Asian region, East Asia is the continent with the highest urban population as compared to the other regions of Asia. In 2000, this region was having a total population of 635 million and as per UNDP projections; this number will be 1075 million by 2020. In East Asian region, 80% of the total urban population is covered by China. The association between urban population and GDP varies from country to country. Fay and Opal (2000) in their study have shown a continuously increasing process of urbanization in Kenya without growth [(6)]. Collier (2006) in his study has shown that various low and middle-income countries have observed urbanization without economic growth [(4)]. On the basis of the views of different authors, it can be concluded that there exists doubt regarding the causal association between these variables.

Urbanization is a global phenomenon, but the level of urbanization is different in different continents. Alam et al (2007) mentioned that in the initial stages, urbanization positively influences economic growth. But later on, an inverse association between these two

factors can be seen. In the third stage, rapid urbanization can negatively impact the economy [1]. Turok (2013) argued that infrastructure and institutional settings also have their significant contribution in affecting the GDP of the economy. Thus, it is not always essential that urbanization alone is affecting economic growth [15]. Singh et al (2015) in their study has shown distinctive connection between urban population and growth of the economies in Pacific island economies. According to the results of their study, urban population pushes growth of the economies but there are various negative externalities which can actually undermine the effects of growth [13]. Liddle (2015) in his study has described about ladder effect of urbanization on growth of the economies. According to him, urbanization negatively affects growth of the economies in under developed countries; it has neutral effect on developing countries and positive impact on developed countries [11]. Sun et al (2019) in their study have described the specific association between urbanization and growth of the economies in developed countries. With the use of spatial econometric testing in their research study, they concluded that economic development of the developed countries is accelerating urban population [14]. The association between these two variables has become an extensive inquiry for economists as well as geographers these days. Various researchers have accepted this general consensus of influence of urban population on growth of the economies. But it is required to study urban population with ambivalence to discover the complex association between urban population and growth of the economies. Unplanned urban population in developing countries leads to socio economic challenges which negatively impact the growth of the economies through its negative externalities. Thus the study targets to explore this association between urbanization and GDP of the economies in Asian countries.

Methodology

The study is based on the analyses relationship between urban population and GDP of East Asian countries. Data for Urban population and GDP is fetched from World Bank indicators for the time period of 1991-2018. The variable urban population (% of the total population) is used as a proxy of urbanization and the dependent variable for this study is GDP of the selected countries. The research study has considered all the East Asian countries China, Hong Kong, Japan, Korea, Macao and Mongolia for this research analysis.

Following tables 1 and 2 are related to descriptive statistics of dependent and independent variables. We have used E-Views 10 for the analyses of the data.

Table 1: Descriptive statistics (Urban Population)

	China	Hong Kong	Japan	Korea	Macao	Mongolia
Mean	41.79	99.97	84.46	59.89	99.96	62.09
Median	41.14	100.00	84.64	59.72	100.00	61.44
Max.	59.15	100.00	91.61	61.89	100.00	68.84
Min.	26.44	99.51	77.33	58.38	99.76	56.62
Std dev	10.29	0.092	5.929	0.9729	0.0674	4.989
Skewness	0.1393	-4.4007	0.0164	0.4704	-1.8746	0.1381
Kurtosis	1.7149	21.571	1.2367	2.2530	5.1557	1.2690

Source: Calculated Using E-Views

Table 2: Descriptive statistics (GDP)

	China	Hong Kong	Japan	Korea	Macao	Mongolia
Mean	8.83	2.56	3.90	1.13	3.51	1.74
Median	5.77	2.24	3.88	1.10	2.48	1.23
Max.	2.54	4.80	5.48	2.09	8.14	4.35
Min.	1.12	9.99	2.42	3.55	9.01	6.31
Std dev	7.44	1.17	9.30	5.24	2.57	1.19
Skewness	0.812	0.402	0.080	0.171	0.638	0.888
Kurtosis	2.365	1.820	1.743	1.815	1.817	2.376

Source: Calculated Using E-Views

Econometric Modeling

In this study, econometric modeling is used to inspect the causal association between urbanization and GDP in East Asian countries. We have assumed a simple panel data models for urban population and GDP with standard auto regressive component as

$$urb_{it} = \phi_i urb_{i,t-1} + \alpha_i d_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$gdp_{it} = \phi_i gdp_{i,t-1} + \alpha_i d_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where i and t represents cross section dimensions and time dimensions respectively, $d_{i,t}$ presents panel specific terms, $\varepsilon_{i,t}$ represents error term.

There are several tests which can be used for the purpose of testing co-integration among the variables, but it is crucial to decide about the use of these tests in case of panel data. JFPC test is considered as the best test for panel data. Pedroni (1999) and Kao (2004) have also proved about the specific results given by their tests in case of panel data but their tests only focus on one way co- integration. JFPC test shows whole panel based co-integration. The study has used the following model for this co-integration analysis.

$$\Delta Y_{it} = \Pi_i y_{it-1} + \sum_{j=1} \Pi_{ij} \Delta y_{it-j} + \varphi_i z_{it} + \varepsilon_{it} \quad (3)$$

Y_{it} in the above model is p x 1 vector of endogenous variable, p represents the number of variables, Π stands for long run p x p matrix and rank of Π remains always between 1 and p. The results of JFPC test are always presented through fisher statistics from the trace test and from max Eigen test. The study has used panel based VECM to check causality between the variables.

$$\Delta Y_t = C_0 + \sum \beta_i \Delta Y_{t-i} + \sum \alpha_i \Delta x_{t-I} + p_i ECT_{t-I} + u_t \quad (4)$$

$$\Delta Y_t = C_0 + \sum y_i \Delta x_{t-i} + \sum \varphi_i \Delta y_{t-I} + n_i ECT_{t-I} + \varepsilon_t \quad (5)$$

Δ in the above equations is a change operator and p_i, β_i and α_i are used as parameters. Error term which is derived from long run co integrating variable is termed as $ECT_{t-i.}$ In this model, disequilibrium level of the previous periods is used to present the change in dependent variable.

Results

For checking the stationarity of the data through panel unit root tests (PURT), we have used LLC, IPS, ADF and PP tests. Table 3 shows the results for variable GDP and Table 4 shows the consequences of the variable urban population.

PURT

Table 3: PURT for variable GDP

Methods	I(0)	I(1)	I(2)
Levin, Lin and Chu t	1.0000	0.4042	0.0000
Im, Pesaran and Shin W-stat	1.0000	0.0181	0.0000
ADF – Fisher Chi Square	0.9999	0.0000	0.0000
PP- Fisher Chi Square	1.0000	0.0000	0.0000

Source: Calculated Using E-Views

Table 3 shows that our independent variable GDP is non stationary at their level for ADF test and it is stationary for other three tests LLC, IPS and PP. Thus, The study has checked it for first order difference. In this case, it was non stationary for PPURT. But at second order difference, it was stationary for all the tests.

Table 4: PURT for variable Urban Population

Methods	I(0)	I(1)	I(2)
Levin, Lin and Chu t*	0.6067	0.0000	0.0000
Im, Pesaran and Shin W-stat	0.6323	0.0000	0.0000
ADF – Fisher Chi Square	0.0033	0.0000	0.0000
PP- Fisher Chi Square	0.0189	0.4728	0.0000

Source: Calculated Using E-Views

Table 4 shows non-stationarity of our dependent variable urban population at level for all PURT i.e. LLC, IPS, ADF-Fisher Chi square and PP- Fisher Chi square. Thus, the study checked it for first order difference. In this case, it was non stationary for Phillips-Perron unit root test. But at second order difference, it was stationary for all the tests.

Results of Johanson Fisher Panel Co integration (JFPC)

Table 5: Johanson Fisher Panel Co integration

Hypothesized	**Fisher Statistics**		**Fisher Statistics**	
No. of CE(s)	(From trace test)	Probability	(From Max-Eigen test)	Probability
None	299.0	0.0000	56.76	0.0000
At most 1	28.63	0.0045	28.63	0.0045

Source: Calculated Using E-Views

Table 5 shows the results of JFPC. According to the results, it can be said that there exists at least one co integration in the variables used in this study. There are only two variables GDP and urban population. JFPC test indicates there exist co-integration between these variables.

Results of Vector Error Correction model

Table 6: Vector Error Correction model

	Coefficient	**Standard Error**	**t- statistic**	**Probability**	**Dependent variable**
Co integration Eq 1	-0.001111	(0.00057)	[-1.95135]	0.0000	Urb
Co integration Eq 2	-6.15E+08	(3.3E+08)	[-1.85749]	0.0642	Gdp

R-Squared	0.938876	Mean dependent var	0.383737
Adjusted R-squared	0.936839	S.D. dependent var	0.521785
S.E of regression	0.131134	Sum squared resid	2.579431
Durbin-Watson stat	2.010848		

Source: Calculated Using E-Views

VECM model is used for further analyses because of same order integration of variables in JFPC test. Table 6 shows the results of VECM. The first co-integration equation shows that value of C1 is negative and the value of probability is significant which is a symbol of long run association of the variables. Value of coefficients shows speed of adjustment of variables. Negative value of coefficient and the significant p value show causal association between urban population and GDP of the countries in the long run. From second variable, the value of coefficient is negative, but p value is not significant. Thus we can say that urban population and GDP have long run relationship.

Results of Wald test

Table 7: Wald Test

Test Statistics	Value	DF	Probability
Chi Square	0.281669	2	0.8686

Source: Calculated Using E-Views

Wald test is used to explore causal association between these variables in the short run. According to this model, no such association exists between these variables because of insignificant probability values.

Discussions

The results of PURT describe that at level and first difference, the variables urbanization and economic growth were not stationary. But these variables showed stationarity, when they were tested at second difference. Results of JPFC proved that there exists only one co integration equation for these variables. Further the results of VECM proved that urban population and GDP have long run relationship in East Asian countries and as per the results of Wald test there is no short run association between these variables. In short, urban population and GDP of East Asian countries are co-integrated in the long run. The study could not explore any short run association among urban population and GDP in same countries. The consequences of the study also show that there is no immediate influence of urban population on GDP in short run. But urban population of these countries significantly influences GDP in the long run. On the other hand, economic growth also influences urbanization in the long run. In East Asia, the countries with high rate of urbanization need to develop such programs which can spur economic growth in those countries. The governments of these economies need to focus on planned urbanization. Various researchers also focused on the influenced of economic development of the countries on urbanization (14). The VECM analyses of this study also shows that economic growth of the countries can accelerate urbanization only in long term. Moreover, in such countries, sustainable development programs are concentrated in cities. Thus, the governments need to develop such policies which can promote equitable benefits sustainable development programs in all the areas.

Conclusions

The research study concludes that in long run urbanization influences growth of economies positively in East Asian countries. In the short run, there exists no such association between these countries. As urbanization in East Asian countries is growing at higher rates, thus the government of the countries needs to design urbanization in such a way that it can spur economic growth of the economies. With the continuous urbanization of the world, concentration of negative effects on health due to increasing sustainable challenges in the countries is also increasing. This challenge becomes crucial in the regions such as East Asia where speed of urbanization is too high. Thus the government of the countries needs to adopt policies for ensuring equitable benefits of urbanization in the countries. To deal with the sustainable challenges in the countries, the governments must explore the forward and backward effects of urbanization. Analyses of forward condition of urbanization can be done on the basis of public services, non-farm activities in the countries and infrastructural facilities. Comprehensive analyses of these forward effects through social, economic and environmental aspects of urbanization can help in better analyses of its effect on the GDP of the countries. Policymakers in the countries should not only focus on acceleration of urbanization, but they should focus on the form of urbanization which can increase employment level, maintain environmental sustainability and can promote overall economic development of the countries.

Conflict of Interest: Nil

Source of Funding: Self-funding

Ethical Clearance: This paper is the original work and has not been published anywhere.

References

(1) Alam, Fatima, and Butt. 2007. "Sustainable Development in Pakistan in the context of energy consumption demand and environmental degradation." *Journal of Asian Economics* 18 (5): 825-837.

(2) Bertinelli, and Black. 2004. "Urbanization and Growth." *Journal of Urban Economics* 56: 80-96.

(3) Braungardt P. World Urbanization Trends [Internet]. Philosophical Explorations. 2019 [cited 13 December 2019]. Available from: http://braungardt.trialectics.com/projects/geography/

world-urbanization-trends/.

(4) Collier P. Africa: geography and growth. TEN. 2006 Jan 1.

(5) Dutt AK, Noble AG, Venugopal G, Subbiah S, editors. Challenges to Asian urbanization in the 21st century. Springer Science & Business Media; 2003 Dec 31.

(6) Fay M, Opal C. Urbanization without grown: a not so uncommon phenomenon. Working papers.

(7) Gallup JL, Sachs JD, Mellinger AD. Geography and economic development. International regional science review. 1999 Aug;22(2):179-232.

(8) Gong P, Liang S, Carlton EJ, Jiang Q, Wu J, Wang L, Remais JV. Urbanisation and health in China. The Lancet. 2012 Mar 3;379(9818):843-52.

(9) Henderson V. The urbanization process and economic growth: The so-what question. Journal of Economic growth. 2003 Mar 1;8(1):47-71.

(10) Woetzel J, Mendonca L, Devan J, Negri S, Hu Y, Jordan L, Li X, Maasry A, Tsen G, Yu F. Preparing for China's urban billion. McKinsey Global Institute. 2009 Mar;1.

(11) Liddle B. The energy, economic growth, and urbanization nexus across development: Evidence from heterogeneous panel estimates robust to cross-sectional dependence. The Energy Journal. 2013 May 1;34(2):223-44.

(12) Nguyen HM, Nguyen LD. The relationship between urbanization and economic growth: An empirical study on ASEAN countries. International Journal of Social Economics. 2018 Feb 12;45(2):316-39.

(13) Singh R, Niraj S, Swami S, Biman C. Urbanization and Economic Growth" An Empirical Study of Pacific Island Economies. Working Paper 2014/01. School of Economics Working Paper Series. Suva: University of the South Pacific; 2014 Mar.

(14) Sun J, Wang J, Wang T, Zhang T. Urbanization, economic growth, and environmental pollution: Partial differential analysis based on the spatial Durbin model. Management of Environmental Quality: An International Journal. 2019 Mar 11; 30(2):483-94.

(15) Turok I, McGranahan G. Urbanization and economic growth: the arguments and evidence for Africa and Asia. Environment and Urbanization. 2013 Oct; 25(2):465-82.

(16) UNDESA. Revision of World Urbanization Prospects. United Nation: Population Division of the United Nations Department of Economic and Social Affairs; 2018.

(17) Cities for all: Bridging the Urban Divide. [Internet]. www.unhabitat.org. 2019 [cited 13 December 2019]. Available from: http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2917.

(18) Urbanization trends in Asia and the Pacific. [Internet]. www.unescapsdd.org.2019 [cited 13 December 2019]. Available from:http://www.unescapsdd.org/files/documents/SPPS-Factsheet-urbanization-v5.pdf.

(19) World Bank. World Banks Group, Australian Aid: East Asia's Changing Urban Landscape – Measuring a Decade of Spatial Growth. World Bank Group; 2015.

Comparative Effect of Trunk Balance Exercise over Conventional Back Care Exercise in Patients with Chronic Mechanical Low Back Pain

[1]Ruchi Yogesh Khandhar, [2]Sathya P, [3]Jibi Paul

[1]M.P.T Student, [2]Associate Professor & Guide, HOD of Kinesiotherapy and Physical Diagnosis, School of Physiotherapy, D.Y.Patil Deemed to be University, Neru, Navi Mumbai

Abstract

Background: Mechanical low back pain refers to any type of pain caused due to abnormal stress and strain on muscles of the vertebral column. It can occur due to an acute traumatic event or cumulative trauma. The work place design is one of the major causes for Mechanical low back pain due to cumulative trauma. Mechanical low back pain also occurs due to poor posture, poorly-designed seating and incorrect bending and lifting habits.

Methodology: 40 patients with chronic mechanical low back pain were randomly divided into experimental group (group A, n= 20) that received trunk balance training exercises and hot packs, control group (group B n=20) received conventional back care exercises and hot packs for 3 days a week for 6 weeks. The single leg stance and star excursion balance test for static and dynamic balance assessed before and after treatment.

Results: Data analysis done using paired t- test showed there was a significant difference between pre and post analysis of both the groups. However when post analysis of both the groups were compared, experimental group showed higher difference as compared with control group.

Conclusion: Trunk balance training exercises was effective in improving static and dynamic balance in patients with chronic mechanical low back pain, and can be included in the treatment for patients with chronic mechanical low back pain.

Keywords: *Chronic mechanical low back pain, trunk balance training exercises, conventional back care exercises, single leg stance, star excursion balance test.*

Introduction

Back pain is an extremely common human phenomenon; a price mankind has to pay for their upright posture. Low back pain (LBP) is a most common public health problem, which involves muscles, nerves and bones of the back leads to disability.[1] [2] On the basis of duration low back pain is classified acute, sub-acute and chronic. It can be further classified as either mechanical, non-mechanical or referred pain on the basis of under lying cause.[3]

Mechanical low back pain is the pain in the lumbo-sacral region caused due to abnormal stress and strain on muscles of the vertebral column, where the pain increases due to physical activity with no radiation to foot or toes the common complaint in these.[4] The cause of mechanical low back pain may be an acute trauma or cumulative trauma. The work place design is one of the major causes for Mechanical low back pain due to cumulative trauma. The common clinical presentation shows that pain develops after movements that involve lifting, twisting or forward – bending. Multiple

Corresponding Author:
Dr. Jibi Paul, MPT, PhD
Professor and PhD Supervisor, Faculty of Physiotherapy, ACS Medical College And Hospital Campus, Dr. MGR Educational and Research Institute, Deemed to be University, Chennai-77
Email id: physiojibi@gmail.com

anatomical structures and elements of the lumbar spine (eg:-bones, ligaments, tendons and discs) are suspected to have a role. Educating patients on prognosis and incorporating psychosocial components of care such as identifying comorbid psychological problems and barriers to treatment are essential components of long-term management.[5]

Balance is a dynamic process by which the body's position is maintained in equilibrium, static or dynamic. Most of the balance intervention programs require a multisystem approaches. Balance exercises are exercises designed to improve balance or postural stability.[6] Postural balance is necessary to maintain normal daily life and physical activity, it involves active interactions of vestibular, visual and somato-sensory information. [7] Several studies have indicated that patients with LBP showed reduced postural control that is commonly manifested in balance problem. Maintenance and control of balance, under static or dynamic conditions, are essential for daily activities. Thus for patients with any musculoskeletal or neuromuscular disorders postural control is evaluated.

Assessment of balance is one of the essential parts in treatment of patients with low back pain as several studies have indicated that such patients have balance affection. Out of all the various methods available single leg stance and star excursion balance test are the test which are patient friendly and can be performed easily, thus these test were used for assessment of static and dynamic balance in this study.

The main purpose of the study was to find effectiveness of trunk balance training exercise in management of patients with chronic mechanical low back pain.

Materials and Method

The study conducted with 40 patients' aged between 18-45 years male and female subjects, diagnosed with chronic mechanical low back pain were recruited from outpatient department of physiotherapy, D.Y. Patil Hospital and Research Centre. Patients with inflammatory arthritis and chronic low back pain having surgical interventions were excluded from the study. Ethical clearance was obtained from institutional ethical committee. Informed consent was taken from the patients prior to evaluation and treatment sessions. The patients were then randomly divided into two groups using lottery method. The experimental group (group A, n=20) receiving trunk balance training exercises and control group (group B, n=20) receiving conventional back care exercises. Static and dynamic balance was assessed for pre and post interventions using single leg stance and star excursion balance test in patients of both the groups. Prior to treatment session the patients in both the groups were given hot packs for 15mins for pain relief. The patients were given exercises 3 sessions per week each lasting for 60 minutes with a total of 18 sessions over 6 weeks of treatment. The objective of this study was to see the effect of trunk balance exercise in patients with chronic mechanical low back pain on static and dynamic balance.

Table 1. Exercise Protocol for Experimental Group (Group A)

Sr.no	Exercise	Progression	Duration
1	Trunk, head & UL rotation from kneeling	Eye closure & head extension	30 secs each side 2 reps/ direction
2	UL flexion and extension with simultaneous head movement from kneeling	Eye closure	3 mins hold performing 6 reps of UL movements.
3	Pelvic bridging followed by raising one lower limb and extending knee.	Eye closure and ball under the foot resisting on couch	30 secs hold 2 reps for each LE.
4	Lifting opposite upper and lower limbs from quadrapued position.	Eye closure & pillows under LL	1 min maintaining for each combination of limbs.
5	Sitting on side of the couch with unilateral support.	Eye closure, crossing upper limbs across chest and pillow under LL.	1 mim hold.
6	Single limb kneeling on the edge of the couch.	Eye closure, head extension, crossing upper arm.	30 secs hold. 2c reps/ each limb.

Table 2. Exercise Protocol for Control Group (Group B)

Sr.no	Exercise	Progression	Duration
1	Supine lying –leg lifts	Unilateral leg lifts & both leg lifts	5 secs hold x 10 reps.
2	Crook lying- abdominal crunches	Crunches with rotation	5 secs hold x 10 reps.
3	Prone lying – leg lifts	Unilateral leg lifts & both leg lifts	5 secs hold x 10 reps.
4	Prone lying – trunk lifts	--------	5 secs hold x 10 reps.

Results and Analysis

The data analysis was done using SPSS software for windows version. Mean and standard deviation of all outcome measures were calculated. The significance level was set at $p<0.05$. The homogenesity of group was maintained. There were non- significant difference between both the groups at baseline measurement.

When pre and post mean values for single leg stance with eyes closed (SLSEC) for group A were compared the average difference was -1.305 secs with SD 0.546. The difference between mean SLSEC at pre and post level was statistically significant since p value=0.000 ($p<0.05$). When pre and post mean values for single leg stance with eyes closed (SLSEC) for group B were compared the average difference was -0.465secs with SD 0.79.The difference between mean SLSEC at pre and post level was statistically significant since p value=0.017. ($p<0.05$).

When pre and post mean values for single leg stance eyes open (SLSEO) for group A were comparison the average difference was -2.130 secs with SD 1.15. The difference between mean SLSEO at pre and post level was statistically significant since p value=0.000 ($p<0.05$). When pre and post mean values for single leg stance eyes open (SLSEO) for group B were comparison the average difference was -0.345 secs with SD 0.613. The difference between mean SLSEO at pre and post level was statistically significant since p value=0.021 ($p<0.05$).

Table 3. Comparison of pre and post mean values for star excursion balance test (Left Leg standing) for group A.

	Paired differences		t	SIG. (2-TAILED)
	Mean	Std. D		
*Presebtltant – postsebtltant	-3.575	1.462	-10.932	.000
*Presebtltam – postsebtltam	-4.525	5.485	-3.689	.002
*Presebtltal – postsebtltal	-4.950	6.076	-3.643	.002
*Presebtltmedial – postsebtltmedial	-4.900	3.615	-6.062	.000
*Presebtltlateral – postsebtltlateral	.625	7.868	.355	.726
*Presebtltpost – postsebtltpost	-5.475	7.280	-3.363	.003
*Presebtltpm – postsebtltpm	-5.875	6.943	-3.784	.001
*Presebtltpl – postsebtltpl	-5.225	6.122	-3.817	.001

Inference:

There was a statistically significant difference seen in parameters of SEBT (Left Leg standing) for group A since $p<0.05$ except for lateral ($p=0.726$) and anterorlateral ($p=0.442$) directions since $p>0.05$.

Table 4. Comparison of pre and post mean values for star excursion balance test (Right Leg standing) group A.

	Paired differences		t	SIG. (2-TAILED)
	Mean	Std. Deviation		
*presebtltant - postsebtltant	-4.800	2.098	-10.228	.000
*presebtltam - postsebtltam	-4.000	2.549	-7.016	.000
*presebtltal - postsebtltal	-4.825	2.504	-8.617	.000
*presebtltmedial - postsebtltmedial	-5.175	2.249	-10.289	.000
*presebtltlateral – postsebtltlateral	-4.925	3.613	-6.095	.000
*presebtltpost - postsebtltpost	-6.025	7.271	-3.705	.002
*presebtltpm - postsebtltpm	-5.250	7.826	-3.000	.007

Inference:

There was a statistically significant difference seen in parameters of SEBT (Right Leg standing) for group A since $p<0.05$.

Table 5 Comparison of pre and post mean values for star excursion balance test (left leg standing) for group B.

	Paired differences		t	SIG. (2-TAILED)
	Mean	Std. D		
*Presebtltant - postsebtltant	-1.050	.998	-4.702	.000
*Presebtltam - postsebtltam	-.950	1.700	-2.498	.022
*Presebtltal - postsebtltal	-.125	1.918	-.291	.774
*Presebtltmedial - postsebtltmedial	-.925	1.453	-2.846	.010
*Presebtltlateral – postsebtltlateral	-1.100	2.049	-2.400	.027
*Presebtltpost - postsebtltpost	-1.500	2.709	-2.476	.023
*Presebtltpm - postsebtltpm	-.800	2.567	-1.394	.179
*Presebtltpl - postsebtltpl	2.050	8.081	1.134	.271

Inference:

There was a statistically significant difference seen in all parameters of SEBT (left leg standing) for group B since $p<0.05$ except for anterorlateral, posterorlateral and posterormedial.

Table 6. Comparison of pre and post mean values for star excursion balance test (Right leg standing) for Group B.

	Paired differences		t	SIG. (2-TAILED)
	Mean	Std. D		
*Presebtltant - postsebtltant	-1.800	1.116	-7.208	.000
*Presebtltam - postsebtltam	-1.900	1.674	-5.073	.000
*Presebtltal - postsebtltal	-2.325	1.680	-6.188	.000
*Presebtltmedial - postsebtltmedial	-1.875	1.604	-5.225	.000
*Presebtltlateral – postsebtltlateral	-1.975	1.261	-7.001	.000
*Presebtltpost - postsebtltpost	-1.950	1.450	-6.014	.000
*Presebtltpm - postsebtltpm	-2.375	1.403	-7.567	.000
*Presebtltpl- postsebtltpl	-2.850	2.390	-5.332	.000

Inference:

There was a statistically significant difference seen in parameters of SEBT (Right leg standing) for group B since $p<0.05$

*SEBT- star excursion balance test, *ant- anterior, *am-anteriormedial, *al- anteriorlateral

*post-posterior, *pm- posteriormedial, *pl-posteriorlateral

Discussion

The main aim of the study was to compare the effect of trunk balance training exercises vs conventional back care exercises in patients with chronic mechanical low back pain. In this study 40 patients with chronic mechanical lowback pain were taken were randomly divided in to experimental group (group A- 20 patients) and control (group B – 20 patients). The subjects in experimental group were treated with trunk balance training exercises and control group were treated with conventional back care exercises. The results obtained in both the groups were statistically analysed.

The patients in experimental group had improvement in single leg stance (eyes closed with mean of 5.205 ± 0.97575 and eyes open with mean of 6.095 ± 2.18812). These patients also showed improvements in SEBT at $p<0.05$ pt in left leg standing at lateral and anterorlateral directions. The results were statistically significant since $p<0.05$.

The patients in control group had improvements in single leg stance (eyes closed with mean of 3.99 and eyes open with mean of 3.975). These patients also showed improvements in SEBT at $p<0.05$ except in left leg standing at anterorlateral, posterorlateral and posterormedial directions. The results were statistically significant since $p<0.05$. The pre and post analysis

of experimental group and control group showed improvements. But when post analysis of experimental and control group was compared, experimental group showed slightly higher difference as compared with control group. This shows that balance training exercises has significant improvement on static and dynamic balance of patients with chronic mechanical low back pain after 6 weeks of interventions.

This findings can be further supported by the study done by Hodges et al, Danneels et al Nourbakhsh et al, Anderson et al, Hides et al where trunk balance and strength training exercises were used in management of pain and disability of the patient and significant improvement was seen.[9],[11],[12],[13] Thus the study shows that there was significant improvement seen on static and dynamic balance in patients with chronic mechanical low back pain following trunk balance training exercises. [14],[15,[16]

Conflict of Interest: There was no conflict of interest to conduct this study.

Funding: This was a self funded study.

Conclusion

The study concludes that there was improvement in static and dynamic balance in patients with chronic mechanical low back pain following 6 weeks of trunk balance training exercises. Thus trunk balance training exercises can be included in the treatment of chronic mechanical low back pain.

References

1. Scholich SL, Hallner D, Wittenberg RH, Hasenbring MI, Rusu AC. The relationship between pain, disability, quality of life and cognitive-behavioural factors in chronic back pain. Disability and rehabilitation. 2012 Nov 1; 34(23):1993-2000.
2. Poitras S, Loisel P, Prince F, Lemaire J. Disability measurement in persons with back pain: a validity study of spinal range of motion and velocity. Archives of physical medicine and rehabilitation. 2000 Oct 1; 81(10):1394-400.
3. Magee DJ. Orthopedic physical assessment. St. Louis, Mo.: Saunders Elsevier. 2008
4. Brotzman SB, Wilk EK. Clinical orthopaedic rehabilitation 2 nd ed. Pennsylvania: Mosby. 1996.
5. Scott Will J, Bury DC, Miller JA. Mechanical Low Back Pain. American family physician. 2018 Oct 1; 98(7).
6. Kisner C, Colby LA. Therapeutic Exercise: Foundation and Techniques. New Delhi: Jaypee Brothers.
7. Nies N, Sinnott PL. Variations in balance and body sway in middle-aged adults. Subjects with healthy backs compared with subjects with low-back dysfunction. Spine. 1991 Mar;16 (3):325-30.
8. Kannabiran B, Nayak S, Nagarani R. Trunk balance exercises and strength training exercises in the management of pain and disability among the chronic low back pain individuals. Journal of Spine 2016; 5(6): 349.
9. Hodges PW. Is there a role for transversus abdominis in lumbo-pelvic stability?. Manual therapy. 1999 May 1; 4(2):74-86.
10. Hides JA, Jull GA, Richardson CA. Long-term effects of specific stabilizing exercises for first-episode low back pain. Spine. 2001 Jun 1; 26(11):e243-8.
11. Danneels LA, Vanderstraeten GG, Cambier DC, Witvrouw EE, Bourgois JD, Dankaerts W, De Cuyper HJ. Effects of three different training modalities on the cross sectional area of the lumbar multifidus muscle in patients with chronic low back pain. British journal of sports medicine. 2001 Jun 1; 35(3):186-91.
12. Nourbakhsh MR, Arab AM. Relationship between mechanical factors and incidence of low back pain. Journal of Orthopaedic & Sports Physical Therapy. 2002 Sep;32(9):447-60.
13. Andersson EA, Nilsson J, Ma Z, Thorstensson A. Abdominal and hip flexor muscle activation during various training exercises. European journal of applied physiology and occupational physiology. 1997 Jan 1; 75(2):115-23.
14. Panjabi MM. A hypothesis of chronic back pain: ligament subfailure injuries lead to muscle control dysfunction. European spine journal. 2006 May 1; 15(5):668-76.
15. Springer BA, Marin R, Cyhan T, Roberts H, Gill NW. Normative values for the unipedal stance test with eyes open and closed. Journal of geriatric physical therapy. 2007 Apr 1; 30(1):8-15.
16. Tsigkanos C, Gaskell L, Smirniotou A, Tsigkanos G. Static and dynamic balance deficiencies in chronic low back pain. Journal of back and musculoskeletal rehabilitation. 2016 Jan 1; 29 (4):887-93.

Behavioral treatment in autism spectrum disorder children by Repetitive motion control

S. Arun kumar[1], N. Nithyavathy[2], K. Suganeswaran[1]

[1]Assistant Professor, [2]Associate professor, [3]Assistant professor, Department of Mechatronics Engineering, Kongu Engineering College, Perundurai 638060, Erode, Tamilnadu, India

Abstract

Health is a significant concern that focuses on the physical, mental, and social living of humankind. Today keeping individuals as healthy and active with readily available healthcare system is a necessity. Autism is one of the developmental disorders, usually noticed with signs in the first two or three years of child growth which shows symptoms like communication and language inability. Researchers have proved that autism disorders can be overcome by holding therapy or applying deep pressure in children. The treatment involves forced/ tight holding provided by physiotherapist or parents to calm. The improper behaviour of child slowly stops for a fixed time period. The current research suggests a behavioural treatment for repetitive motion in an autistic child. This intervention is achieved due to the control of repetitive or stereotypic motion by sensing the unbalanced signals received from heartbeat and motion sensors placed in the autistic child's body. The irregular sensor signals are communicated to parents and therapist for future data analysis.

Keywords: *Health care system, Autism Spectrum Disorders, Repetitive motion control, Holding therapy.*

Introduction

A modernized patient monitoring system provides individuals with improved healthcare facilities in an economical and patient-friendly way at any instant. The healthcare system is currently experiencing both cultural and modernized transition from a traditional approach to a modernized approach. Healthcare professionals play a vital role in providing knowledge significant part to the patient in the conventional strategy. The basic problem associated is that healthcare professionals must be insight with the patient who is admitted in hospital and they stay bedside to the medical instruments. To overcome this concern, the patients should be equipped with adequate knowledge to play an important role in self-diagnosis and preventive measures. Notification of present state of a patient and its recording for future predictions is of great importance in patient monitoring.

Autism Spectrum Disorders (ASD) is a challenge even to educator those try to plan effective instructional programs for recovery [1]. Autism affected young children are at high risk to face communicational behaviours. Early intervention in autism young children should be done for analyzing their functional and problem behavioural treatment [2]. Because of the ubiquitous nature of autism impacts on the functioning of the individual in college and home, parents need to be included as active partners in the development of the instructional plan of their child. Autism children reported deficits in their ability to generalize their behaviours learned from one person to others [3].

The necessary elements needed for the treatment of autism disorders are support from individuals and families, instructions, well-structured learning environment, approach to their problematic behaviour, and involvement of member of family. Influence of family members is valuable in monitoring a child's environment [4]. A joint partnership with the family and doctors can contribute to the effectiveness of treatments. In their child development, parents are actually the first to recognize delays and difficulties. They are constantly seeking diagnoses and procedures that will enable their kids to gain autonomous abilities and a better quality of life [5]. The present survey has suggested that in order for educational programs that address problematic behaviours of children to be successful, their proactive behaviours must be monitored periodically.

This provides a clear that the problem behaviour of the

Child is not altered, instead,treatments should be focused on replacing the problem conduct with an effective suitable alternative conduct or mechanism resulting in a comparable effect.

A person will not be able to concentrate on a particular work at all means and tend to lose their concentration at certain times that provides a chance for mistakes. Modern patient monitoring should at all times obtain, record, display and communicate physiological information from a patient's body to a distant place by encapsulating the benefits of current bioinstrumentation and telecommunicationtechniques. [6] [7].

A different form of the patient monitoring system should be used to monitor the autistic child. The autistic child behaviour is sent as real-time data by appropriate sensors to their doctor and parents. In case of critical information in the obtained sensor data, the child must be saved by the engineered autistic system and a message of the current state of child should be sent to the doctor as well as parent. The purpose of this work is to engineer a proof of concept system that will inflate an air jacket worn by the child at the desired pressure limit.

Experimental Method

Sensing in the device begins with a motion sensor, and the sensor readings are provided to a microcontroller for processing. Initially, A microcontroller converts the sensor measurements from an analog to a discrete value. This process is achieved before entering the microcontroller bypassing the sensor outputs through an Analog to Digital Converter (ADC). To calculate the necessary elements, the microcontroller must take the digital data from the ADC and apply various formulas and conversion factors. Then microcontroller compares the digital input with threshold limit, initiating triggers when certain preset values or limits get exceeded. In the entire process of sensor readings, the algorithm tries to detect a repetitive motion [8] [9] [10].

Upon detecting this dangerous sensation, the microcontroller initiates a signal which will turn on the driver to inflate an airbag strategically placed at the waist of the patient. Fig 1 shows the process flow for triggering inflation jacket during autism disorders. When the child experiences repetitive problem behaviour s like frequent gestures, unusual postures, teeth grinding, hand flapping, and self-injurious behaviour, causes the change in motion or movement that produces vibration. The sensors acquire the vibration from the child's body and it is provided to the Arduino. The microcontroller receives the signal from the motion sensor and heartbeat sensors located in the child body. The microcontroller actuates the relay if the signal obtained is beyond the threshold limit. In turn, the relay actuates the 24V direction control valve (DCV).

This valve is an integrated electro-mechanical device containing a solenoid coil that actuates a solenoid switch. This opens the pneumatic pressure air to inflate the air jacket worn by the autistic disordered child. This inflation causes a jerk or sudden movement of the person wearing the jacket. This actuation mechanism induces a change in the behaviour of autism children, and finally, the child attains consciousness and tends to stop the repetitive movements. The sensors continuously check for the threshold limit and monitor the behavioural nature of the child.

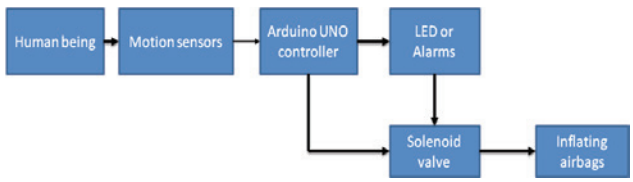


Fig. 1. Process flow for triggering Inflation jacket during Autism Disorders

The present conditions of child behaviour are predicted through simple programs embedded in the controller. The controller contains GSM module and mobile communication modem [11]. Suppose if the child didn't stop the behaviour after the threshold time interval, it sends the data about the problematic state of the child to doctor and parents via a messaging service.

Working of the Project

A child experiences repetitive behaviours, which include frequent gestures, unusual postures, teeth grinding, hand flapping, and self-injurious behaviour. It occurs in the child's body, causing self-injury. Hence these behaviour need to be sensed by a motion sensor like the adxl335 accelerometer. It is a 3-axis accelerometer with low energy, signal voltage conditioning. The sensor measures acceleration with a minimum 3.0 g range and measures static gravitational tilt acceleration to detect dynamic shock or vibration speed. Motion sensors detect the motion after calibrating it to an initial point in the three-dimensional axis. Motion sensors can be placed at

the wrist and neck.

Initially, the motion sensor senses which gives the analog value, and then the analog values are compared to previous analog value when it reaches the higher level the sensor produces output voltage. The output depends on the programming of the Arduino controller. Motion sensors used in this system senses the resonating motion and sends the signal to the Arduino controller that actuates the alarm and sets the LED to glow. Fig 2 shows the Process set-up for triggering inflation jacket. The Arduino board then actuates the solenoid valve and makes the airbags to inflate, and when the readings exceed the saturation value, a signal is sent to the GSM module which sends a message to the patient's parents.

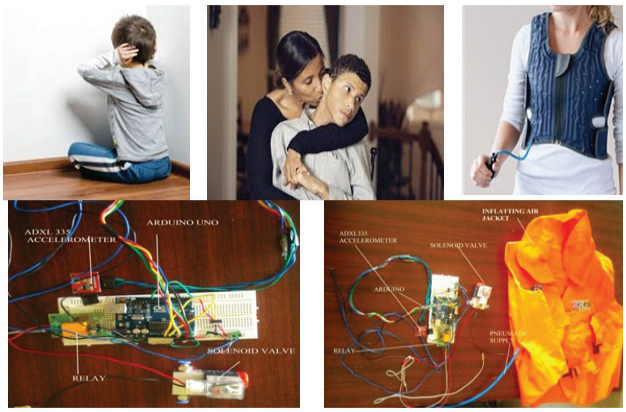


Fig. 2. Wearable air jacket set-up with controller mechanism

Arduino works on the basis of c programming. It is actuated by the signal from the accelerometer sensor. The Arduino controller works on the input of 5volt. The program can be dumped into the Arduino controller based on the requirement. The Arduino controller gives an output voltage of 5v when the accelerometer gives output. A time delay can be added to the program so that we can control the time of output voltage. This output signal from the Arduino is used to actuate the 12V relay. After the actuation of the relay, it remains on position for a particular time based on the Arduino programming. This 12V relay actuates the 24V DC solenoid valve. Thus actuation of solenoid valve opens the pneumatic supply to actuate the inflating airbag.

The solenoid opens according to the timing in the Arduino controller. This quick opening of solenoid valve causes sudden expansion of the inflating air jacket suddenly. The sudden inflation of the pneumatic airbag causes a jerk or sudden movement of the person wearing the inflating airbag. This actuation mechanism of the inflating airbag induces a change in the behaviour of autism children. Thus this sudden expansion causes a change in behaviour, and the child attains consciousness and stops the repetitive movements.

An inflatable air jacket has major components like the chamber to hold air, source for gas (compressed air or CO_2 gas cylinder), and mechanism to discharge gas from the cylinder into the chamber and inflation tube to inflate /deflate air to/from the chamber manually. Usually, inflatable jacket uses compressed air or CO_2 to fill with air. The inflatable air jacket inflates automatically when the jacket is triggered by the sensor signal and inflation of the jacket takes place.

The gas from cylinder fills a nylon or polyamide material jacket such that the gas fills at a velocity of 100 m/s. The entire process that is from the initial sensing to fill the air jacket takes about approx. 500 milliseconds. This set-up weighs approximately 0.9 kg and is fitted inside the standard protective jacket. Timing is crucial in the airbag's ability to save lives in a repetitive mechanism. An air jacket must be able to deployable in a matter of seconds from the initial sensor signal recognition. It must also be prevented from deploying when there is non-occurrence of problematic situation. Hence, the first component of the airbag set-up is a sensor that can detect and immediately trigger the air jacket's deployment.

Thus, as a result, the inflated air jacket is now filled with air from the pressurized cylinders and prevents the impact of repetitive behaviour. This, in turn, reduces their chance of injury. And at the same instant, the GSM module gets activated to send messages to the child's parent and doctor. The doctor can be able to predict the behaviour of child with the help of this GPS system and provides the necessary treatment. The air jacket serves the purpose of protection from the impact of repetitive behaviour by control action.

Conclusion

Children affected with autism should be protected from self-injuring and their problematic behaviour should be overcome. And at the same time parents and doctors will be able to know to monitor the child's health even from the remote location. The significance of extensive behavioural analysis will reduce problems and add aspects to the lives of a child to enhance the richness and efficiency of life, teaching and community activities.

future scope

The sensors can be used to gather and analyze the numbers of biomedical parameters. This scheme may also be coupled with a web-based architecture in which mail is sent to the physicians concerned. The prescribed patient study may also make automated delivery of drugs possible. Miniaturized pneumatic compressors/ cylinders can be used to make the inflating air jackets compact and independent of external pneumatic supply. We predict that the field of system change will be defined and refined in future years, but it is clear that any attempt to implement existing best practices in behaviour al support must recognize that the intervention unit is expanding.

Ethical Clearance- Not required since it is in development phase only.

Source of Funding- Self

Conflict of Interest -NIL

References

1. Boyd, Brian A., et al. "Sensory features and repetitive behaviour s in children with autism and developmental delays." Autism Research 3.2 (2010): 78-87.
2. Boyd, Brian A., Stephen G. McDonough, and James W. Bodfish. "Evidence-based behavioural interventions for repetitive behaviour s in autism." Journal of autism and developmental disorders 42.6 (2012): 1236-1248.
3. Stronach, Sheri, and Amy M. Wetherby. "Examining restricted and repetitive behaviour s in young children with autism spectrum disorder during two observational contexts." Autism18.2 (2014): 127-136.
4. Johnson, Chris Plauché, and Scott M. Myers. "Identification and evaluation of children with autism spectrum disorders." Paediatrics 120.5 (2007): 1183-1215.
5. Clifton, L., Clifton, D. A., Pimentel, M. A., Watkinson, P. J., & Tarassenko, L. Predictive monitoring of mobile patients by combining clinical observations with data from wearable sensors. IEEE Journal of biomedical and health informatics, (2013). 18(3), 722-730.
6. Lee, Young-Dong, and Wan-Young Chung. "Wireless sensor network based wearable smart shirt for ubiquitous health and activity monitoring." Sensors and Actuators B: Chemical 140.2 (2009): 390-395.
7. Yuce, Mehmet R. "Implementation of wireless body area networks for healthcare systems." Sensors and Actuators A: Physical 162.1 (2010): 116-129.
8. Liang, X., Barua, M., Chen, L., Lu, R., Shen, X., Li, X., & Luo, H. Y. "Enabling pervasive healthcare through continuous remote health monitoring." IEEE Wireless Communications 19.6 (2012): 10-18.
9. Nawka, N., Maguliri, A. K., Sharma, D., & Saluja, P "SESGARH: A scalable extensible smart-phone based mobile gateway and application for remote health monitoring." 2011 IEEE 5th International Conference on Internet Multimedia Systems Architecture and Application. IEEE, 2011.
10. Pereira, O. R., Caldeira, J. M., Shu, L., & Rodrigues, J. J "An efficient and low-cost Windows Mobile BSN monitoring system based on TinyOS." Telecommunication Systems 55.1 (2014): 115-124.
11. Yu, Hongzhou, and Lu Liu. "Remote health monitoring system using Zigbee network and GPRS transmission technology." 2011 Fourth International Symposium on Computational Intelligence and Design. Vol. 1. IEEE, 2011.

Review article

Role of Tranexamic Acid in Oral Surgery

S. Mounika[1], . Santhosh[2]

[1]Undergraduate Student, [2]Reader, Department of oral surgery Saveetha Dental College, Saveetha University, India

Abstract

Background: Tranexamic acid is a synthetic lysine derivative that exerts its antifibrinolytic effect by reversibly blocking lysine binding sites on plasminogen and thus preventing fibrin degradation. In case of dental surgery, post operative bleeding is a common problem which if uncontrolled can result in increased loss of blood and delayed wound healing. Patients with bleeding and clotting disorders and patients on anti coagulant therapy have tendency for excessive bleeding. In such cases the use of tranexamic acid becomes more significant in dental surgeries. By understanding the pharmacokinetics and pharmacodynamic aspects of the tranexamic acid we can gain a through knowledge about its properties which will aid its use in oral surgery.

Key Words: *Tranexamic acid, surgery, bleeding.*

Introduction

Tranexamic acid is an anticoagulant is used to reduce the blood coagulability to an optimal level to help in providing protection against thromboembolic effects in patient undergoing oral surgeries. This is attained in case of minor risk of spontaneous bleeding. Patients reporting for invasive dental procedures are expected to cause more bleeding.

Consideration regarding whether the anticoagulant treatment as to be continued, modified or discontinued at some point of the the treatment has to be considered. In such situations the dentist has to take into consideration regarding the patient's ability to attain haemostasis in cases of continuation of anticoagulants and in cases of withdrawal of anticoagulants. To avoid these consequences per procedural care.

Tranexamic acid is a synthetic derivative of the amino acid lysin which exhibit its antifibrinolytic effect, through the reversible blocking of lysin binding sites on the plasminogen molecules. Intravenous administration of tranexamic acid has been routinely used for many years to reduce hemorrhage during and after surgical procedures like coronary artery bypass, scoliosis surgery, oral surgery, orthotopic liver transplantation, total hip or knee arthroplasty, and urinary tract surgery[1,2]. A complete drug history is important in patients taking anti coagulants. There is also influence of certain medications which may interfere with haemostasis and prolonged bleeding. Drugs such as alcohol, heroin can result in bleeding[3]

Tranexamic acid is an active trans stereoisomers of amino-methyl cyclohexane carboxylic acid and has been shown to have powerful antifibrinolytic properties. It was first described by Okamoto in 1962[4].

Tranexamic acid is available in both systemic and topical forms. Systemic form of treatment is not advised in patients with oral anticoagulants as it may result in thromboembolism. Concentration of trance amid acid is hardly detectable in plasm after the use in the form of mouth wash and it ha insignificant effect in inhibition of the fibrinolysis [5,6]. Tranexamic acid shows accelerated wound healing [7]. Thus it is significant to know the role of Blood loss and subsequent transfusions are associated with major morbidity and mortality [8,9]. Thus the use of antifibrinolytics can result in reduction of blood loss in cardiac surgery, trauma, liver surgery and solid organ transplantation and non-surgical diseases. The evidence of their efficacy has been mounting for years [10,11]. Synthetic lysine-analogue tranexamic acid (TXA, trans-4-aminomethylcyclohexane-1-carboxylic acid), along with ε-aminocaproic acid (ε-ACA), were first patented by S. Okamotoin 1957 [12]. Okamoto and Okamoto (1962) drew attention to tranexamic acid (AMCA) as a more potent inhibitor of the fibrinolytic enzyme system than aminocaproic acid, first introduced by Okamoto (1959). Further research by Melander et al. (1964) and Okamoto

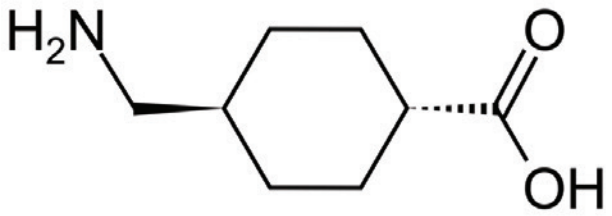
et al. (1964) showed that the cyclohexane derivative consisted of two isomers, the more active being the synthetic amino-acid tranexamic acid.This was found to be at least ten times more potent than amino caproic acid and the effect to last longer, and Anderson et al. (1965) found it to be seven times more potent. The use of amino caproic acid in the control of haemorrhage after the extraction of teeth in haemophilia has been investigated by Melander (1964) (1968).[13]

Several factors , may operate together to cause haemorrhage. For instance, in the presence of defective small vessel constriction or low-grade disseminated intravascular coagulation the action of the normal fibrinolytic response may be sufficient to initiate haemorrhage.[14]

Mechanism of Action:

The main action of the amino caproicacid compounds is to compete with lysine binding sites on plasminogen and plasmin. They inhibit the activation of plasminogen by streptokinase, urokinase and tissue activator. The binding of the heavy chain of plasmin to fibrin in monomerism is achieved by lysin binding sites, the blocking of these sites by amino caproic acid causes yo ichiometric inhibition of plasmin, with the formation of the inactive complex between plasmin and amino caproic acid. It will be no ted from the excellent view by D Colleen that the rate of that the rate of binding of alpha 2 plasmin is dependant on the availability of free ridual plasmin. In the presence of free residual plasmin is rapidly inactivated by alpha 2 to. Antiplasim Conversely, when the lysine residues are blocked, either by fibrin monomer or by amino-caproic acid, inactivation by alpha2-antiplasmin is reduced. This potent action of amino caproic acid as an inhibitor of plasmin in physiological fibrinolysis on a substrate of fibrinogen or fibrin has been recognised only fairly recently much of earlier studies was carried out . Similarly amino caproic acid is relatively inactive against the hydrolytic action of plasmin synthesis . Thus striking action of amino caproic acid Isco block the action of plasmin on fibrin . The interaction between plasminogen, plasmin, activator and fibrin complex. Tissue activators adsorbent to fibrin and in the presence of plasminogen mediate proteolytic cleavage of the terminal part of plasminogen, changing native Glu- plasminogen into Lys- plasminogen. The latter has higher affinity for the fibrin than the native. Plasminogen promote the resolution of fibrin with thrombus rather than causing the digestion of circulating fibrinogen during the fibrinolytic process. Plasmin is change form plasminogen by further cleavage of an internal Arg- Lys peptide bond in plasminogen . Plasmin also has affinity for fibrin. Thus consideration of fibrinolytic inhibitors must include their effective enzymes site but also their ability to interfere with the binding of the various components. The problem is further complicated by the type of activator studied. Tissue has greater affinity for urokinase[15]

Pharmacology of Tranexamic Acid:



Tranexamic acid is a synthetic derivative of the amino acid lysine and it inhibits fibrinolysis by blocking lysine binding site on the plasminogen. It is a competitive inhibitor of activation of plasminogen to plasmin and at higher a concen- trations and a non-competitive inhibitor of plasmin. Topical application of tranexamic acid has the potential to inhibit local fibrinolysis at the site of bleeding but with minimal systemic absorption. In this way, it could reduce bleeding and the need for blood transfusion without systemic side effects such as throm- boembolic events.

TXA is a synthetic lysine-analogue antifibrinolytic [16] that competitively inhibits the activation of plasminogen to plasmin; at high concentrations it non-competitively blocks plasmin, thus TXA inhibits the dissolution and degradation of fibrin clots by plasmin. The binding of TXA to plasminogen is 6 to 10 times more potent that of ε-ACA [17]. TXA has been shown to increase thrombus formation in a dose-dependent fashion in animal models, in contrast to aprotinin, which inhibits thrombus formation [18].

Suppression of fibrinolysis by tranexamic acid is manifested in surgical patients by reductions in blood levels of D-dimer, but the drug has no effect on blood coagulation parameters. Concurrent administration of heparin does not influence the activity of tranexamic acid. A series of cyclic compounds were founding have more potent fibrinolytic activity than EACA. One of the most suitable was AMCHA(4-aminomethyl-cyclohexane carboxylic acid). The potency of this compound, which is a mixture of stereoisomers, is due

to the residues in the trans-isomer, known as tranexamic acid which forms about 20-25% of the parent mixture. Tranexamic acid is some 10times more potent than EACA. It is such that that the potency of the compound depend on critical distance between the essential amino carboxylic acid groups[19].

Pharmacokinetics:

Maximum plasma concentrations of tranexamic acid are attained within 3 hours of an oral dose; the presence of food in the gastrointestinal tract has no effect on the pharmacokinetic parameters of the drug. Elimination after intravenous administration is triexponential, and over 95% of each dose is eliminated as unchanged drug in the urine. The total cumulative excretion after an intravenous dose is approximately 90% after 24 hours.

Of the total amount of circulating tranexamic acid, 3% is bound to plasminogen. The drug crosses the blood-brain barrier and the placenta, but excretion into breast milk is minimal. Tranexamic acid is not detectable in saliva after systemic (oral) administration, and mouth washing with 5% w/v aqueous solutions of the drug results in plasma drug concentrations below 2 mg/L[20]

Indications:

Tranexamic acid can be used in patients with haemophilia for two to eight days ie. Short term use to prevent haemorrhage during replacement therapy following tooth extraction. T XA is the only drug that can be used safely for reducing blood loss. Infusion of IV TXA to trauma patients within three hours of trauma has successfully saved many lives per year 1,000 trauma patients in Tanzania, India and the UK [21]

It can be used in other cases like excessive bleeding, mensuration, trauma and other surgery.

Tranexamic acid in oral surgery and its use in the form of mouth wash:

The treatment is to prevent bleeding after oral/ dental surgery in patients who are taking anticoagulants. It is an effective alternative to reducing patients' anticoagulants before surgery, then increasing them afterwards.

This treatment allows you to keep taking your normal dose of anticoagulant. Any bleeding in the mouth is controlled by tranexamic acid working directly on the bleeding area[22].

It is very important to follow the following methods,

Use the mouth rinses four times a day starting on the day of dental or any oral surgery. Use the first dose of 5-10 minutes prior to the extraction.

Rinse your mouth with 5ml for a period of two minutes each time. Be aware not to swallow any of the mouthwash after dental or other oral surgeries.

By using tranexamic acid in form of mouth rinses showed reduction in plasma levels.[23]

Determination of bleeding disorders prior to dental procedures includes:

Tests associated with the evaluation of bleeding complications for dental patients undergoing surgery include (1) complete blood count (CBC), (2) blood smear (3) bleeding time (BT), (4) prothrombin time (PT) (5) international normalization ratio (INR) (6) partial prothrombin time (PTT) (7) serum fibrinogen which measures the level of fibrinogen in the serum; (8) fibrin degradation products, (9) protamine paracoagulation test, (10) euglobulin clot lysis test [24]

Topical usage of TXA:

The topical use of TXA has been examined by Cochrane[25] Although the authors found reliable evidence that topical TXA reduces bleeding and blood trans-fusion in surgical patients, the risk of thromboembolism is unclear, as many studies do not report this complication or are underpowered. Topical administration results in a ten fold less plasma concentration of TXA when compared to intravenous administration. The surgical extraction of third molars under day case surgery is one of the most frequently performed oral surgical procedures. Bryant *et al*.[26] reported an almost 6-fold increase in the total number of dentoalveolar procedures carried out as day cases under general anaesthesia over the past 20 years with third molar surgery showing a 7-fold increase. Day case surgery patients have unique needs, distinct from those of traditional overnight or long-stay in-patients. The disadvantages of day case surgery are that patients may present for surgery improperly prepared or may be discharged from direct supervision before they have adequately recovered. Their post-operative needs are

central to achieving complete recovery and ensuring there are no unplanned readmissions to hospital. Chye *et al* [27]. reported a readmission rate to hospital of 0.25%,compared with 2.5% and 1.9% was reported.

Side effects of tranexamic acid:

Oral:

Tranexamic acid can cause serious side effects, including:

· Blood clots. The risk of serious blood clots may be increased when tranexamic acid is taken with:

o hormonal contraceptives, especially if you are taking higher than your normal dose of birth control, are overweight, or if you smoke cigarettes

o medicines used to help your blood clot

o some medicines used to treat leukaemia

· problems with your vision (including colour vision);

· sudden numbness or weakness, especially on one side of the body;

· sudden headache, confusion, problems with vision, speech, or balance;

· sudden chest pain or trouble breathing;

· pain or swelling in one or both legs;

· migraine headache;

· pale skin, feeling light-headed or short of breath, rapid heart rate, trouble concentrating; or

· feeling like you might pass out.

Cutaneous Adverse Effects:

Drug eruption, epidermal necrolysis, and bulbous eruption. [28,29]

Conclusion

In the past, the management of patients therapeutically anticoagulated with various anticoagulants requiring dental extractions has posed a dilemma to the attending dental surgeon. The following factors have probably contributed to the favourable evolution of the management of these patients: increased training and experience of dentists; improved dental status of patients, minimizing necessity for multiple extractions and increasing awareness of local fibrinolysis in the oral cavity and the use of local measures. Thus the review about Tranexamic acid would aid to know in use in dentistry and it's method of usage , available forms, indications contra indications and other factors would help in gaining a brief knowledge about TXA.

Ethical Clearance-Nil

Source of Funding- Nil

Conflict of Interest -Nil

References

1. Kambo I, Bedi N, Dhillon BS, Saxena NC. A critical appraisal of cesarean section rates at teaching hospitals in India. International Journal of Gynecology & Obstetrics. 2002 Nov 1;79(2):151-8.
2. Thorsen S, Clemmensen I, Sottrup-Jensen L, Magnusson S. Adsorption to fibrin of native fragments of known primary structure from human plasminogen. Biochimica et Biophysical Acta (BBA)-Protein Structure. 1981 May 29;668(3):377-87.
3. Brown RS, Thwaites BK, Mongan PD. Tranexamic acid is effective in decreasing postoperative bleeding and transfusions in primary coronary artery bypass operations: a double-blind, randomized, placebo-controlled trial. Anesthesia & Analgesia. 1997 Nov 1;85(5):963-70.
4. Watts G. Utako Okamoto. The Lancet. 2016 Jun 4;387(10035):2286. OkamotoS.Ref.to British Patent Specification1957;770,693.
5. Gai MY, Wu LF, Su QF, Tatsumoto K. Clinical observation of blood loss reduced by tranexamic acid during and after caesarian section: a multi-enter, randomized trial. European Journal of Obstetrics and Gynecology and Reproductive Biology. 2004 Feb 10;112(2):154-7.
6. Yang H, Zheng S, Shi C. Clinical study on the efficacy of tranexamic acid in reducing postpartum blood lose: a randomized, comparative, multicenter trial. Zhonghua Fu Chan Ke Za Zhi. 2001 Oct;36(10):590-2.
7. Lindoff C, Rybo G, Astedt B. Treatment with tranexamic acid during pregnancy, and the risk of

thrombo-embolic complications. Thrombosis and haemostasis. 1993 Aug;70(2):238-40.

8. Akopov SE, Suzuki S, Fredieu A, Kidwell CS, Saver JL, Cohen SN. Withdrawal of warfarin prior to a surgical procedure: time to follow the guidelines?. Cerebrovascular Diseases. 2005;19(5):337-42.

9. Alexander R, Ferretti AC, Sorensen JR. Stop the nonsense not the anticoagulants: a matter of life and death. The New York state dental journal. 2002 Nov;68(9):24-6.

10. Beirne OR. Evidence to continue oral anticoagulant therapy for ambulatory oral surgery. Journal of oral and maxillofacial surgery. 2005 Apr 1;63(4):540-5.

11. Carter G, Goss AN, Lloyd J, Tocchetti R. Current concepts of the management of dental extractions for patients taking warfarin. Australian dental journal. 2003 Jun 1;48(2):89-96.

12. Okamoto S, Hijikata-Okunomiya A, Wanaka K, Okada Y, Okamoto U. Enzyme-controlling medicines: introduction. InSeminars in thrombosis and hemostasis 1997 Dec (Vol. 23, No. 06, pp. 493-501). Copyright© 1997 by Thieme Medical Publishers, Inc.

13. Okamoto K, Iba T, Uchiyama T, Kawasugi K, Koga S, Mayumi T, Koike K, Gando S, Kushimoto S. Expert consensus for the treatment of disseminated intravascular coagulation in Japan. Thrombosis research. 2010 Jan 1;125(1):6-11. 14.MelanderB, GlinieckiG, GranstrandB, HanshoffG.Theantifibrinolyticallyactiveisomer of AMCH Abstracts of the Xth International CongressofHae- matology, Stockholm,Aug30-Sept41964:G68.

15. Little JW, Miller CS, Henry RG, McIntosh BA. Antithrombotic agents: implications in dentistry. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics. 2002 May 1;93(5):544-51.

16. Lockhart PB, Gibson J, Pond SH, Leitch J. Dental management considerations for the patient with an acquired coagulopathy. Part 2: Coagulopathies from drugs. British dental journal. 2003 Nov 8;195(9):405.

17. Patton LL, Ship JA. Treatment of patients with bleeding disorders. Dental clinics of North America. 1994 Jul;38(3):465-82.

18. Rice PJ, Perry RJ, Afzal Z, Stockley IH. Antibacterial prescribing and warfarin: a review. British dental journal. 2003 Apr 26;194(8):411.

19. Scully C, Wolff A. Oral surgery in patients on anticoagulant therapy. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology and Endodontics. 2002 Jul 1;94(1):57-64.

20. Jover Cerveró A, Poveda Roda R, Bagán JV, Jiménez Soriano Y. Dental treatment of patients with coagulation factor alterations: An update. Medicina Oral, Patología Oral y Cirugía Bucal (Internet). 2007 Sep;12(5):380-7.

21. Wahl MJ. Dental surgery in anticoagulated patients. Archives of internal medicine. 1998 Aug 10;158(15):1610-

22. Hirsh J, Dalen JE, Anderson DR, Poller L, Bussey H, Ansell J, Deykin D. Oral anticoagulants: mechanism of action, clinical effectiveness, and optimal therapeutic range. Chest. 2001 Jan 1;119(1):8S-21S

23. Cochrane E. Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. International journal of qualitative methods. 2006 Mar;5(1):80-92.

24. Bryant RE. Graph-based algorithms for boolean function manipulation. Computers, IEEE Transactions on. 1986 Aug;100(8):677-91.

25. Chye PW, Skeath PR, Su CY, Lindau I. New and unified model for Schottky barrier and III–V insulator interface states formation. Journal of Vacuum Science and Technology. 1979 Sep;16(5):1422-33.

28. Sindet-Pedersen S, Ramström G, Bernvil S, Blombäck M. Hemostatic effect of tranexamic acid mouthwash in anticoagulant-treated patients undergoing oral surgery. New England Journal of Medicine. 1989 Mar 30;320(13):840-3.

29. Pemberton MN, Oliver RJ, Theaker ED. Miconazole oral gel and drug interactions. British dental journal. 2004 May 8;196(9):529.

Effect of Surya Kriya and Shambavi Mahamudra Programme on Selected Psychological Variable among College Men

S. Parthasarathy[1], S. Dhanaraj[2]

[1]Ph.D., Scholar, Alagappa University College of Physical Education, Karaikudi,
[2]Assistant Professor, Centre for Yoga Education, Alagappa University, Karaikudi.

Abstract

The purpose of the present investigation is to find out the effect of surya kriya and shambavi mahamudra programme on selected psychological variable among college men**.** To achieve this purpose of the study 30 students were selected at random from Karaikudi, Tamilnadu, India as subjects. Their age ranged from 18 to 22 years. They were divided into three equal groups of 10 subjects each and assigned to experimental group-I, experimental group-II and control group. The experimental group I underwent surya kriya, experimental group II underwent shambavi mahamudra programme and Control Group was not given any specific training. All the subjects underwent one area of test namely depression. They assessed before and after the training period of 12 weeks. The one way analysis of covariance was used to analyze the collected data. The study revealed that the above said criterion variable was significantly improved due to the effect of surya kriya and shambavi mahamudra programme on selected psychological variable among college men

Key words*: surya kriya and shambavi mahamudra practice**, depression, f- ratio.***

Introduction

Today in our human body there are more common disease can be occurred in day to day life. Blood pressure is the system of circulation of blood cycle. It can be founded two types systolic blood pressure and diastolic blood pressure. Systolic pressure is the response of systole fro, the heart. Diastolic blood pressure is the important function in our circulatory cycle. Shambhavi Mahamudra kriya is a way within the Isha Yoga lineage that having both pranyanama practices and meditation-based techniques[1]. A kriya is a yogic action, or technique, such as breathing control. Yoga is a great soul and wisdom of the Universe. It can promote the social and inner well being through the limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations)[8]. To participating yoga regularly it can made you into sound body and sound mind[2]. Yoga practices are the costless permanents treatment for diseases. It is a practical holistic philosophy structured to bring about profound state as well is an integral matter, which takes into Consideration human as a whole[3]. One can start Yoga practicing at any given moment of time and you can start with meditation practice or directly with pranayama without even doing the asanas, the science of Yoga Nidra is based on the receptivity of consciousness[4]. When it is operating with the intellect and with all the essential senses, by making an individual think that he or she is aware and awake, but the mind is actually less receptive and more critical. Training is a chain process that can be able to attain certain needs of the person's goal[5]. In the sports world, physical education and sports is the most essential aspects due to the facts physical education programme increase the performance and the effectiveness of the sports and games. Today, sports have become the part and parcel of our ethical culture[6]. It is being influenced and does influence our entire social chart including education policy, economics, arts, politics, law and even international diplomacy. The sports training can produce some physical fitness, Motor fitness, Physiological and psychological benefits to the person and attain performance related tasks. It is also promoting the individual overall health and wealth to the sports person[7]. Yoga is a methodical effort towards self-perfection by the development of the potentialities and latent in the individual habits.

Aim of the Study

The purpose of the study was to find out the effect of surya kriya and shambavi mahamudra programme on

selected psychological variable among college men.

Methodology

To achieve this purpose of the study 30 men subjects were selected at random from Karaikudi, Tamilnadu, India as subjects. Their age ranged from 18 to 22 years. They were divided into three equal groups of 10 subjects each and assigned to experimental group-I, experimental group-II and control group. The experimental group I underwent surya kriya experimental group II underwent shambavi mahamudra practice and Control Group was not given any specific training. All the subjects underwent one and Control Group was not given any specific training.

Analysis of the Data

The effects of independent variables on selected psychological variable were determined through the collected data by using appropriate statistical techniques and the results are presented below. Table I presents pre and post test means and the results of the paired sample t-test of surya kriya exercise and shambavi mahamudra practice on depression.

Table- I: The summary of mean and paired sample 't' test for the pre and post test on diastolic blood pressure of experimental groupS

Depression	Surya kriya	Shambavi mahamudra	Control group
Pre test mean ± SD	41.60 ± 0.52	41.80 ± 0.79	41.70 ± 0.82
Post test mean ±SD	36.90 ± 0.99	36.70 ± 0.67	34.00 ± 0.67
't' test	12.82*	13.47*	19.45*

*significant at .05 level. (The table value required for 0.05 level of significance with 2.13 respectively)

The paired sample 't' was computed on selected dependent variables. The results are presented in the above Table I. The 't' value of Surya kriya, Shambavi mahamudra Practice and control group for diastolic blood pressure are 12.82, 13.47 and 19.45 respectively. All the't' values are significantly higher than the required table value of 2.13 with df 9 at 0.05 level of confidence. The result of the study shows that Surya kriya, Shambavi mahamudra Practice and control group has significantly improved the performance of diastolic blood pressure. The analysis of covariance on diastolic blood pressure of Surya kriya, Shambavi mahamudra Practice and control group have been analyzed and are presented in Table II.

Table – II: Values of analysis of covariance for experimental groups and control group on depression

Adjusted post-test means						
SKG	**SMMG**	**CG**	**SS**	**Df**	**MS**	**F-ratio**
36.87	36.73	34.00	52.37	2	26.18	42.91*
			15.87	26	0.61	

Significant at .05 levels. (The table values required for significance at .05 level of confidence with df 2 & 26 is 3.37)

Table-II shows that the adjusted post test mean value of depression for surya kriya, shambavi mahamudra Practice group and control group are 36.87, 36.73 and 34.00 respectively. The obtained F-ratio of 42.91 for the adjusted post test mean is more than the table value of 3.37 for df 2 and 26 required for significance at 0.05 level of confidence. The results of the study indicate that there are significant differences between the experimental groups and control group on diastolic blood pressure.

Table – III: **Scheffe's post hoc paired means comparisons and effect size on depression of experimental groups**

ADJUSTED POST- TEST MEANS				
SKG	**SMMG**	**CG**	**MD**	**CI**
36.87	36.73	-	0.14	0.91
36.87	-	34.00	2.87*	0.91
-	36.73	34.00	2.73*	0.91

(*Significant at 0.05 level of confidence; Scheffe's C.I value of depression 0.91)

Table III shows that the adjusted post- test mean differences on surya kriya and control group, shambavi mahamudra and control group are 2.87, 2.73 respectively and they are greater than the confidence interval value 0.91 which shows significant differences at 0.05 level of confidence. surya kriya and shambavi mahamudra practices are 0.14 respectively and they are lesser than theconfidence interval value 0.91 which shows significant differences at 0.05 level of confidence.

The ordered adjusted means are presented through bar diagram for better understanding of the result of this study in Figure I.

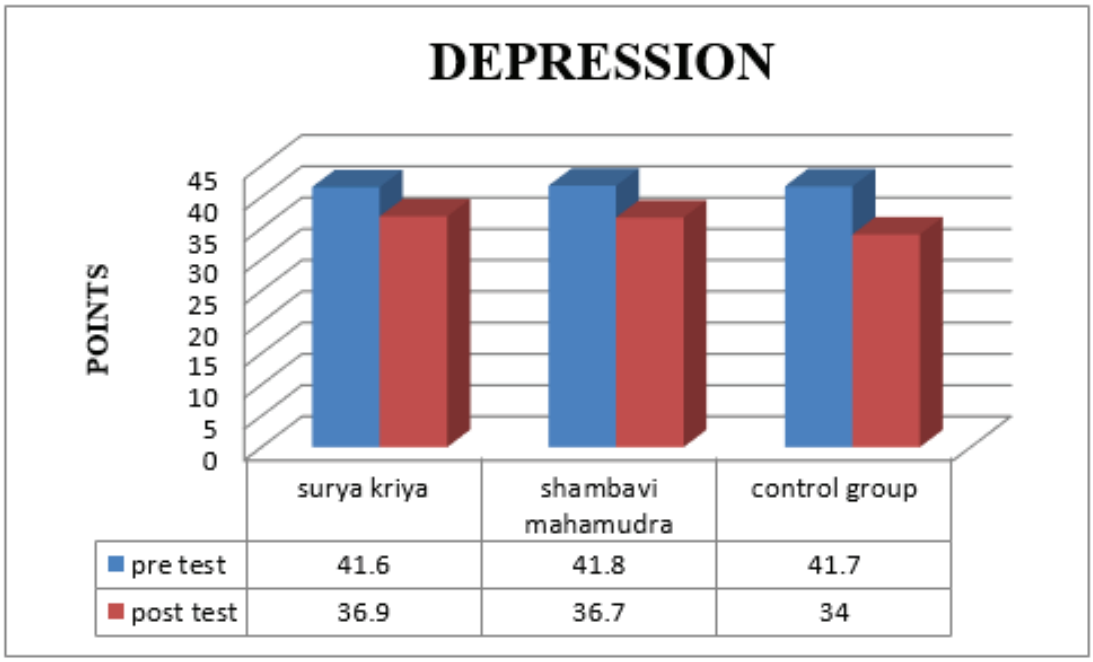


Figure I

Discussion on Findings

The result of the study on depression indicates that all the experimental groups namely Surya Kriya group and Shambavi Mahamudra Practice group brought about significant improvement after the training. The analysis of the data indicates that there was no significant difference on depression between Surya Kriya group and Shambavi Mahamudra group. Based on the mean value, the Shambavi mahamudra practice group was better in controlling the level of depression than the surya kriya group.

Conclusions

1. Finally it was concluded that surya kriya and shambavi mahamudra practice methods helped to increasing the diastolic blood pressure among school Students.

2. There was a little improvement difference between the surya kriya and shambavi mahamudra practice on diastolic blood pressure but not at the significant level. Based on the mean value was concerned, 12 weeks of surya kriya systems diastolic blood pressure more than shambavi mahamudra practices among school Students.

Recommendation:

1. The following recommendation for future research is based on the results of this investigation and the related literature.

2. The results of this research study clearly indicate that the effect of diastolic blood pressure through surya kriya and suryanamaskar programme.

3. Hence, it is recommended that physical education experts should give importance to the physiological exercise and suryanamaskar practice for the school students which will helps to develop, physiological. Hence the students can be very active and alive in the class room and also healthy in their life style.

Conflict of Interest : Nil.

Ethical Clearance: With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Parthasarathy., & Dhanaraj S. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. *Indian Journal of Applied Research, 2019; 9* (11), 45-46.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. *International Journal of Yoga, Physiotherapy and Physical Education.* 2017; *2*(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. *Indian Journal of Applied Research,* 2019; *9,* (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. *International Journal of Advanced Education and Research,* 2019; *4* (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research,2019; 9,* (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. *International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3* (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. *Journal of Information and Computational Science,*2019*; 9*(8), pp. 483-487.
8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research.* 2019; *9,* (10), pp. 73-74.
9. Dhanaraj S. Influence of autogenic training on selected psychological variables of college cricket players. Indian Journal of Applied Research, 2014; 4(4). pp.506-507.
10. Palanisamy A., Franklin M., and Dhanaraj S. Effects of Power Training With Varied Intensity

on Selected Motor Fitness Variables Among College Men Volleyball Players. Indian Journal of Research,2013; 2(7), pp. 40-42.

11. Dhanaraj S and Palanisamy A. (2013). Effect of Aerobic Training on Selected Biochemical Variables of College Men Athletes. International Journal of Scientific Research, 2013; 2(5). pp. 514-515.

Effect of Shambhavi Mahamudra and Pranayama Practice on Stress among Middle Aged Men

S. Parthasarathy[1], S. Dhanaraj[2], K. Alaguraja[3], K. Selvakumar[4]

[1]Research Scholar, [2]Professor, [3]Research Scholar, [4]Research Scholar, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamilnadu, India.

Abstract

The purpose of the present study was to investigate the effect of shambhavi mahamudra and pranayama practice on stress among middle aged men. To achieve the purpose of the study thirty middle aged men were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 35 to 45 years. The selected students were divided into two equal groups consists of 15 men each namely experimental group and control group. The experimental group underwent a shambhavi mahamudra and pranayama practices programme for six weeks. The control group was not taking part in any training during the course of the study. Stress was taken as criterion variable in this study. The selected subjects were tested on stress was measured through perceived stress scale. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique 't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to shambhavi mahamudra and pranayama practices given to the experimental group on stress when compared to control group.

Keywords: *shambhavi mahamudra practice, pranayama practices, stress and't' ratio.*

Introduction

Stress is the major disease that can be affected the human activities. Shambhavi Mahamudra kriya is a protocol within the Isha Yoga lineage that includes both pranyanama and meditation-based techniques[8]. A kriya is a yogic action, or inner technique, such as breath control. Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations)[1]. To practising yoga regularly it can make you into sound body and sound mind[2]. Yoga is the costless permanents treatment for more diseases. It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole[3]. One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures), The science of Yoga Nidra is based on the receptivity of consciousness[4]. When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical. Training is a chain process that can be able to attain certain needs of the person's goal[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports. Today, sports have become a part and parcel of our culture[6]. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy,. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person[7]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual. Today's there is an escalating emphasis on appearing smarter, feeling better and living longer. In order to achieve these ideals as, scientific evidence tells us that one of the keys is high fitness and exercises. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs

of the person. It's a scientific process the person must be follow the basic principles yogasana practice. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all. Yogic action, or inner technique, such as breath control.

Research Methodology

Selection of subjects

The purpose of the study was to find out the effect of shambhavi mahamudra and pranayama practice on stress among middle aged men. To achieve this purpose of the study, thirty middle aged men were selected as subjects at random. The age of the subjects were ranged from 35 to 45 years.

Selection of variable

Independent variable

Ø Shambhavi Mahamudra and Pranayama Practice

Dependent variable

Ø Stress

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as a combined shambhavi mahamudra practice and pranayama practices group (Experimental Group) and control group. The experimental group underwent combined shambhavi mahamudra practice and pranayama practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following physiological variable namely stress was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable stress was measured through perceived stress scale at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis Of The Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the pre and post tests of experimental and control group on Stress (Scores in points)

Variables	Group	Mean		Degree of freedom	't' ratio
		Pre	Post		
Stress	Control Group	46.33	46.53	14	1.00
	Experimental Group	46.20	52.60	14	17.04*

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on stress were 46.33 and 46.53 respectively. The obtained 't' ratio was 1.00, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on stress were 46.20 and 52.60 respectively. The obtained 't' ratio was 17.04* since the obtained 't' ratio was greater than the required

table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in stress. It may be concluded from the result of the study that experimental group improved in stress due to six weeks of combined shambhavi mahamudra and pranayama practice.

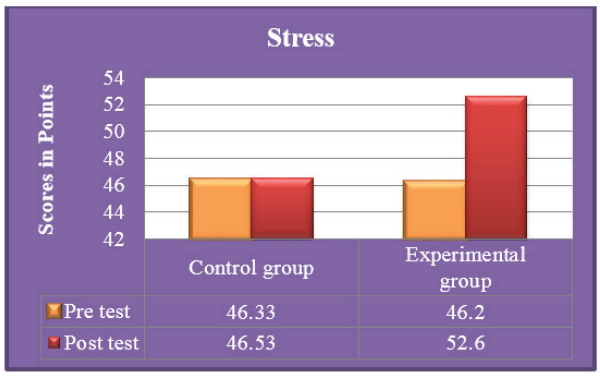


Figure-1: Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on Stress

Discussions on Findings

The result of the study indicates that the experimental group, namely combined shambhavi mahamudra and pranayama practice group had significantly improved the selected dependent variable, namely stress, when compared to the control group. It is also found that the improvement caused by combined shambhavi mahamudra and pranayama practice group when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on stress after the training period.

2. There was a significant improvement in stress. However the improvement was in favor of experimental group due to six weeks of combined shambhavi mahamudra and pranayama practice.

Conflict of Interest : Nil.

Ethical Clearance

With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research. 2019; 9, (10), pp. 73-74.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. International Journal of Yoga, Physiotherapy and Physical Education. 2017; 2(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. Indian Journal of Applied Research, 2019; 9, (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. International Journal of Advanced Education and Research, 2019; 4 (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. Indian Journal of Applied Research,2019; 9, (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3 (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. Journal of Information and Computational Science,2019; 9(8), pp. 483-487.
8. Parthasarathy., & Dhanaraj S. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. Indian Journal of Applied Research, 2019; 9 (11),

45-46.

9. Dhanaraj S. Influence of autogenic training on selected psychological variables of college cricket players. Indian Journal of Applied Research, 2014; 4(4). pp.506-507.
10. Palanisamy A., Franklin M., and Dhanaraj S. Effects of Power Training With Varied Intensity on Selected Motor Fitness Variables Among College Men Volleyball Players. Indian Journal of Research,2013; 2(7), pp. 40-42.
11. Dhanaraj S and Palanisamy A. (2013). Effect of Aerobic Training on Selected Biochemical Variables of College Men Athletes. International Journal of Scientific Research, 2013; 2(5). pp. 514-515.

Knowledge, Attitude, Practice and Perspectives Regarding Tobacco Cessation Program among Students in Private Dental Institution at Chennai –A Cross Sectional Study

S. Shree Lakshmi[1], Pradeep Kumar Rathinavelu[2], I. Meignana Arumugham Indiran[3], D. Srisakthi Doraikannan[2], V. Keerthi Narayan[4]

[1]Post Graduate Student, [2]Reader, [3]Professor, Department of Public Health Dentistry, Saveetha Dental College, Saveetha University, Chennai, India, [4]Senior Lecturer, Department of Oral Pathology and Microbiology, Thai Moogambigai Dental College and Hospital, Chennai, India

Abstract

Aim: Dentists could play an important role in tobacco cessation counseling. This study is conducted to assess dental professionals' understanding of tobacco prevention and control methods. **Material and Method:** A descriptive cross sectional study was conducted in which a close-ended, self-administered 30 item-questionnaire was distributed among 130 interns at private dental institutions in Chennai. Demographic data, tobacco use status, attitudes toward cessation programs, perceived barriers and counseling procedure was filled by the surveyed subjects. **Results:** About 97.7% of the dental interns agreed their role in helping patients to quit smoking. Though 82.3% enquired all their patients regarding their smoking status, 86.9% of them feared improper follow up. Nearly 85.4% of the respondents believed that the counseling done is effective but only 32% anticipated successful intervention and 21% of them were very confident in conducting it. **Conclusion:** It was concluded that although dentists were aware of their obligations towards smoking cessation counseling for patients but certain factors like lack of time, confidence, ,training ,absence of reimbursement and fear of losing patients were the common barriers for the same. Expansion of armamentarium to include tobacco cessation counseling strategies in clinical practice must be adopted by all dental professionals.

Keywords: *Tobacco, Smoking, Dentists, Counseling, Interns, Dental Institutions*

Introduction

Smoking is injurious not only to an individual's health; it is a hazard to the public as well. The World Health Organization reports that tobacco is the sixth risk factor out of eight for death of approximately 6 million people every year [1]and estimates an increase in the annual death toll to more than 8 million by 2030 [2]. Families of smokers on an average spend thrice more than non-smokers for illness episodes [3]. Owing to its causative role in raised mortality and morbidity it is considered a global epidemic [4]. Tobacco related mortality is highest in India with 900,000 annual deaths [5]. The Global Adult Tobacco survey conducted in India between 2009- 2010 concludes that among 275 million tobacco users 164 million use smokeless form of tobacco while 42 million consume both forms of tobacco and discloses that 34.6% of the adult population use tobacco in any form wherein, 47.9% males are habitual to tobacco usage as compared to 20.3% females. It has also to an estimation that 1 million people die in India due to tobacco related diseases [6, 7, 8]. Numerous studies have recognized the adverse effect of tobacco. Chewing tobacco has led to an increase in the number

Corresponding Author:
Dr. Pradeep Kumar Rathinavelu
Department of Public Health Dentistry, Saveetha University, Saveetha Dental College, No:162, Poonamalle High Road, Chennai-600 077, Tamil Nadu, India. Phone: +91-9940391698
Email: drrpradeepkumar@gmail.com

of cases reported with head and neck cancers. Adults are likely to quit smoking when advised by their dentist [9]. Dental professionals have opportunities to educate and help addicted individuals quit smoking [10] and they are in an ideal position to provide cessation counseling program for achieving an increase in the abstinence rate from tobacco consumption [11, 12]. Unless tobacco users are helped to quit, the proportion of deaths would rise substantially in the nearing future and thus our study is carried out with an aim to assess the demographic data, tobacco use status, attitudes, perceived barriers, counseling procedure, perception and experience of dental interns regarding tobacco cessation program in private institution at Chennai.

Materials and Methodology

Nearly 29 dental institutions are located in Tamil Nadu. Chennai is said to be India's health capital providing health care through various Government and private hospitals is the area selected for conducting this cross sectional study. Among the 13 dental colleges in Chennai city within Tamil Nadu, 3 dental colleges were randomly selected. Nearly 130 interns at different private dental institutions constituted the study population.

Questionnaire:

A self-administered structured questionnaire consisting of 30 item questionnaire designed to obtain dental interns' demographic data, knowledge, attitudes, tobacco use status, practices, perspectives and experience regarding Tobacco Cessation program among dental interns in Private Dental Institution was used. The study participants' willingness to take part in the study by filling the given questionnaire and their agreement for response was considered as obtaining implied consent. One hundred percent response rate was achieved.

Statistical Method: Descriptive statistics using frequency and percentage was used. Inferential statistics using Pearson's Chi-square test was done to check the level of significance and association between variables.

Analysis Report:

A) The present study shows **attitude level** among dental interns regarding tobacco cessation counseling. It shows that among 130 study subjects, 99(76.3%) dental interns felt that they require adequate space with privacy to counsel the patients and 112(86.2 %) of them expect support from other staffs for the smoking cessation program to be effective. About 25(19.2%) of them had undergone training program to handle addicted smokers while 116(89.2%) of the interns were willing for an intensive training course. Nearly 126(96.9%) of them had extended their support for ban of smoking in public places **(FIGURE 1).**

B) The present study shows **perception level** among dental interns regarding tobacco cessation counseling. It shows that 86.9 % dental interns feel that patients might not turn up for the next visit and nearly 76.2% believe that they might not extend co-operation if tobacco cessation counseling is given 92.3 % of them trust that tobacco cessation counseling could be effective when good quality content is used within appropriate time. Only 51.5% of the dental interns are of the opinion that the warning images on tobacco products are effective to discontinue smoking habit. 85.4% of them feel that tobacco cessation counseling is effective **(FIGURE 2).**

C) The present study shows **practice level** among dental interns regarding tobacco cessation counseling. It shows that among 130 study participants, 107(82.3%) of them ask all theirs patients regarding smoking status, 45(34.6%) of them provide pamphlets and books on staying tobacco free, 118(90.8%) explain patients all the health risks due to smoking, only 42(32.3%) make use audio visual aids and 38(29.2 %) make use of electronic gadgets to remind patient enable them quit smoking. It also reveals that 78(60%) of the dental interns are properly document records about tobacco users and 36(27.7%) of them refer smokers to de-addiction centers. Out of the total, only 35(26.9 %) prescribe nicotine substitutes for their patients .About 15 (11.5%) dental interns are smokers currently (**FIGURE 3**).

D) The present study shows the frequency, follow up of tobacco cessation counseling given and financial concerns to it. It shows that 37(28.5%) of the dental interns have given tobacco cessation counseling regularly while 86(66.2%) of them provide only at times whenever time permits and 7(5.4%) do not take up at all. Hardly 48(36.9%) of them had followed up for every case routinely and 64(86.2%) have reported that it is only done sometimes. 18(13.8%) of the dental interns do not follow up at all. About 43(33.1%) of the study population is concerned on financial reimbursement usually when they start the counseling session while 70(53.8%) considers it only occasionally.

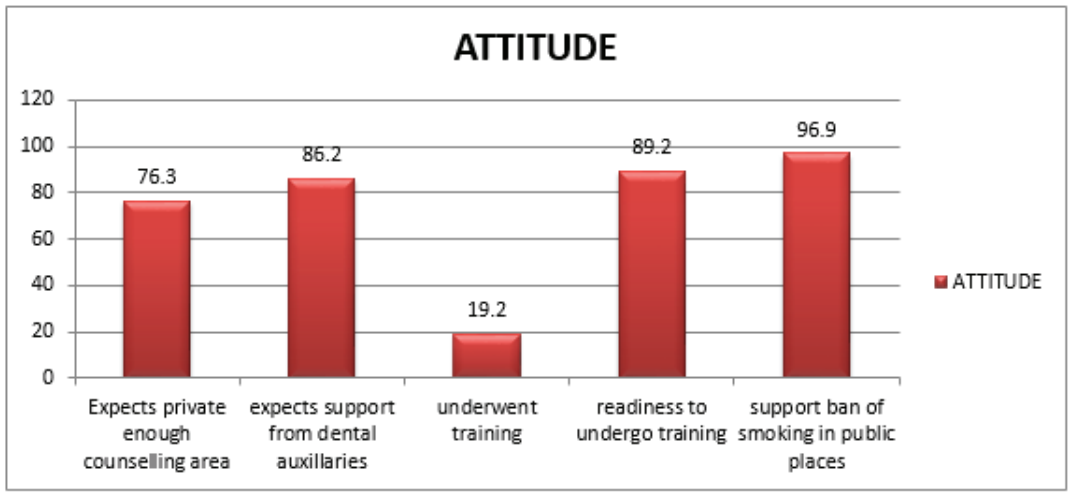


Figure 1: Assessment of attitude level among dental interns regarding tobacco cessation counseling.

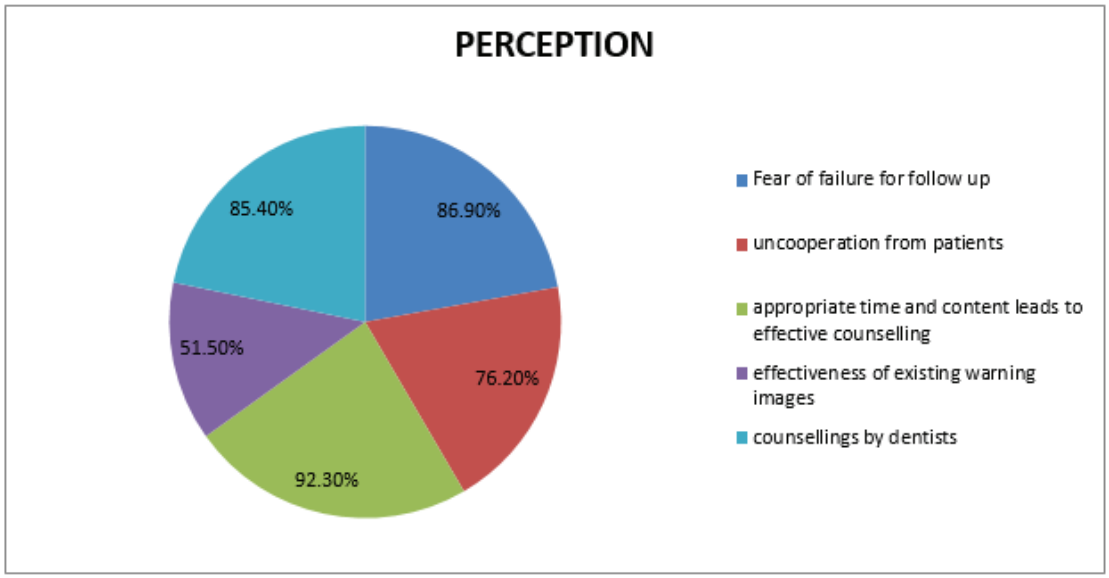


Figure 2: Assessment of perception level among dental interns regarding tobacco cessation counseling.

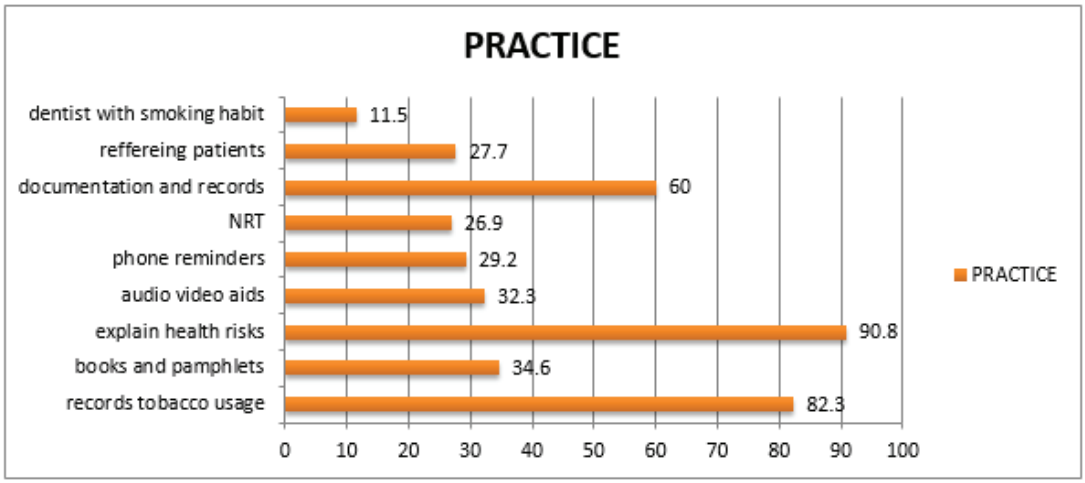


Figure 3: Assessment of practice level among dental interns regarding tobacco cessation counseling.

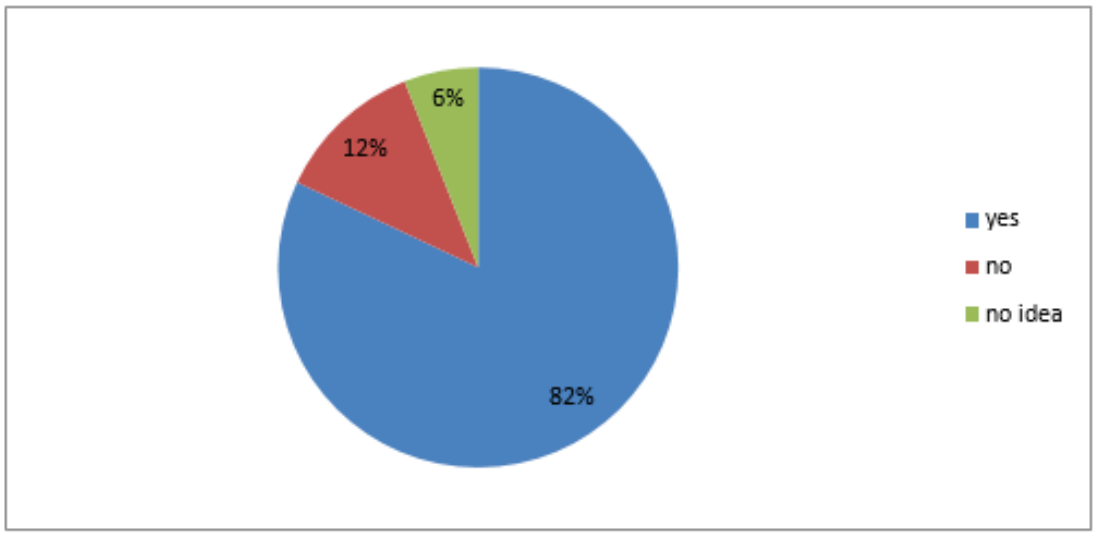


Figure 4: Knowledge about cotpa (cigarettes and other tobacco products act) among dental interns

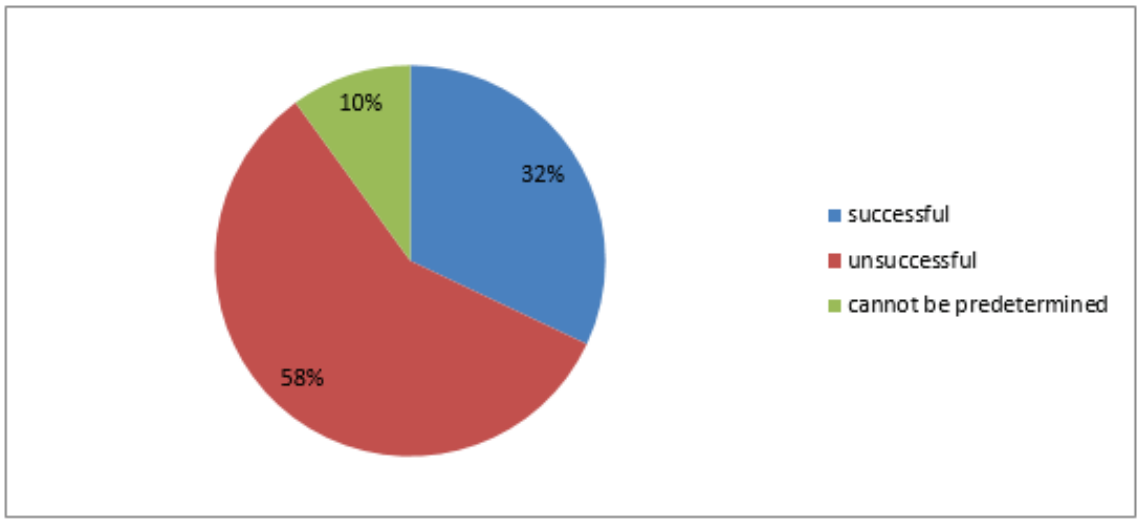


Figure 5: Anticipated outcome of tobacco cessation intervention

Discussion

As health professionals play a vital role in enriching health of the society and dentists are in a better position to spend more time with patients. Around 97.7% participants in this study similar to previous studies feel that it is the moral and ethical responsibility of every dentist to conduct tobacco cessation program with provision of encouragement and motivation for patients to quit use [13, 14]. 82.3% of them routinely ask their patients about tobacco use. The role and responsibility of dental professionals in serving as role model for the community in adaptation of healthy life style is accepted by majority of the interns (86.9%).

Merely 75.4% were found to be confident that they are qualified to counsel smokers. In our study, not all participants reported that they were taught how to counsel smokers and the above findings may be explained by the fact that only 19.2% had undergone training program to conduct counseling. On the other hand 80.9% constituting a massive proportion of our study group have not underwent such training despite the fact that 89.2% show readiness to accept such intense course. About 72.3% revealed awareness regarding behavioral modification while only 50% were familiar with avocation of pharmacological intervention as well. Though 50% were aware of NRT (Nicotine replacement therapy) and 73.1% were not advising at all for patients while 26.9 % prescribed NRT in practice.

As far as knowledge about COTPA (Cigarettes and Other Tobacco Products Act) is concerned only 82 % believed that their campus has legislative policy against use of tobacco while 12% of them have reported that they do not have such regulation and 6 % have no idea in terms of ban for smoking in and around educational institutions **(FIGURE 4).**

Majority of them (90.8%) explained all health risks to smokers but few of them utilized audiovisual aids especially books and pamphlets are offered only by 34.6% intern. Less numbers dentists consisting of 29.2% used their phones to give reminder messages to the patients as well. Nearly 36.9% followed up regularly on their patients to refrain from smoking while 86.2% occasionally tried. Thus the above two factors like knowledge and adequate training contributes as requisites for a successful tobacco intervention which influences the outcome of this study. The role and responsibility of dental professionals in serving as role model for the community in adaptation of healthy life style is accepted by majority of the interns (86.9%). These findings are in consistent with other surveys having the nearly same purpose conducted in the various countries across the world [2, 15, 16, 17].

According to various Indian studies, most doctors did not ask for or suggest methods to quit tobacco [15, 16]. Similarly, in our study also only a minority of the interns actively participated in tobacco intervention services. About 11.5% of the dental interns used tobacco contrary to 22% and 14.2% in other studies, which is high, and a cause for concern [9]. (**FIGURE 5**) About 97.7% participants in this study feel that it is the moral and ethical responsibility of every dentist to conduct tobacco cessation program with encouragement and motivation for patients to quit use, which is in close agreement with the other studies [18, 19]. This is similar to the earlier study on dental students who had also favored a ban on public use and on sale of tobacco products to adolescents [20].

Conclusion

Dental professionals play a significant role in tobacco cessation at clinical and community levels as well. The need of the hour is to train them for successful achievement of the goal of "Tobacco Free Society." Immense efforts are needed to motivate and empower the doctors to actively engage in smoking cessation support. It is high time to fight against tobacco on ground level. Hence active participation of dedicated dentists with sincerity should be encouraged.

Acknowledgement: None

Conflict of Interest: There is no conflict of interest in this work

Ethical Approval and Informed Consent: Ethical clearance was obtained from Institutional ethics committee, Saveetha Deemed University.

Source of Funding: Self- Funding study. Funding not obtained from outside source.

References

1. Rani M, Bonu S, Jha P, Nguyen SN, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross sectional household survey. Tobacco Control 2003; 12:8-15.
2. Sur D, Mukhopadhyay SP. A study on smoking habits among slum dwellers and the impact on health and economics. J Indian Med Assoc 2007; 105(9):492-6, 498.
3. Cigarette smoking-attributable mortality and years of potential life lost: United States 1990. MMWR Morb Mortal Wkly Rep 1993; 42:6459.
4. Niu SR, Yang GH, Chen ZM, Wang JL, Wang GH, He XZ, Schoepff H, Boreham J, Pan HC, Peto R. Emerging tobacco hazards in China: 2.Early mortality results from a prospective study. BMJ 1998; 317:1423-4.
5. Jha P, Jacob B, Gajalakshmi V, Gupta PC, Dhingra N, Kumar R, Sinha DN, Dikshit RP, Parida DK, Kamadod R, Boreham J, Peto R. A Nationally Representative Case– Control Study of Smoking and Death in India. N Engl J Med, 2008; 358, 1137-47.
6. Global Adult Tobacco Survey. GATS India report 2009-2010. Mumbai: International Institute for Population Sciences (IIPS) and New Delhi: Ministry of Health and Family Welfare, 2010.
7. WHO. Tobacco or Health: A Global Status Report. Geneva: WHO Publication; 1997.
8. A Vanka, NM Roshan, KS Ravi, ND Shashikiran. A review of tobacco cessation services for youth in the dental clinic. J Indian Soc Ped Prev Dent 2009; 27:78-84.
9. Tomar SL, Asma S. Smoking-attributable

periodontitis in the United States: findings from NHANES III. J Periodontol 2000; 71:743-51.

10. Christen AG, Klein JA, Christen JA, McDonald JL Jr , Guba CJ .How-to-do-it quit smoking strategies for the dental office team: an eight-step program. J Am Dent Assoc 1990:20-27.
11. Johnson NW, Bain CA. Tobacco and oral disease. EU-Working Group on Tobacco and Oral Health. B Dent J 2000; 189:200-6.
12. Shah MN. Health professionals in tobacco control: Evidence from global health professional survey (GHPS) of dental students in India. New Delhi, India: WHO 2005.
13. Reibel J. Tobacco and oral diseases. Update on the evidence, with recommendations. *Med Princ Pract* 2003;12 Suppl 1:22-32.
14. Fielding JE. Smoking: Health effects and control (1). *N Engl J Med* 1985; 313:491-8.
15. Afifah R, Schwarz E. Patient demand for smoking cessation advice in dentist offices after introduction of graphic health warnings in Australia. *Aust Dent J* 2008; 53:208-16.
16. Christen AG, Klein JA, Christen JA, McDonald JL Jr , Guba CJ .How-to-do-it quit smoking strategies for the dental office team: an eight-step program. *J Am Dent Assoc* 1990:20-27.
17. Fiore MC, Bailey WC, Cohen SJ, Dorfman, S.F, Goldstein, M.G, Gritz, E. Treating Tobacco Use and Dependence. Clinical Practice Guideline. Rockville, MD: US Department of Health and Human Services. Public Health Service 2000. Available at http://www.surgeongeneral.gov/tobaccotobaqrg.html.
18. Albert D, Ward A, Ahluwalia K, Sadowsky D. Addressing tobacco in managed care: A survey of dentists' knowledge, attitudes and behaviors. *Am J Public Health* 2002; 92:997-1001.
19. Saud M, Madhu B, Srinath KM, Ashok NC, Renuka M. Physicians practice and perspectives regarding tobacco cessation in a taching hospital in Mysore city, Karnataka. Indian J Psychiatry 2014; 56:24-8.
20. Mashburg A, Samit A. Early diagnosis of asymptomatic oral and oropharyngeal squamous cancers. CA Cancer J Clin 1995; 45: 328-5.

Role of Dental Public Health Personnel in Effective Diagnosis and Follow up in the Treatment and Prognosis of an Oral Cancer Patient

S. Shree Lakshm[i], D. Srisakthi Doraikannan[2], I. Meignana Arumugham Indiran[3], Arun Murugaiyan[4], V. Keerthi Narayan[5]

[1]Post Graduate Student, [2]Reader, [3]Professor, Department of Public Health Dentistry, [4]Senior Lecturer, Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Chennai, India, [5]Senior Lecturer, Department of Oral Pathology and Microbiology, Thai Moogambigai Dental College and Hospital Chennai, India

Abstract

Oral cancer is of significant public health importance to India owing to its high prevalence. Early detection of oral cancer offers the best chance for long term survival and has the potential to improve treatment outcomes and make healthcare affordable. The objective of this paper is to report a case on similar difficulty faced in public health care scenario and to create awareness among services sector on focusing the incidence of disease in the country highlighting the significance of a community dentist's role in guidance of betterment of life an individual who was ignorant and asymptomatic. Hence an attempt to project this case report with two year follow-up and a quality of life.

Key Words: *Awareness, Diagnosis, Oral Cancer, Oral Public Health, Verrucous Carcinoma.*

Introduction

India is the second most densely populated country with 1,369 million residents. The Government of India has adopted several growth oriented policies witnessing an annual increase of 5.44% public health expenditure. Despite the efforts and achievements, the prevalence of oral diseases in India remains very higher when compared with other countries. Primary Health Centre is the first point contact for an individual towards health care system which serves as an active ground where the presence of a dentist is crucial for early diagnoses, prompt treatments and timely referrals. Around 75% of health infrastructure and resources are concentrated in urban areas where only 27% of the total Indian population resides while 73% of the country's population do not have easy reach to healthcare system. More than half of the community health centres are not functional and there is no dentist in 20% of the rural primary health care centres and one dentist for 2.5 lakh people in rural India [1]. There is an acute shortage of dental auxiliaries, appropriate polices, public and private partnerships leading to poorly equipped dental care setups resulting in lack of prioritization for oral healthcare services for the entire population [2-4].

Oral cancer is of significant public health importance to India owing to its high prevalence. Primarily, it is diagnosed at later stages which result in low treatment outcomes and considerable costs to the patients who typically cannot afford treatments [5]. Secondly, rural areas in middle- and low-income countries also have inadequate access to skilled care providers and limited health services. As a result, delay has also been largely associated with advanced stages of oral cancer. Early detection of oral cancer offers the best chance for long term survival and has the potential to improve treatment outcomes and make healthcare affordable. Oral cancer affects those from the lower socioeconomic strata of society due to a higher exposure to risk factors such as the use of tobacco.

Corresponding Author:
Dr. D. Srisakthi Doraikannan
Reader, Department of Public Health Dentistry
Saveetha Dental College, Saveetha University,
Chennai, India, Email id: dentishree777@gmail.com
Phone: +91 8144542777

Although clinical diagnosis occurs via examination of the oral cavity, the majority of cases present to a healthcare sector at later stages of cancer subtypes, thereby reducing chances of survival due to delays in diagnosis [6]. Efforts to increase the frame of literature on the knowledge of the disease aetiology and regional distribution of risk factors have begun gaining momentum. Oral cancer will remain a major health problem until efforts towards early detection and prevention are taken which will reduce the burden [6, 7]. In light of this, the objective of this paper is to report a case on similar difficulty faced in public health care scenario and to create awareness among services sector on focusing the incidence of disease in the country highlighting the significance of a community dentist's role in guidance of betterment of life an individual who was ignorant and asymptomatic. Hence an attempt to project this case report with two year follow-up and a quality of life measure was made.

Case Report

About the case: A 62 year old male reported to the community urban health center of our institution with a chief complaint of a non-healing growth of tissue on the right upper back teeth region for a year following an injury that resulted after a stair case fall. He developed pain in the same zones triggered on touch and usage of denture which aggravated on mastication over the course of period. He had undergone an uneventful extraction and replacement in the same region before 4 years and gave a history of consuming hypoglycemic for 12 years.

On intraoral examination:

Following the recording of brief case history intraoral examinations were performed. On inspection an ovoid swelling on the right cheek area was observed extraorally which was tender on palpation (**FIGURE 1**). A solitary, firm, non-scrappable proliferous ulcerative growth measuring 3×2 centimetres was found on the alveolar mucosa of right maxillary vestibule having finger like corrugations which was pinkish with focal areas of white spots (Figure 1).

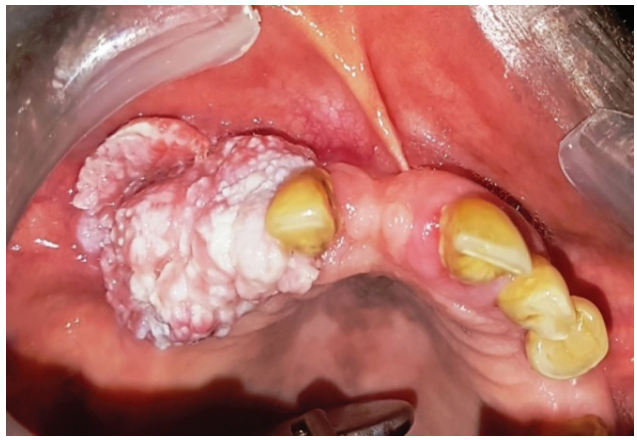


FIGURE: 1: Clinical Photograph showing the non-scrappable proliferous ulcerative growth measuring 3×2 centimeters

Analysis of the past dental and relevant history was done and provisional diagnosis of traumatic fibroma, epulis fissuratum with super added candidal infection, verrucous hyperplasia; proliferative verrucous leukoplakia (PVL), verrucous carcinoma and squamous cell carcinoma were made. He was referred to our college dental speciality wing where he was prescribed topical application of antifungal drugs (1% Cotrimazole) for a week. As the lesion did not show signs of regression, CBC and RBC investigations were carried out and found to be normal and hence CT and incisional biopsy were also conducted.

On special investigations:

Correlating the clinical picture with CT revealing a poorly infiltrating soft tissue dense lesion which was likely to be a mitotic upper gingivo-buccal mucosal CA of stage IV, histopathological examination of the biopsied tissues was done which revealed confirmatory findings [**FIGURE 2**]

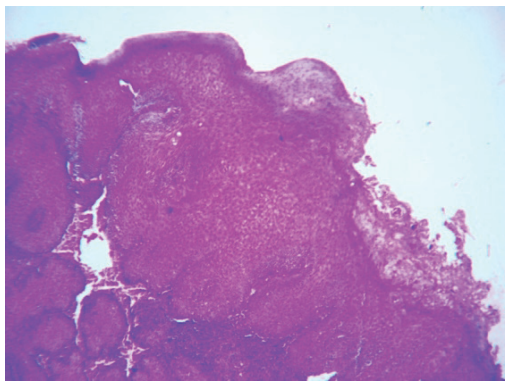


FIGURE 2: Histopathological Image (40x) showing broad bulbous retepegs with mild dysplasia, parakeratin plugging with break in the basement membrane and malignant cells infiltrating in to the subjacent minimal connective tissue stroma.

Points taken into consideration before arriving at a final diagnosis:

Oral fibroma was ruled out since it usually presents as a firm smooth papule in the mouth and it is in the same colour as the rest of the mouth lining which sometimes may be paler or darker if it has bled. The surface may be ulcerated due to trauma, or become rough and scaly. It is usually dome-shaped but may be on a short stalk like a polyp (pedunculated). If it has developed under a denture it may be flat with a leaf-like shape. It should be noted that no histological dysplastic features and other observations were not present and fibromas never develop into oral cancer [8].

Epulis fissuratum is a fibrous overgrowth caused by chronic irritation of the denture flange against the area where the gums meet the alveolar vestibular mucosa. Although it is very uncommon for these lesions to be associated with oral squamous cell carcinoma, as a precautionary measure the removed lesion should be sent for microscopic testing to rule out by histological confirmations [9, 10]. Non response to antifungal drugs was taken note to rule out candida infection as a precipitating or secondary factor.

Final Diagnosis

On complete evaluation of clinical, radiological and histological findings a conclusive diagnosis of verrucous carcinoma (VC) was put forward by ruling out other possible diagnoses.

Discussion

It should be noted that VC of the oral cavity is a different clinicopathologic tumour distinguished from the usual squamous cell carcinoma because of its local invasiveness, non-metastasizing behaviour, and special clinical appearance. Oral verrucous lesions typically presents as slowly enlarging, grey or white overgrowths on the buccal mucosa or gingiva of older men [11]. It is a warty variant of squamous cell carcinoma characterized by a predominantly exophytic overgrowth of well-differentiated keratinizing epithelium. Histologically, it is known to present "elephant feet" like down-growth that seems to compress the underlying connective tissue and typically show minimal or absent cytological atypia [12]. Verrucous hyperplasia (VH) may be a de novo lesion or associated with papillomas. VH and PVL are irreversible clinicopathologic lesions with considerable potential for evolving into verrucous or squamous cell carcinoma. PVL is a disease of the oral cavity in which VH is a part of its developmental spectrum [13].

In a study by Keszler, histologic data showed orthokeratinization more frequently in PVL and VH, while parakeratinization in VC. Although, sharp epithelial projections predominated in all three lesion types, lympho-plasmatic infiltration and Russell bodies were more frequent in VH. Histometrically, connective tissue–epithelial interface, epithelial height and connective tissue–epithelial interface plus verrucous epithelial surface, showed statistical differences between PVL or VH versus VC. Keszler concluded that histometric analysis was able to detect epithelial differences between both premalignant lesions and VC [14]. VC, though uncommon lesion, in its pure form, can be considered a disease of later life, typically occurring in the seventh–eighth decades, with a strong male predominance. VC is strongly associated with the chronic use of tobacco, chewing betel nuts, alcohol and poor oral hygiene [15, 16]

Treatment strategy planned: On complete evaluation of clinical, radiological and histological examination following treatment strategy was planned **(TABLE 1)**

TABLE 1: Table showing the phases of treatment planned for the patient

Emergency Phase	Surgical protocol- Adv. Partial Maxillectomy from 11 to 16 region followed by split thickness graft under General anaesthesia
Phase I	Ø Adv. Health Education, Ø Nutritional Counseling, Ø QOL-OC Measurement
Phase II	Adv. Extraction of 12, 22, 24,43

***Cont* .. TABLE 1: Table showing the phases of treatment planned for the patient**

Phase III	Ø Adv. Scaling, Ø Adv. Replacement i.r.t 12,13,14,15,16,17,25, 31,27,41,42, Ø Adv. Class- I restoration in 36, Ø Adv. Class –V restoration in 46, Ø Adv. Class V GIC in 23, and 25
Phase IV	Adv. Recall and Review

The above treatment plan was explained to the patient. His pre-operative quality of life using Quality of Life-Oral Cancer questionnaire consisting of 29 items was measured and counseling was given prior performing the surgery which ended with placement of an obturator. Deeper sections and complete sampling was required further to rule out frank squamous cell carcinoma. The excised portion was sent for excisional biopsy which revealed adequate clearance. He was prescribed antibiotics and analgesics for three days and instructed to maintain soft diet, good oral hygiene and avoid blowing through nose. His condition progressed with satisfactory healing during the recall visit and subsequent necessary treatment procedures were performed **(FIGURE 3)**

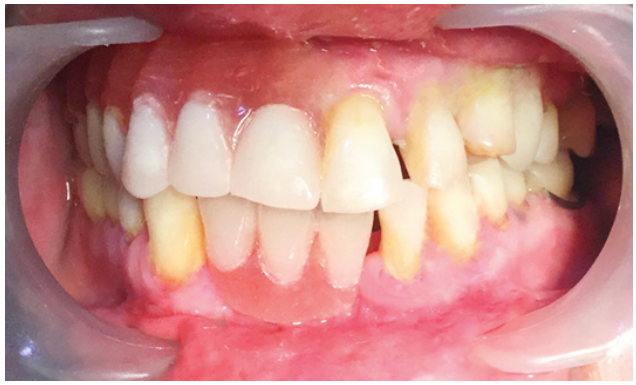
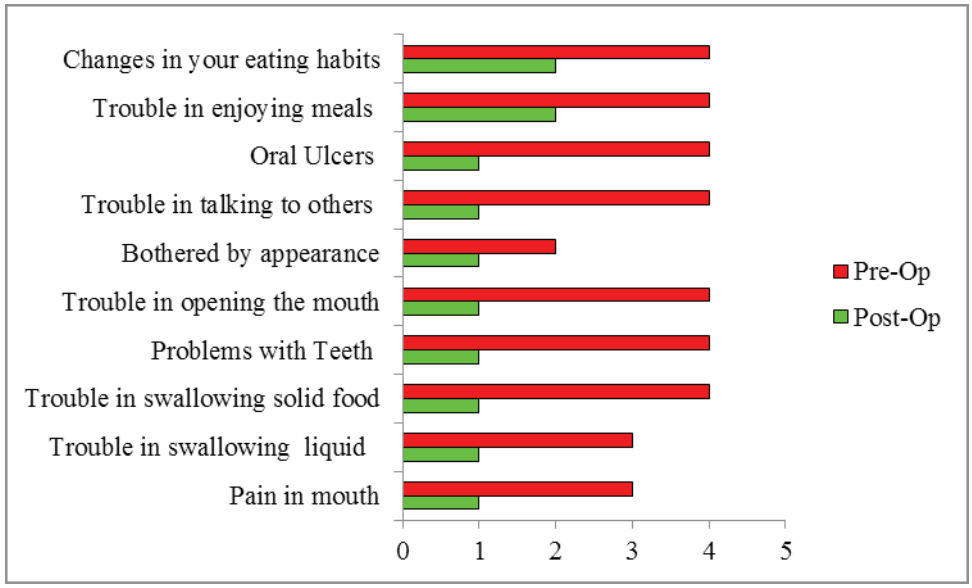
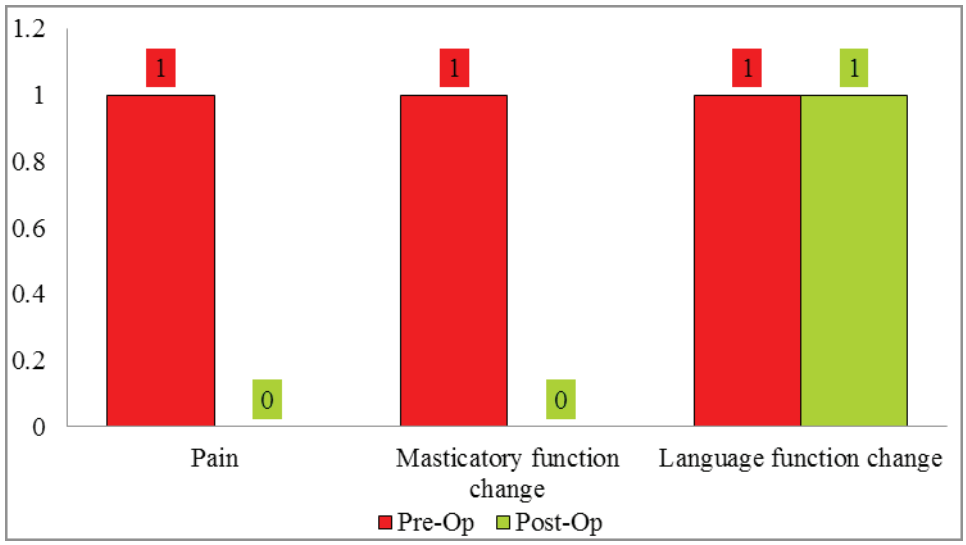


FIGURE 3: Intra-Oral clinical photograph following Phase-III treatment

QOL-OC score of 58 to 32 post surgery denotes an improvement in his quality of living in terms of functional efficiency and esthetics (**GRAPH 1, 2**).



GRAPH 1: Graph showing the range of Perceived Quality of life by the patient before and after Surgery



GRAPH 2: Graph showing the level of Experience of the patient recorded before and after Surgery

The patient reported weight gain post –operatively. Reinforcement of oral hygiene instructions was given with demonstration of brushing technique with teeth model. He was educated with more emphasis on denture hygiene maintenance.

Impact Of The Case Report:

The above report is just a presentation of one case resulting in drastic improvement in the quality of life of an individual following early diagnosis, prompt treatment, regular follow-up and adoption of preventive strategies highlighting the significance of dentists at health centres and conducting health programmes at mass level to focus on the incidence of oral diseases as well. This case emphasizes the need to educate the patient regarding denture care which could have saved him from such a lesion. Though the patient was ignorant initially, appropriate timely professional advice given has enabled him develop a positive dental attitude towards comprehensive treatments as well.

Recommendation:

This case is a classic example highlighting the need for recruitment of dental health professionals in all Government health care centres and urgent fixing of health facilities in rural India along with creation of awareness which can be done by creating attractive opportunities and growth benefits for dentists to migrate from urban to rural areas.

The potential of Public Health Dentists should be well utilized for early identification of oral precancer/cancer, oral health education, tobacco cessation counselling, provision of basic treatments including ART, topical fluoride and sealant applications and most importantly recruiting them to perform the responsibilities of an administrator taking up monitoring roles for the smooth and effective functioning of rural health care centres and ensuring maintenance of updated registers consisting of details regarding regular long-term follow up of special cases [20].

As it was not affordable for the patient to undergo cast partial denture which was a suggested better option, his functional efficiency and aesthetics was regained with removable prosthesis. The Government of India should introduce the free denture scheme for geriatric population like the Government of Karnataka which under the Dantha Bhagya Scheme has benefited 1512 of its senior citizens as of 2019 [18].

Conclusion

Large numbers of outreach programs through mobile dental vans are a solution to spread awareness and disseminate treatment at rural areas. There should be inclusion of dental health programs with family welfare programs by the government like in other developed countries and the barriers in the implementation of National Oral Health Policy should be addressed to achieve universal dental coverage for our country's citizens for which integration of political, social, organizational (both government and nongovernmental), professional dedication and support are the need of the hour making its long term distant goal reachable for a

healthy India.

Ethical Clearance: Ethical Clearance is taken from the Institutional Ethical Committee, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences.

Source of Funding: Self-funding

Conflict of Interest: Nil

References

1. Availability of Health Centre in Tamil Nadu as on 31st March 2017. Community.data.gov.in.
2. Ahuja NK, Parmar R. Demographics and current scenario with respect to dentists, dental institutions and dental practices in India. Indian Journal of Dental Sciences 2011; 3:8-11.
3. Ramandeep Singh Gambhir,Amanpreet Kaur and Agad Prakash Singh Dhaliwal. Dental Public Health in India: An insight. Journal of Family Medicine and Primary Care 2016; 5(4):747-751.
4. Ajay Narayan, Suraj j Thomas, Augustine Daniel, Sabba Fatima and Renu A Mathew. An overview of Oral Health in India: Current Scenario and Challenges. International Journal of Oral Care and Research 2016; 4(4); 280-283.
5. P. S. Khandekar, P. S. Bagdey, and R. R. Tiwari. "Oral cancer and Some epidemiological factors: a hospital based study," Indian Journal of Community Medicine 2006; 31(3); 157– 159.
6. S. Kumar, R. F. Heller, U. Pandey, V. Tewari, N. Bala, and K. T. H. Oanh. "Delay in presentation of oral cancer: a multifactor analytical study," National Medical Journal of India 2001; 14(1), 13–17.
7. Coelho Russell ken. Challenges of the Oral Cancer Burden in India. Journal of Cancer Epidemiology 2012, 1:1-17. Article ID 701932.
8. Gonsalves WC, Chi AA, Neville BW. Common oral lesions: Part II. Masses and neoplasia. American Family Physician 2007; 75: 509-12.
9. Lederman DA, Fornatora ML.Oral fibromas and fibromatoses – Medscape Reference
10. Stoopler ET, Alawi F. Clinicopathologic challenge: a solitary submucosal mass of the oral cavity. International Journal of Dermatology 2008; 47: 329–331.
11. Woolgar J.A., Triantafyllou A. Pitfalls and procedures in the histopathological diagnosis of oral and oropharyngeal squamous cell carcinoma and a review of the role of pathology in prognosis. Oral Oncology 2009; 45(4–5):361–385.
12. Pindborg J.J., Reichart P.A., Smith C.J., Van der Wall I.WHO . 2nd ed. Springer-Verlag; Berlin: 1997. Histological Typing of Cancer and Precancer of the Oral Mucosa. 10–16.
13. Murrah V.A., Batsakis J.G. Proliferative verrucous leukoplakia and verrucous hyperplasia. Ann Otol Rhinol Laryngol. 1994 Aug; 103(8 Pt 1):660–663.
14. Keszler A., Gutierrez R, Dominguez F.V. Verrucous carcinoma, hyperplasia and leukoplakia of the oral mucosa: a clinico-histopathological and histometric study. Acta Odontol Latinoam 1985; 2(2):43–51.
15. Miller M.E., Martin N., Juillard G.F., Bhuta S., Ishiyama A. Temporal bone verrucous carcinoma: outcomes and treatment controversy. Eur Arch Otorhinolaryngol. 2010; 267:1927–1931.
16. Oliveira DT, Moraes RV, FiamenguiFilho JF, FantonNeto J,Landman G, Kowalski LP. Oral verrucous carcinoma: a retrospectivestudy in Sao Paulo Region, Brazil. Clinical Oral Investigations 2006; 10(3):205–9
17. Top 10 States/UTs with respect to Public Health Expenditure during 2017-18. Community.data.gov.in.
18. States/UTs Functioning of Primary Health Centres. Community.data.gov.in.
19. Thomas S. Plenty and scarcity. British Dental Journal 2013; 214:4.
20. Indian Public Health Standards (IPHS) Guidelines for Community Health Centres [internet]; Revised 2012. Available from: http://health.bih.nic.in/Docs/Guidelines/Guidelines-Community-Health-Centres.pdf.

A Mediation Analysis of the Effect of Perceived Stress on the Relationship between Self Efficacy and Quality of Life in Medical Students

S.GopalJee[1], Ashok Rai[2]

[1]Associate Prof. & Head, Department of Psychology, DAV PG College (B.H.U.) Varanasi,
[2]Pediatrician and State president of Indian medical association, UP

Abstract

Stress in medical students is caused by tenacious medical programs, which may have physical and psychological effects on the quality of life of medical students. The study aimed to examine the relationship between self efficacy and quality of life in medical students. In addition, we examined the mediation role of perceived stress on relationship between self efficacy and quality of life. The study was conducted on hundred medical students (64 male and 36 female) of Institute of medical sciences, Banaras Hindu University, Varanasi in the age range of 19 to 22 years (Mean age= 20.36, SD= 1.26). The data was collected by using the self efficacy scale (Sud et al, 1992), perceived stress scale (Cohen et al 1983) and WHOQOL-26 BRIEF. Results showed that most of the dimensions of QOL as well as the total scores of QOL were correlated positively with self efficacy and negatively with perceived stress. To examine the mediation role of perceived stress in self efficacy-QOL relationship a mediation analysis was carried out. In the total sample, self efficacy predicted QOL in an initial regression model (beta = 0.37, $p < 0.001$). When perceived stress was added to the model, however, self efficacy was attenuated less and insignificant (beta = 0.11, NS). A Sobel test of significance confirmed a mediated effect ($p<0.01$). Self efficacy is associated with QOL in medical students, and this relationship is mediated by perceived stress.

Key words: *perceived stress, Quality of life, Self efficacy*

Introduction

At present, there is increasing interest in the study of self esteem and quality of life. In today's changing and competitive scenario the term stress received a great attention among the medical students. Medical students, who are in a phase of transition from adolescence to adulthood, are in the most challenging phase of life. Most medical students are away from home, trying to adjust in new environment and anxious enough for their future[1]. Self-efficacy is a theoretically and empirically robust motivation belief that has been shown to play an important role in the learning and development of new skills in medical students. Bandura's social cognitive theory suggests that self-efficacy—defined as the confidence to carry out the courses of action necessary to accomplish desired goals and it plays an important role in influencing achievement outcomes through its dynamic interplay with environmental and behaviouraldeterminants[2].Although skills and knowledge provide the raw materials for student success in medical education, beliefs about personal capabilities to use these raw materials can spell the difference between success and failure. Self-efficacy beliefs are goal-oriented, context specific and future-oriented judgments of capabilities that change according to the task involved [3, 4.]

There is growing concern about quality of life of medical students during medical study.The World Health Organization (WHO) defined Quality of Life (QoL) as "an individual's perception of their position in life, in the

Corresponding Author:
Satya Gopal Jee
D**esignation:** Associate Professor & Head,
Address: Department of Psychology, D.A.V. P.G. College, Ausanganj, Varanasi, 221001,
Email id:satyagopal.psycho@gmail.com

context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns"[5] .QoL is comprised of multiple aspects, including psychological health, physical well-being, social relationships, and environmental conditions[6].It is shown by many of the study that decreased QoL scores among medical students during their training years, which is associated with several future adverse effects, including an unhealthy lifestyle, variable psychological problems, academic failure, and other negative impacts on the students' professional development [7,8,9,10,11]. Different types of stress can affect quality of life of medical students such as a stressful clinical visit, continuous attention when interacting with patients, peer competition for academic excellence, the overwhelming load of new and massive information to learn, and of course difficulty[12,13,14].Studies with medical students have found that during the first year of medical school students had a deficit in hours of sleep, physical activity, and social interactions[15,16].

It is evident from the review that self efficacy is associated with enhanced quality of life. Although research on the self efficacy of medical students is of great interest in medical education, no attempts have been made to systematically review the research and examine the role of self efficacy on quality of life of medical students. Previous research did not present the mechanism of perceived stress on relationship between self efficacy and quality of life of medical students. Whereas self efficacy is directly facilitate the quality of life. The observation credits indirect support to our contemplation that the beneficial effect of self efficacy may be mediated by the perceived stress. However, there is lack of literature in this area and most of the previous studies on self efficacy–QOL were conducted on non professional population.

Method

Sample: The present study was conducted on 100 medical students (1st year and 2nd year) from institute of medical sciences, Banaras Hindu University and Heritage institute of medical sciences, Varanasi. They were consists of 64 male and 36 female. Age of participants ranged from 19 to 22 years (Mean age= 20.36, SD= 1.26). Self efficacy, Perceived stress and quality of life scale were administered on these students. None of the participants reported any present or prior history of medical or psychiatric illness in a semi-structured interview conducted before the administration of the tools for the present study.

Tools

1. **Hindi version of General self efficacy scale[17]**: The Hindi adaptation of generalized self-efficacy scale, adopted by SonaliSud[17], was used for measuring self-efficacy, which comprises 10 items. The German scale was developed by Mathias Jerusalam & Ralf Schwarzer[18]. It assesses optimistic self belief used to cope with difficult situation in life. The coefficient of internal consistency, estimated by Cronbach's alpha was determined to be 0.91.

2. WHOQOL-26 BRIEF Hindi version[19]: The 26-item WHO's QoL Instrument-Short Version (WHOQOLBREF) was used to measure QoL. The scale consisted of 2 items about overall QoL and general health perception and 24 items about QoL satisfaction that are divided into four domains, including physical QoL, psychological QoL, social relationships, and environmental QoL. The total score is the sum of the domains and ranges from 20 to 80. Domain scores indicate an individual's perception of QoL in each domain. The Cronbach's coefficients of the total and each domain in a study were from .58 to .90.

3. Perceived stress scale[20]: It is a 14 -item scale which measures the degree to which situations in one's life is appraised as stressful during the past month. There are seven negative and seven positive questions for which the subjects were required to choose from a scale of 5 alternatives 'never' 'almost never' 'sometimes' 'fairly often' 'very often' relating to their feeling of being stressed on a 0-4 scale.

Procedure

The participants were approached after taking permission from the respective hospitals. They were contacted individually and explained the purpose of study.The medical students have signed the informed consent letter which signified their voluntary participation in the research. All participants were requested to ensure that they have responded to each items of all scale. The obtained data were analyzed by using bivariate correlation and mediation analysis.

Results and Discussion

To ascertain the relationship of self efficacy with various domains of Quality of life and perceived stress bivariate correlation coefficients were computed. The obtained results have been displayed in Table 1.

Table 1:Correlations of total quality of life as well as various dimensions of quality of lifewith perceived stress and self efficacy

Measures	**Perceived Stress**	**physical**	**Psychological**	**Social relations**	**Environmental**	Total QOL
Perceived Stress	---	-0.44**	-0.48**	-0.54**	-0.40**	-0.71**
Self efficacy	-0.38**	0.28**	0.21*	0.18	0.26**	0.37**

p<0.05, **p<0.01

Table-1 shows correlations among study variables. The perceived stress is negatively strongly correlated significantly with quality of life as well as all the dimensions of quality of life(r=-0.44, r=- 0.48,r= -0.54,r=-0.40and r=-0.71,p< 0.01). Self efficacy is significantly positively correlated with total quality of life and all dimensions of quality of life except social rations (r=0.28,r=0.21,r=0.18NS,r= 0.26 and r=0.37, p<0.01).Thus, the observed pattern of correlation suggests that This perceived stress may affect both physiological and psychological health negatively and lead to decline in the quality of life of medical students. It means life as medical students is often stressful.This finding is consistent with a previous review; high perceived stress levels of students can have negative effects on QoL and healthy lifestyle, and their experience of depressive episodes could easily lead to decreased QoL[21]. Even burnout, have been documented in pharmacists, physicians, nurses, and dentists[22,23,24,25].

It is evident from Table-1 that opposite pattern of correlations was also obtained between various dimensions of quality of life and self efficacy. All dimensions of QOL (except social relation) positively and significantly correlated with self efficacy (r= 0.28, p<0.01, 0.21, p<0.01, 0.18 NS, 0.26, P<0.01, 0.37, P<0.01). The findings of the present study empirically support the notion that Self-efficacy proposed by Bandura plays an important role in modulating health behaviors and in turn positively affecting life qualities. Many studies have indicated that patients with higher self-efficacy are more effective in the self-management of hypertension[26]. Person with high self-efficacy would be more likely to deal with life stressors with confidence and engage in the necessary behaviors to preserve or restore health[27].

It is also evident from the finding of the present study that higher level of self efficacy is associated with higher level of quality of life and lower perceived stress. This pattern of relationship among self efficacy, perceived stress and quality of life support our assumption that healthy effect of self efficacy is likely to be mediated by the perceived stress. However, we have tried to empirically test this meditational effect on self efficacy-quality of life relationship which is presented in **table-2 and fig-1**

Table-2:Mediation effect of using social media on positive ageing perception–loneliness relationship

Testing step in mediational model	**R**	**R2**	**R2 Change**	**F change**	**B**	**Beta**	**t**
Testing step I Path a							
Predictor to mediator	0.38	0.15	0.15	16.64**	-0.72	-0.38**	4.09**
Testing step II Path B							
Mediator to outcome	0.71	0.51	0.51	101.33**	-1.28	-0.71**	10.06**
Testing step III Path C							
Predictor to outcome	0.37	0.14	0.14	15.30**	1.24	0.37**	3.91**
Testing step IV path C' mediation effect							
Predictor to outcome After mediation ---------- 1. Self efficacy	--	--	--	--	0.37	0.11 NS	1.46NS
2. Perceived stress	0.72	0.52	0.52	52.33**	-1.21	-0.67**	8.79**

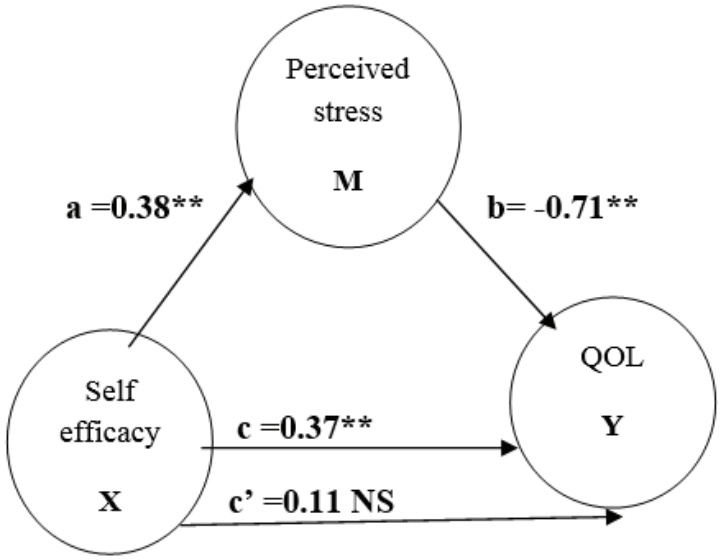


Fig-1 Path diagram of the mediation role of perceived stress

In the hierarchical regression model, the relationships between the self efficacy and QoL contributed significantly to the model, indicating that the self efficacy was a strong predictor of QoL (c = 0.37, $p < .001$). However, after adding perceived stress in the model, the coefficient of self efficacy was diminished (c'= 0.11, NS), suggesting the mediating effect of perceived stress. Additionally, the Sobel test was conducted to examine the significance of the mediator effect by using thefollowing formula

$$\text{Z-value} = ab/\text{SQRT}(b^2X\ s^2_a + a^2Xs^2_b)$$

a = raw (unstandardized) regression coefficient
sa = standard error of a.
b = raw coefficient for the association between the mediator and the DV

sb = standard error of b.

The Sobel test showed highly statistically significant result with Z=3.796, p<0.001. Results indicate that the relationship between self efficacy and quality of life was fully mediated by perceived stress. It suggests that Medical students may experience stressful condition due to their curriculum burden and career responsibilities. Adverse physical and mental health leads to impaired quality of life of medical students which may affect their learning and academic capabilities during medical education.This finding is consistent with a previous review that psychosocial consequences such as depression anxiety as well as stress can reduce the quality of life of medical students[28].Study-related stressors experienced by medical students include high workloads, tight time schedules, dissection of corpses, contact with severely ill, suffering and dying patients, and financial problems, as well as language barriers, communication difficulties and cultural differences especially for south Indian to north Indian[29]. To produce successful doctors, stress needs to be tended to at the early stages of training. Students who enter medical colleges are less likely to be depressed than students in other fields; however, this statistic is reversed by the second year of medical school. Addressing medical student perceived stress right away is essential to stave off depression and anxiety that students often experience.

Conclusion

In sum, the results of this study highlight the negative association between stress and QoLand positive association between self efficacy and quality of life in medical students. Also pointed that factor as perceived stress can maximize this negative association, deteriorating even more the QoL. Self efficacy belief determine our manner of perceiving the work environment in such a way that doctors who believe themselves to be effective face challenging educational demand with efforts. It means self efficacy is powerful personal resource that predicts the quality of life in doctor professionals in positive way but this effect decreases when stress is perceived by doctors. It is pointed out, the reduced number of studies that address the raised issues together i.e., self efficacy, stress and QoLin medical students. Medical studies are perceived to be characterized by competition, lacking time for leisure activities or social contacts and schedules that demand exclusive dedication, all of which can lead to reduced quality of life. Therefore, if we want to improve self efficacy, we must work to reduce stress level.

Research ethics approval: Research ethics approval was obtained from IMS, BHU and Haritage institute, Varanasi

Conflict of Interest Statement: The authors declare that there is no conflict of interest.

Source of Funding: Self funding

References

1. Hodgson, C &Simoni, J. Graduate Student Academic and Psychological Functioning, Journal of College Student Development.,1995. 36 (3), 244-253
2. Bandura A. On the functional properties of perceived self-efficacy revisited. J Manag. 2012;38:9– 44.
3. Bandura A. Social cognitive theory: an agentic perspective. Annu Rev Psychol. 2001; 52:1–26. 7.
4. Bandura A. Guide for constructing self-efficacy scales. In: Pajares F, Urdan TC, editors. Self-efficacy beliefs of adolescents. Greenwich (CT): Information Age; 2006. 307–37.
5. Group WH. Development of the WHOQOL: rationale and current status. Int J Ment Health. 1994; 23:24–56.
6. Pagnin D, De Queiroz V. Comparison of quality of life between medical students and young general populations. Educ Health. 2015; 28:209.
7. Ibrahim NK, Mahnashi M, Al-Dhaheri A, Al-Zahrani B, Al-Wadie E, Aljabri M, Al-Shanketi R, Al-Shehri R, Al-Sayes FM, Bashawri J. Risk

factors of coronary heart disease among medical students in King Abdulaziz University, Jeddah, Saudi Arabia. BMC Public Health. 2014; 14:411.

8. Saipanish R. Stress among medical students in a Thai medical school. Med Teach. 2003; 25:502–6.
9. Rosal MC, Ockene IS, Ockene JK, Barrett SV, Ma Y, Hebert JR. A longitudinal study of students' depression at one medical school. Acad Med. 1997; 72:542–6.
10. Mane Abhay B, Krishnakumar M, Niranjan Paul C, HiremathShashidhar G, Mane AB. Differences in perceived stress and its correlates among students in professional courses. J Clin Diagnostic Res. 2011; 5:1228–33.
11. Roh MS, Jeon HJ, Kim H, Han SK, Hahm BJ. The prevalence and impact of depression among medical students: a nationwide cross-sectional study in South Korea. Acad Med. 2010
12. Chan GC, Koh D. Understanding the psychosocial and physical work environment in a Singapore medical school. Singap Med J. 2007; 48:166.
13. Dyrbye LN, Thomas MR, Shanafelt TD. Medical student distress: causes, consequences, and proposed solutions. Mayo Clin Proc. 2005;80:1613–22.
14. Dahlin M, Joneborg N, Runeson B. Stress and depression among medical students: a cross-sectional study. Med Educ. 2005; 39:594–604.
15. Parkernson GR, Broadhead WE, Tse CJ: The Health Status and Life Satisfaction of First-year Medical Students. Acad Med. 1990, 65: 586-587.
16. Tempski P, Perotta B, Pose RA, Vieira JE: A questionnaire on the quality of life of medical students. Med Educ. 2009, 43: 1107-1108.
17. Sud,S., Schwarzer, R., & Jerusalem, M. (1998). General Self-Efficacy Scale (H). Retrieved July, 15, 2011
18. Schwarzer, R., & Jerusalem, M. Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, Measures in health psychology: A user's portfolio. Causal and control beliefs. 1995, 35-37. Windsor, UK: NFER-NELSON.
19. World Health Organization. WHOQOL-BREF manual introduction, administration, scoring and generic version of the assessment. Geneva, Switzerland: World Health Organization; 1996.
20. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. J Health Soc Behav. 1983; 24:385–96.
21. Ribeiro IJ, Pereira R, Freire IV, de Oliveira BG, Casotti CA, Boery EN. Stress and quality of life among university students: a systematic literature review. Health Prof Educ. 2017;4(2):70e7
22. Ortmeier BG, Wolfgang AP, Martin BC. Career commitment, career plans, and perceived stress: a survey of pharmacy students. Am J Pharm Educ. 1991; 55:138-42.
23. Wolfgang AP, Perri III M, Wolfgang CF. Job-related stress experienced by hospital pharmacists and nurses. Am J Hosp Pharm. 1988; 45:1342-5.
24. Barnett CW, Hopkins WA, Jackson RA. Burnout experienced by recent pharmacy graduates of Mercer University. Am J Hosp Pharm. 1986; 43:2780-4.
25. Lapane KL, and Hughes CM. Job satisfaction and stress among pharmacists in the long-term care sector. Consult Pharm. 2006;21:287-92
26. Sarkar U., Fisher L., Schillinger D. Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? Diabetes Care, 2012, 29(4), 823–829.
27. Machado L. A. C., Telles R W, Costa-Silva L., Reis R. P., Barreto S. M. Psychometric properties of Multidimensional Health Locus of Control A and General Self-Efficacy Scale in civil servants: ELSA-Brasil Musculoskeletal Study (ELSA-Brasil MSK). Brazilian Journal of Physical Therapy,2016., 20(5), 451–460
28. Kötter T, Voltmer E. Stressbelastung von Medizinstudierendenmessen: Übersetzung des "Perceived Medical School Stress Instruments" in die deutsche Sprache. GMS – Zeitschriftfürmedizinische Ausbildung. 2013; 30(2):13.
29. Madill A, Latchford G. Identity change and the human dissection experience over the first year of medical training. Soc Sci Med. 2005;60(7):1637–47

Effect of Yogicpractice on Resting Pulse Rate among College Men Long Distance Runners

S.Jayasingh Albert Chandersekar[1], N.Ganapathy[2], P.Yokesh[3], R.Manoranjith[4]

[1]Asst. Prof, Dept. of Physical Education & Sports Sciences, SRM IST, Kattankulathur, [2]Director of Physical Education, SRM ValliammaiEngg. College, Kattankulathur, [3]Asst.Prof, Alagappa University College of Physical Education, Karaikudi, [4]PhD Scholar, Alagappa University College of Physical Education, Karaikudi

Abstract

The purpose of the present study was to investigate the effect of yogic practice on resting pulse rate among college men long distance runners. To achieve the purpose of the study thirty men long distance runners were selected from colleges affiliated to Alagappa University, during the year 2015. The subject's age ranges from 18 to 25 years. The selected LDR were divided into two equal groups consists of 15 men LDR each namely experimental group and control group. The experimental group underwent a yogic practice programme for six weeks. The control group was not taking part in any training during the course of the study. Resting Pulse Rate was taken as criterion variable in this study.The selected subjects were tested on resting pulse rate by taking radial pulse. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due toyogic practice given to the experimental group on resting pulse rate when compared to control group.

Keywords: *yogic practice, Resting Pulse Rate and't' ratio.*

Introduction

Yoga is needed and a powerful remedy, not only for the day to day problems but also to overcome niggling health problems. Micro and Macro Yogic Exercises on Vital Capacity.[1] The philosophy of yoga is "Caring, Sharing and empowering". Yogic practices provide an excellent means for returning to normal from Diabetics without any side effect and an inspired life. Regular practice removes obstructions, path to holistic health. [2] Which impede the flow of vital energy. When the cells work in unison, they bring backharmony and health to the system. 20 to 25 minutes (every morning or evening) of callisthenic exercises on resting pulse rate.[3] Pranayama practice increases lung capacity, breathing efficiency, circulation, cardiovascular efficiency, helps to normalize blood pressure, strengthens and tones the nervous system, combats anxiety and depression, improves sleep, digestion and excretory functions, provides massage to the internal organs, stimulates the glands, enhances endocrine functions, normalizes body weight, provides great conditioning for weight loss, the path way to health full living.[4] Improves skin tone and complexion.

Yoga is a most ancient system or education, based on a higher philosophical knowledge and a spiritual concept of man, physiological changes among male athletes.[5] Psychological changes among college women athletes.[6] For the harmonious development of the body and mind. It recognizes thenecessity of developing healthy, vital and well controlled body forthe attainment of a high order of mental life. While, health is a stateof organism in which all organs function uninterruptedly andvigorously and in full co-operation with one another for a longersurvival and the best development of the body. It helps the man toexpress his best through his intellectual, moral, spiritual and physicalactivities. A vital body and dynamic mind are intimately associatedwith vital health. When health is established, the body becomes afitter machine, more enduring, more powerful better developed andbetter controlled, the mind becomes alert, more imaginative betterbalanced and more contemplative and the emotions more normalized and spiritualized.**Gharote.M.L,(1974)**

Resting Pulse Rate

The number of times heart contracts in each minute while the body is at rest.**Robert V. Hockey, Ed.D,(1989).**

The number of beats of a pulse per minute or the number of the beats of the heart and entries per minute. The number of beatsfelt in exactly in one minute is known as pulse rate.**William Goddie, (1964).**

Methodology

The purpose of the study was to find out the effect of yogic practice on resting pulse rate among college men long distance runners. To achieve this purpose of the study, thirty men LDR were selected as subjects at random. The age of the subjects were ranged from 18 to 25 years. The selected subjects were divided into two equal groups of fifteen subjects each, such as a yogic practice group (Experimental Group) and control group. The experimental group underwent yogic practice for three days per week for six weeks. The control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following physiological variable, namely resting pulse rate were selected as criterion variable. All the subjects of two groups were tested on selected criterion variableresting pulse rate by taking radial pulse,at prior to and immediately after the training programme. The‘t’ test was used to analysis the significant differences if any, in between the groups respectively. The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis of the Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent‘t’ test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the Pre and Post Tests of Experimental and Control Group on Resting Pulse Rate (Scores in beats/minute)

Variables	Group	Mean		SD		Sd Error		df	‘t’ ratio
		Pre	Post	Pre	Post	Pre	Post		
Resting Pulse Rate	Control	68.26	68.53	1.03	1.30	0.35	0.33	14	1.17
	Experimental	68.13	63.13	1.36	1.41	0.26	0.36		14.70*

*****Significance at .05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of control group on resting pulse rate were 68.26 and 68.53 respectively. The obtained ‘t’ ratio was 1.17, since the obtained ‘t’ ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of experimental group on resting pulse rate were 68.13 and 63.13 respectively. The obtained ‘t’ ratio was 14.70* since the obtained ‘t’ ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant. The result of the study showed that there was a significant difference between control group and experimental group in resting pulse rate. It may be concluded from the result of the study that the experimental group decreased in resting pulse rate due to six weeks of yogic practice.

Discussions on Findings

The result of the study indicates that the experimental group, namelyyogic practice group had significantly improved the selected dependent variable, namely resting pulse rate, when compared to the control group. It is also found that the improvement caused by yogic

practice when compared to the control group. The result of this study on resting pulse rate has in line with the study conducted by **KewalKrishan and Sudhirkumar Sharma (2009).**

Conclusions

5. There was a significant difference between experimental and control group on resting pulse rate after the training period.

6. There was a significant improvement in resting pulse rate. However the improvement was in favour of experimental group due to six weeks of yogic practice.

7. **Ethical Clearance**- Nil

8. **Source of Funding**- Self

9. **Conflict of Interest**- Nil

References

[1] Kumar S, Kapri BC. Effect of Selected Micro and Macro Yogic Exercises on Vital Capacity of School Going Children. Int. J. Phy. Edu. Spo.;2(10):23-6..

[2] Iyengar B. The path to holistic health. A Dorling Kindersley Book, Londyn. 2001

[3] Krishan K, Sharma SK. Effects of yogic practices and callisthenic exercises on resting pulse rate variable of secondary school boys. Journal Of Health, Physical Education & Sports. 2009;1(1).

[4] Hockey RV. Physical FitneSS: thepathwaytohealthfulliving. Times Mirror. Goddie W. Twentieth Century Dictionary.

[5] Arun Prasanna T, Vaithianathan K. The Combined Effect of Continuous Run, Alternate Pace Run and Fartlek Training on Selected Physiological Variable among Male Athletes. Indian Journal of Public Health Research & Development. 2019 Mar 1;10(3).

[6] Meera R, Mohanakrishnan R, Prasanna TA. Effect of Core Training with and without Yogic Practices on Selected Psychological Variables among College Women Athletes. Indian Journal of Public Health Research & Development. 2019 Apr 1;10(4).

Nanoparticles in Wound Healing-A Review

S.Swarna Meenakshi[1], M.Sankari[2],

[1]Post Graduate Student, [2]Professor, Department of Periodontics, Saveetha Dental College, Saveetha University, Saveetha Institute of Medical and Technical Sciences (SIMATS) Chennai, India

Abstract

Impaired Wound Healing is a battle that millions fight every day. Thus, novel and innovative strategies are of utmost need. Nanotechnology has revolutionized the way we treat wounds. This review discusses about the various nanomaterials used for treating wounds, also talks about the development of a novel and potent nanomaterial made of melatonin with special interest as to why it would prove superior to the other materials when it comes to oral tissues.

Key words: *Nanomaterials, wound healing, melatonin, nano particle, silver*

Introduction

The healing of wounds is one of the most complex biological processes that occur during human life. After an injury, there is a synchronized activation of multiple biological pathways. In our everyday life we encounter all kinds of injury from a paper cut to an ulcer to a much severe organ damage. Unlike earthworms that are capable of re-growing lost body parts, we humans are incapable of any such miraculous feats. Hence, it is only natural to possess carefully orchestrated ways to heal our damaged tissues. Wound healing is the process by which the integrity of a damaged tissue is restored. It consists of four phases: Hemostasis, inflammatory phase, proliferative phase and remodeling. These phases involve a series of physiological events that are driven by bioactive mediators that are specific for each phase of healing. [1] Hemostasis phase involves vasoconstriction and activation of the complement cascade; inflammatory phase involves vasodilation and activation of macrophages. In the proliferative phase epithelialization, neo-angiogenesis and granulation tissue formation begins. [2] The principal feature of the remodeling phase is the deposition of Extracellular matrix in an organized manner, formation of myo-fibroblasts and wound contraction.[3] The same holds good when it comes to wounds of the oral cavity. Periodontal tissue destruction is in a sense, a wound as well, since there is ulceration and destruction of tissues within the gingival sulcus leading to further tissue destruction of the periodontium. An alteration or hindrance in any of the phases lead to inadequate or an improper wound healing. Many factors such as lifestyle of the patient, systemic health etc plays a major role in wound healing. [4] When it comes to periodontal tissue destruction, materials that have potent antimicrobial activity in addition to those that are capable of stimulating growth factors and angiogenesis are of utmost need.

Nanomaterials in Wound Healing:

At present wide range of therapy either conventional dressings or modern approaches like usage of biomaterials, synthetic polymers with excellent mechanical properties and biocompatibility are available. Wound healing potentiated by nanomaterials have proved to be promising. The size, biocompatibility, colloidal stability, surface charge, surface functionalization and higher surface area offered by the nanomaterials have an additional advantage and could play a critical role in wound healing. [2]

Polymer Based Nano materials:

The most versatile polymers that are used to manufacture biomaterials specially for wound healing and care are poly (lactide- co-glycolide) (PLGA), polycaprolactone (PCL) and PEG (Polyethylene glycol. PLGA-curcumin nanoparticles showed a tremendous improvement in wound-healing capability compared to that of macromolecules of PLGA or curcumin.[5] Durga Prasad et al[6] , Mau[7] et al in their studies found that PLGA nanoparticles loaded with Curcumin which are known for their anti-inflammatory and antioxidant properties were capable of Quenching Reactive oxygen

species and also had the potential to inhibit the enzyme Myeloperoxidase. A study by Chen Yu et al tested the usage of PLGA nanoparticles to deliver recombinant human EGF (rhEGF) to enhance Full-thickness wound closure in Diabetics rats. [8] The rhECF delivered through PLGA nanoparticles showed sustained release for 24 hours. Park et el in their study proved that Sonic hedgehog intradermal gene therapy using a biodegradable poly (beta-amino esters) nanoparticle facilitated angiogenesis and tissue regeneration by activating angiogenic signaling pathways, thereby enhanced the wound healing.[9] Another study by Archana D et al investigated chitosan nano-dressing to potentiate wound healing and found an excellent antimicrobial and anti inflammatory response.[10]

Carbon Based Nano materials:

Fullerenes and Carbon Nanotubes showed promise in wound healing and angiogenesis. They are powerful Anti-oxidants that are capable of scavenging Reactive Oxygen Species and nitrogen substances. Fullerenes can also be functionalized, thereby reducing their aggregation, altering their solubility as well as reducing their toxicity. [11] Functionalization is done by using hexa-dicarboxyl, tris-dicarboxyl and gamma (γ)-cyclodextrin (CD). Modified Fullerenes are said to have better properties compared to the unmodified ones.[12] Gao et al in their study postulated that tris-C60 significantly reduced the production of proinflammatory cytokines in dermal keratinocytes in a dose/time-dependent manner. [13]

Lipid based Nano materials:

Liposomes loaded with curcumin and quercetin were studied to treat full thickness skin defects in in-vitro and in-vivo models in a study by Castangia et al.[14] They used phytodrugs that possessed antioxidant and anti-inflammatory properties which were able to prevent skin ulceration and enhance early regeneration of wounds. In another study by Fukui et al [15], Liposome-encapsulated hemoglobin accelerated skin wound healing in mice. Study by Plock J et al showed that hemoglobin-loaded phospholipid bilayer vesicles coated with polyethylene glycol (HbVs) improved wound healing and tissue survival in critically ischemic cutaneous wounds in mice. [16]

Metal Based Nano materials:

The most investigated nanoparticle so far is Silver. Silver nanoparticles (AgNPs) have proven to exhibit antimicrobial activity, anti inflammatory as well as anti oxidant potential. [17] Kwan et al, in their study stated that Silver nanoparticles were capable of improving tensile properties of repaired skin by influencing the alignment of collagen. [18] Silver nanoparticles modified with chondroitin sulfate and acharan sulfate were demonstrated to be capable of wound healing and accelerating collagen deposition in the wound area.[19] Dhapte et al in their study found that Green synthesis of silver nanoparticles using Bryonia laciniosa leaf extract improved the cytocompatibility of the particles and had a better effect on wound healing compared to that of a commercially available cream of silver sulfadiazine[20] . A very interesting finding was that, the authors found a scar-less healing which they attributed to the potential of silver to modulate the Pro-inflammatory cytokines (IL-6 and IL-10). Trickler et al [21] and Dykman et al [22] in their studies on Copper and Gold nanoparticles respectively, found that they were capable of enhancing wound healing as well. Potential of Iron oxide in improvement of wound healing was also studied by Ziv-Polat et al, who found that Thrombin-conjugated Iron oxide nanoparticles accelerated the healing of incisional wounds significantly by improving the tensile strength of skin and also reducing scarring.[23]

Ceramic Based Nano materials:

Several materials like Silicates and its derivatives, bioactive glass nanoparticles fall under this category. Krausz AE et al used a Curcumin-TMSO(Tetramethyl orthosilicate) nano material for Wound closure and observed a well organized Granulation tissue,enhanced and organized collagen deposition, improved neovascularization in the wound site.[24] Meddahi-Pelle A et al used Silica nanoparticles for suturing as an alternative to Dermabond (2-octyl cyano-acrylate) and Ethicon sutures in wistar albino rat model and found that they were much more efficient than the compared two. [25]

Melatonin in Wound Healing:

While various nanomaterials such as silver, gold, carbon, zinc oxide, iron oxide, polymers such as PLGA, PCL, chitosan polysaccharides have a successful place as wound healing materials, there is still a need for much effective and potent wound healing stimulators. Once such compound is Melatonin. Melatonin is an indoleamine synthesized and secreted by the pineal

gland, retina, bone marrow and intestines in a circadian rhythm. [26]

Melatonin is of special interest especially in the oral cavity since it is a potent anti oxidant and anti-inflammatory agent. It plays a role in bone remodeling as well. [27] Melatonin is said to promote Osteoblast differentiation, increase the synthesis of type I collagen, Bone matrix proteins such as osteopontin and osteocalcin. [28]-[30] A study by Castrovejo et al showed that melatonin influences bone cell precursors in the bone marrow of rats. [31] Ramirez et al in their animal study proved that melatonin was capable of promoting angiogenesis. [32] Study by Pugazhenthi et al investigated the effect of melatonin on the expression of one of the most potent angiogenic protein, VEGF (Vascular endothelial growth factor) and found a significant increase in VEGF expression. [33] Another study by Soybir et al showed similar results. [34] Several studies have provided evidence that melatonin has significant inhibitory effect on different types of tumors like Breast,Ovary, endometrium, prostrate, intestine, liver and Bone.[35],[36] In addition to this, studies have also shown that melatonin was able to counteract the side effects of chemotherapeutic drugs.[37]

However, melatonin has a short half-life. Thus,encapsulation of melatonin with PLGA particles have had benefits in numerous studies. Zhang et al in their study showed the effectiveness of melatonin encapsulated into PLGA micro and nano particles on osteogenesis of human mesenchymal cells in vitro. [38] Similarly melatonin releasing PLGA nanoparticles seemed to have a good effect on osteosarcoma cells. In addition to these beneficial properties, melatonin loaded on nanohydroxyapatite was capable of regenerating bone in infrabony defects. Thus, formulation and usage of melatonin nanoparticles would have further additional benefits by improving their bioavailability and efficiency. [39]

Conclusion

Beneficial aspects of different nano-materials for wound-healing applications have been reported; however, the underlying molecular mechanisms and signaling pathways are not clearly elucidated or understood. Better understanding of such mechanisms and studies aiming to formulate novel nano-materials such as melatonin will redefine the face of Nanotechnology based wound healing. Further studies involving the development of a nanomaterial using melatonin would have the potential to change the way we look at wounds of the oral cavity.

Ethical Clearance: Obtained from the Institutional Ethical Committee.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Broughton G 2nd, Janis JE, Attinger CE. Wound healing: an overview. Plast. Reconstr. Surg 2006; 7:117.
2. Ilaria Tocco BZ, Franco B, Vincenzo V. Nanotechnologybased therapies for skin wound regeneration. J. Nanomater 2012;11.
3. Bielefeld KA, Amini-Nik S, Alman BA. Cutaneous wound healing: recruiting developmental pathways for regeneration. Cell. Mol. Life Sci 2013; 70(12): 2059–2081.
4. Guo S, Dipietro L. Factors affecting wound healing. J. Dent. Res 2010; 89(3): 219–229.
5. Elsabahy M, Wooley KL. Design of polymeric nanoparticles for biomedical delivery applications. Chem. Soc. Rev 2012; 41(7):2545–2561.
6. S Durgaprasad RR, Kumar H, Ravindrasingh R. Effect of a topical curcumin preparation (biocurcumax) on burn wound healing in rats. J. Pharmaceut. Biomed. Sci 2011;8(8):1–3 (2011).
7. Mun SH, Joung DK, Kim YS et al. Synergistic antibacterial effect of curcumin against methicillin-resistant staphylococcus aureus. Phytomedicine 2013; 20(8–9):714–718.
8. Chu Y, Yu D, Wang P, Xu J, Li D, Ding M. Nanotechnology promotes the full-thickness diabetic wound healing effect of recombinant human epidermal growth factor in diabetic rats. Wound Repair Regen 2010;18(5):499–505.
9. Park HJ, Lee J, Kim MJ et al. Sonic hedgehog intradermal gene therapy using a biodegradable poly(beta-amino esters) nanoparticle to enhance wound healing. Biomaterials 2012;33(35):9148–9156.
10. Archana D, Dutta J, Dutta PK. Evaluation of chitosan nano dressing for wound healing: characterization, in vitro and in vivo studies. Int. J. Biol. Macromol 2013;57:193–203.

11. Zhang Y, Petibone D, Xu Y et al. Toxicity and efficacy of carbon nanotubes and graphene: the utility of carbon-based nanoparticles in nanomedicine. Drug Metab. Rev 2014;46(2):232–246.
12. Zhou Z. Liposome formulation of fullerene-based molecular diagnostic and therapeutic agents. Pharmaceutics 2013;5(4):525–541 (2013).
13. Gao J, Wang H-L, Iyer R. Suppression of proinflammatory cytokines in functionalized fullerene-exposed dermal keratinocytes. J. Nanomater 2010;9.
14. Castangia I, Nacher A, Caddeo C et al. Fabrication of quercetin and curcumin bionanovesicles for the prevention and rapid regeneration of full-thickness skin defects on mice. Acta Biomaterialia 2014;10(3):1292–1300.
15. Fukui T, Kawaguchi AT, Takekoshi S, Miyasaka M, Tanaka R. Liposome-encapsulated hemoglobin accelerates skin wound healing in mice. Artif. Organs 2012;36(2):161–169 (2012).
16. Plock JA, Rafatmehr N, Sinovcic D et al. Hemoglobin vesicles improve wound healing and tissue survival in critically ischemic skin in mice. Am. J. Physiol. Heart Circ. Physiol 2009;297(3):H905–H910.
17. Pal S, Tak YK, Song JM. Does the antibacterial activity of silver nanoparticles depend on the shape of the nanoparticle? A study of the gram-negative bacterium escherichia coli.Appl. Environ. Microbiol 2007;73(6):1712–1720.
18. Kwan KH, Liu X, To MK, Yeung KW, Ho CM, Wong KK. Modulation of collagen alignment by silver nanoparticles results in better mechanical properties in wound healing. Nanomedicine 2011;7(4):497–504.
19. Im AR, Kim JY, Kim HS, Cho S, Park Y, Kim YS. Wound healing and antibacterial activities of chondroitin sulfate- and acharan sulfate-reduced silver nanoparticles. Nanotechnology 2013;24(39):395102.
20. Dhapte V, Kadam S, Moghe A, Pokharkar V. Probing the wound healing potential of biogenic silver nanoparticles.J. Wound Care 2014;23(9):431–441.
21. Trickler WJ, Lantz SM, Schrand AM et al. Effects of copper nanoparticles on rat cerebral microvessel endothelial cells.Nanomedicine 2012;7(6):835–846.
22. Dykman L, Khlebtsov N. Gold nanoparticles in biomedical applications: recent advances and perspectives. Chem. Soc.Rev 2012;41(6):2256–2282.
23. Ziv-Polat O, Topaz M, Brosh T, Margel S. Enhancement of incisional wound healing by thrombin conjugated iron oxide nanoparticles. Biomaterials 2010; 31(4):741–747.
24. Krausz AE, Adler BL, Cabral V et al. Curcuminencapsulated nanoparticles as innovative antimicrobial and wound healing agent. Nanomedicine 2015; 11(1):195-206.
25. Meddahi-Pell. A, Legrand A, Marcellan A, Louedec L, Letourneur D, Leibler L. Organ repair, hemostasis, and in vivo bonding of medical devices by aqueous solutions of nanoparticles. Angew. Chem. Int. Ed. Engl 2014;53(25): 6369–6373.
26. Hardeland, R.; Pandi-Perumal, S.R.; Cardinali, D.P. Melatonin. Int. J. Biochem. Cell Biol 2006;38:313–316.
27. Suzuki, N.; Somei, M.; Seki, A.; Reiter, R.J.; Hattori, A. Novel bromomelatonin derivatives as potentially effective drugs to treat bone diseases. J. Pineal Res 2008;45:229–234.
28. Roth, J.A.; Kim, B.G.; Lin, W.L.; Cho, M.I. Melatonin promotes osteoblast differentiation and bone formation. J. Biol. Chem 1999; 274:22041–22047.
29. Satomura, K.; Tobiume, S.; Tokuyama, R.; Yamasaki, Y.; Kudoh, K.; Maeda, E.; Nagayama, M. Melatonin at pharmacological doses enhances human osteoblastic differentiation in vitro and promotes mouse cortical bone formation in vivo. J. Pineal Res 2007;42:31–239.
30. Sethi, S.; Radio, N.M.; Kotlarczyk, M.P.; Chen, C.T.; Wei, Y.H.; Jockers, R.; Witt-Enderby, P.A. Determination of the minimal melatonin exposure required to induce osteoblast differentiation from human mesenchymal stem cells and these effects on downstream signaling pathways. J. Pineal Res 2010;49:222–238.
31. Acuña-Castroviejo, D.; Reiter, R.J.; Menéndez-Peláez, A.; Pablos, M.I.; Burgos, A. Characterization of high-affinity melatonin binding sites in purified cell nuclei of rat liver. J. Pineal Res 1994;16:100–112.
32. Ramírez-Fernández, M.P.; Calvo-Guirado, J.L.; de-Val, J.E.; Delgado-Ruiz, R.A.; Negri, B.; Pardo-

Zamora, G.; Peñarrocha, D.; Barona, C.; Granero, J.M.; Alcaraz-Baños, M. Melatonin promotes angiogenesis during repair of bone defects: A radiological and histomorphometric study in rabbit tibiae. Clin. Oral Investig 2013;17:147–158.

33. Pugazhenthi, K.; Kapoor, M.; Clarkson, A.N.; Hall, I.; Appleton, I. Melatonin accelerates the process of wound repair in full-thickness incisional wounds. J. Pineal Res 2008;44:387–396.
34. Soybir, G.; Topuzlu, C.; Odaba¸s, O.; Dolay, K.; Bilir, A.; Köksoy, F. The effects of melatonin on angiogenesis and wound healing. Surg. Today 2003; 33:896–901.
35. Liu L, Xu Y, Reiter RJ. Melatonin inhibits the proliferation of human osteosarcoma cell line MG-63. Bone 2013;55:432–8.
36. Sanchez-Barcelo EJ, Mediavilla MD, Alonso-Gonzalez C, Reiter RJ. Melatonin uses in oncology: Breast cancer prevention and reduction of the side effects of chemotherapy and radiation. Expert Opin Investig Drugs 2012; 21:819–31.
37. Casado-Zapico S, Rodriguez-Blanco J, Garcia-Santos G, Martin M, Sanchez-Sanches AM, Antolin I, Rodriguez C. Synergistic antitumor effect of melatonin with several chemotherapeutic drugs on human Ewing sarcoma cancer cells: Potentiation of the extrinsic apoptotic pathway. J. Pineal Res, 2010;48:72–80.
38. Zhang L, Zhang J, Ling A, Peng Y, Chang H, Su P, Huang D. Sustained release of melatonin from poly (lactic-co-glycolic acid) (PLGA) microspheres to induce osteogenesis of human mesenchymal stem cells in vitro. J Pineal Res 2013; 54:24–32.
39. Yousef, Doaa & Al Hessy, Amal & Al Aziz A. Saeed, Ab & El Shamy, Eman. Nanohydroxyapatite versus melatonin loaded on nanohydroxyapatite and nanohydroxyapatite with platelet rich fibrin on the treatment of intrabony defects. Tanta Dental Journal 2018; 15:148–163.

Orginal Article

Evaluation of Etiopathogenesis, Clinical Profile and Lrinec Scoring in Necrotising Soft Tissue Infections

Sahil Mittal[1], Rishab Yadav[2], Kapil Sindhu[3], Parth Patel[1], Pragya Bhagwati[1], Shiva Patel[1]

[1]Junior Resident, Dept. of surgery, [2]Junior Resident, Dept. of Radiology, Dept. of Surgery, [3]Assistant Professor, Dept. of Surgery, MMIMSR, Mullana Ambala

Abstract

Necrotising soft-tissue infections can be defined as infections of any of the layers within the soft tissue compartment that are associated with necrotising changes. NSTI is an uncommon but life-threatening. To resolve this, some authors have developed different diagnostic adjuncts such as finger tests, skin biopsies, bedside ultrasounds and laboratory parameters in distinguishing NSTI from other soft-tissue infections (LRINEC laboratory risk indicator for necrotizing fasciitis score). **Material and Method** : An observational study was conducted in 50 patients (clinically diagnosed necrotising soft tissue infection). clinical observations supported by relevant investigations were documented on the attached proforma and the data so obtained was statistically analysed. **Observation and result** : The results suggested that maximum number of affected individuals are males, middle aged individuals. Majority of patients had normal pulse with mean body temperature of 37.3°C, normal blood pressure,INR, normal serum level of sodium, potassium and bilirubin. High level of RBS (more than 200mg/dl). Tenderness was the most commonly elicited clinical sign of NSTI, crepitus was noted in only 20% patients. Maximum number of patients were found to be infected by streptococcus pyogenes (42%). The mean level was -hemoglobin -10.2+2.3 g/dl, WBC -13,340 + 6116 /mm3, serum creatinine value of s 1.6mg/l. High discrepancy noted in value of CRP. High prevalence of NSTI involving the extremities ranging from 64.39% to 93.The mean value of LRINEC score is 6±2.92 36 % of patients having <6 score and 64% patients having score >6. **Conclusion** : It can be concluded that the local clinical findings are of paramount importance rather than clinical features of systemic toxicity such as fever and tachycardia.

Keywords: *Clinical Profile, Evaluation, LRINEC score,*

Introduction

Necrotizing soft-tissue infections (STIS) can be defined as infections of any of the layers within the soft tissue compartment (dermis subcutaneous tissue, superficial fascia, deep fascia, or muscle) that are associated with necrotizing changes. They are usually caused by the synergistic presence of various aerobic or anaerobic, gas producing or not, bacteria. Their progression is often fulminant and it has been recognised for centuries. NSTI may appear in any anatomical region, multiple layers may be involved at times and, despite the portal of entry being a rupture in the skin continuity, sometimes this cannot be found ([1]) .

The abdomen, perineum and lower limbs are the most common sites of such infections. Practically NSTI may develop after any kind of operation, but more often occurs after incarcerated inguinal hernias, perianal abscesses, urological operations and gynaecological operations [(2,3)] NSTI has been reported after blunt or penetrating trauma, postoperative complications, injection of intravenous drugs or subcutaneous insulin, animal bites, colocutaneous fistula, renal calculi, and idiopathic causes [(4,5)] . A portal of entry as obvious as a tissue injury (iatrogenic or not) or a bite (animal or human) is required for the development of a NSTI. However, these infections may occur without such obvious portal of entry [(6)] . Once susceptible patients are colonised, the causative bacteria produce toxic proteolytic enzymes that allow for tissue invasion [(7)] . Anaerobic environment and vascular thrombosis in the affected area accelerate bacteria proliferation and, through hematogenous spread, a distant infection may occur [(8)].

Predisposing factors of NSTI include advanced age, diabetes mellitus, malnutrition or obesity, drug abuse, corticosteroid use, immunosuppression, AIDS, chronic obstructive lung disease (COPD) together with the chronic use of steroids, serious trauma, and chronic venous or lymph insufficiency with tissue oedema [9,10] . The presence of a foreign body in combination with/or dead tissue formation, urgent and extensive abdominal or perineal operations, as well as tissue ischemia (most often due to tight sutures, haematomas, peripheral angiopathy, irradiation and wide bums), are considered to be local predisposing factors [11, 12].

It is an uncommon but life-threatening disease with a high mortality rate (ranging from 6 to 76%) despite advances in modern medical care [1-3]. Delays in diagnosis and in operations for debridement are associated with increased mortality [1, 6]. Lack of specific clinical features and characteristics in the initial stages of the disease may be the main reason for the failure of early recognition of NSTI [8] . The purpose of this study was to develop a detailed clinical profile of necrotising soft tissue infections as an aid to diagnosis and management.

Material and Method

The study was conducted in the department of General Surgery,Maharishi Markandeshwar Institute Of Medical Sciences And Research (MMIMSR) Mulana, Ambala which is a tertiary care institute situated in Haryana, a northern state of India. All the patients of NSTIs admitted under department of general surgery were included in the study with effect from 1st October 2017- 30 September 2019.

A minimum of 50 patients formed subjects of the study.

Inclusion Criteria :

Patients presenting with infections of any of the layers of soft tissue compartment which includes dermis, subcutaneous tissue, superficial fascia, deep fascia or muscle which are accompanied by necrotising changes.

Exclusion Criteria :

1. Patient not giving their consent.
2. Patients lost in follow-up.
3. Patients not found to have NSTI's.

Study Tools

Following study tools were used for present study :

1. Clinical assessment and observation along with signs and symptoms of patients.

2. Laboratory investigations including The LRINEC score.

Study Protocol

All the patients included in the study were subjected to the following investigations-

Hematological investigations

- completehemogram.
- Fasting blood sugar
- Random blood sugar
- Serum sodium
- Serum potassium
- Serum creatinine
- Blood urea
- Liver function test including serum bilirubin (total and direct) alkaline phosphatase, aspartate transaminase, alanine transaminase and serum albumin.
- Coagulation profile which includes bleeding time, clotting time and PT/INR.
- C-reactive protein.

Radiological investigation wherever needed which includes:

Plain X Ray of the part

Computed tomography (CT scan)

Magnetic Resonance Imaging (MRI)

Histopathological confirmation of diagnosis was done from the biopsy of the involved tissue procured at the time of surgery. Tissue culture and antibiogram were done to identify pathogens and sensitivity.

Observation and Results

Mean age of the study population was 48.1± 17.7 years. Majority of patients were seen to be between 40 to 70 years of age. Tachycardia was reported in overall 28% of patients. Only 10 (20%) of patients NSTI, were

found to be febrile. Hypotension was seen in 6 (12%) of patients of NSTI, with blood pressure <90/60 mm of Hg. Majority of the patients in the present study had normal blood pressure. Tenderness was the most commonly reported clinical presentation of NSTI, with 45 (90%) of patients having tenderness of the involved region. Other commonly reported manifestations included skin discoloration (80) %, edema of overlying skin (68%), swelling (66%), warmth (66%) and exudative discharge (60%). Bleeding was the least common (2%) clinical presentation of NSTI in our study population. 46 patients had low hemoglobin levels of ≤13.5g/dl with 10 (20%) of them having sever anemia, with Hb< 8g/dl. The entire study population had a mean Hb of 10.2±2.3 gm/dl. Very high WBC counts of more than 25000 / cu mm were seen in 4 (8%) of the subjects with mean of 13,340±6116/ cumm. Mean RBS value for the entire study population was 180±117 gm/dl. 15 (30%) of patients had serum creatinine of more than 1.6mg/ dl with a mean of 1.40±0.72 mg/l. In this study there are 36% of cases having the LRINEC score ≤ 5. While 26% cases having score 6-7, only 38% have score 8 or above, suggesting that 36% of cases are expected to have <50% expectancy of having NSTI, while 26% cases are expected to have NSTI to about 50-75% and 38% cases have chance of having NSTI by 75% and above having mean value 6±2.92

Table1:Distribution of patients based on local examination

Clinical presentation	Number of patients (n=50)	Percentage
Skin discolouration	40	80%
Swelling	33	66%
Warmth	33	66%
Tenderness	45	90%
Edema ofoverlyingskin	34	68%
Crepitus	10	20%
Dermalgangrene/necrosis	25	50%
Exudate	30	60%
Foul Odour	15	30%
Bleeding	1	2%
Ulceration	25	50%

Table2: Distribution of cases based on their Hb levels

Haemoglobin(g/dl)	Number of patients (n=50)	Percentage
>13.5	4	8%
11 to 13.5	19	38%
8to10.9	17	34%
<8	10	20%

Table3: Distribution of patients based on white blood cell count

W.B.C range (percumm)	Number of patients (n=50)	Percentage
<15000	33	66
15000-25000	13	26
>25000	4	8

Table 4: Case distribution based on serum creatinine

Serum Creatinine	Number of patients (n=50)	Percentage
≤1.6	35	70
≥1.6	15	30

Table5: Percentage distribution of cases based on C Reactive Protein

CRPRange (mg/L)	Number of patients (n=50)	Percentage
≤150	18	36%
≥150	32	64%

Table 6: Percentage distribution of patients based on LRINEC score

LRINEC Score	Number of patients (n=50)	Percentage
≤5	18	36%
6-7	13	26%
≥8	19	38%

Discussion

Taking into account all the values, LRINEC scoring was done.The mean value of LRINEC score is 6±2.92 in our study. Similar findings are seen in the study by D. J. Tilkom et al (88) in which 25 out 30 patients (83.3%) had a LRINEC score > 6. Only in 5 patients (16,7%), the LRINEC score was <6, also it showed the LRINEC mean value of 7.3 against the values in our study showing 12 (27 %) in < 6 score and 32 (73 %) patients.

Similarly in a study done by Chin-Ho Wong et al (71), using the LRINEC score, he stratified the patients into three groups, low (LRINEC score <5), moderate (LRINEC score 6-7), or high (LRINEC score >8) risk categories for NSTI. These risk groups corresponded to a probability developing NSTI of <50%, 50-75%, and >75%, respectively. 89.99% of patients with NSTI had a LRINEC score of > 6 whereas only 10.1% had a score score of <6, comparative to our study having 36 % of patients having <6 score and 64% patients having score > 6. The mean value of our study Was6 ± 2.92, comparable to Wong's value of 7. This finding shows the LRINEC score is capable of detecting early cases of NSTI among patients with severe soft tissue infections. A LRINEC score of >6 should raise the suspicion of NSTI, and a score of is strongly predictive of this disease. The LRINEC score can significantly decrease the time to b diagnosis by stratifying patients into risk categories for NSTI warranting immediate further evaluation. Clinical variables alone are often nonspecific early in the course of the disease and can potentially lead to fatal delay operative treatment. A diagnostic score that includes clinical as well as laboratory variables would inevitably favour advance cases of NSTI where clinical recognition is usually not a problem) and risk missing early cases of NSTI (where early diagnosis would profoundly affect outcome). An objective diagnostic tool based on laboratory variables alone to assess for the possibility of NSTI is therefore advocated.

Conclusion

For the diagnosis of NSTI the local clinical findings viztenderness, skin discolouration are of paramount importance rather than clinical features of systemic toxicity such as fever and tachycardia.

Simple laboratory evaluation using the LRINEC scoring system is useful for diagnosing NSTI. A higher score (>6) is highly predictive of presence of NSTI, however a lower score (<5) does not altogether rule out the possibility of NSTI.

The microbiology of NSTI reveals majority of infections being mono microbial and caused by skin based organisms (staphylococci and streptococci). Therefore tissue culture and gram positive coverage are vital for NSTI patients.

Competing Interests: The authors declare that there is no conflict of interest in this study.

Funding: All funds in this study were covered by the personal fund of the authors.

Conflict of Intrest: Nil

Ethics Committee: Ethical clearance taken from institutional ethical committee.

References

1. Sutherland ME, Meyer AA. Necrotizing soft-tissue infections. SurgClin North Am. 1994; 74: 591-607
2. Fournier JEAN. Gangrènefoudroyante de la verge. Semin Med 1883; 3:345-7
3. Meleney FL. Hemolytic streptococcus gangrene. Arch Surg. 19249:317-64
4. Wilson B. Necrotizing fasciitis. Am Surg, 1952; 18:416-31
5. Baskin LS, Carroll PR, Cattolica EV, McAninch JW. Necrotizing soft tissue infections of the perineum and genitalia: bacteriology, treatment, and risk assessment. Br J Urol. 1990; 65: 524-9
6. Nichols RL, Florman S. Clinical presentation of soft-tissue infections and surgical site infections. Clin Infect Dis. 2001: 33 (Suppl. 2): S84-S93.
7. Ward RG, Walsh MS. Necrotizing fasciitis: 10 years' experience in a district general hospital. Br J Surg. 1991; 78:488-9
8. McHenry CR, Piotrowski JJ. Petrinic D, Malangoni MA. Determinants of mortality for necrotizing soft-tissue infections. Ann Surg. 1995; 221: 558-65
9. Francis KR, Lamaute HR, Davis JM, Pizzi WF. Implications of risk factors in necrotizing fasciitis. Ann Surg. 1993; 59: 3048
10. Marangoni Necrotizing soft tissue infections: are we making any progress? Surg Infect. 2001; 2: 145-52.
11. Bertram P ,Treutner KH, Stumpf M, Schumpelick V . Postoperative necrotizing soft-tissue infections of the abdominal wall.Langenbecks Arch Surg. 2000; 385: 3941
12. Voros D. Anaerobic infections of the soft tissue and bones. Anaerobe. 1997; 3: 11
13. Retroperitoneal necrotizingfasciitis. BrJSurg. 1992; 79: 342-4.
14. LewisRT. Soft tissue infections. World J Surg. 1998; 22:146-51.
15. BosshardtTL,HendersonVJ,OrganCHJr. Necrotizingsofttissueinfections.Arch Surg. 1996; 131: 846-52
16. ArslanA,PierreJerome,BorthneA. Necrotizingfasciitis:reliableMRI for disease in the preoperative diagnosis. EurRadiol. 2000;36:139-43
17. YamaokaM,FurusawaK,UematsuT,YasudaK .Early evaluation of necrotizing fasciitis with use of CT.J. Cranio Maxillo Fac Surg. 1994;22:268-71.
18. Theis JC,RietveldJ.Danesh-CloughT.Severe necrotizings of tissue infections in orthopaedic surgery. J Orthop Surg. 2002; 10:108-13.
19. VaidN,KothadiyaA,PatkiS,KanhereH.Necrotising fasciitis the neck .Indian Journal of Otolaryngology and Head and Neck Surgery.2002;54(2):143-5.
20. Wilkinson D ,Doolette D .Hyperbaric Oxygen Treatment and survival From Necrotizing Soft Tissue Infection. ArchSurg. 2004 139

Prevalence of Knee Joint Dysfunction in Multiparous Pregnant Women

Sakshi Pradeep Shah[1], Pranjali Gosavi[2]

[1]*Final year BPTh Student, Krishna college of physiotherapy, KIMSDU.* [2]*Assistant Professor, Department of Community Health Science*

Abstract

During pregnancy, physiological and hormonal changes lead to increase in ligament laxity and postural changes. Damage to the ligaments of knee joint, and other knee problems which results in increase in the risk of fall in pregnant women. **Objective:** The study was done to determine the prevalence of knee joint dysfunction in multiparous pregnant women. **Method:** The study involved 66 multiparous women at KIMSDU. Each of them was assessed for right and left Q angle and also knee joint proprioception was recorded by using goniometer. Signs and symptoms of knee joint dysfunction were graded based on lysholm knee scoring scale. **Result**: On the basis of this study 29% of women showed signs and symptoms of knee joint dysfunction. 47 subjects had excellent and 19 subjects had poor joint condition. 44 had normal Q angle and 21 had altered Q angle. There are significant changes in knee joint proprioception. **Conclusion:** The study concluded that there is prevalence of knee joint dysfunction in multiparous pregnant women.

Key words: *Multiparous women, knee dysfunction*

Introduction

According to world health organization, pregnancy is nine month or so for which a women carries a developing embryo and fetus in her womb. Pregnant women often experience musculoskeletal problems related to lower extremity due to hormonal, anatomical, and physiologic changes throughout the pregnancy. Symptoms like muscle strain, cramps, pain, fatigue and soreness of knee, hip, ankle are often experienced.[1] Most women do not take medical help until discomforts start interfering their lives. These results in physical changes that occur in pregnancy and results in biomechanical effects upon functional movements.[2]

Physiological changes

Physiological changes during pregnancy are as result of hormonally mediated changes in the collagen and involuntary muscle, increased blood volume, increased blood flow to fetus resulting in consequent enlargement of uterus and increase in body weight and adaptive changes in centre of gravity and posture.[3]

There is increased level of estrogens, progesterone, and relaxin during pregnancy. These increase in levels of hormones are to ease the parturition Especially relaxin has effect on joint laxity. Relaxin hormone is produced by corpus luteum and deciduas .The action of relaxin is to decrease the strength and rigidity of collagen, softening of ligaments that support the joints. So there is a gradual replacement of collagen in the target tissues with remodeled form which has greater extensibility and pliability.[4] So as a result joint becomes more mobile and less stable and hence likelihood of injury to the joints is increased. Pregnancy related ligament laxity may lead to joint instability. There is 50% increase in joint laxity in multipara women compared to primipara women.[1]

Estrogren and progesterone also associated with vestibular affection such as dizziness, vertigo, instability.

Musculoskeletal changes

Musculoskeletal changes during pregnancy have effect on musculoskeletal system.

Address for correspondence
Pranjali Gosavi
Department of community health science
Krishna college of physiotherapy, karad
E- mail: Pranjalig24@gmail.com

Weight gain: There is 20% weight gain during pregnancy which can double the force across the hip and knee joint.[1] throughout the pregnancy there is 10 kg to 14 kg weight gain takes place. The average weight gain in primigravidae is 12.5kg and in multigravidae it is probably 0.9 kg less than primigravidae[4] Overloading of the joint due to weight gain and postural realignment causes postural instability.

Postural changes: postural changes in the pregnancy include an increase in lordotic curve in cervical and lumbar region of vertebral column, protraction of shoulder girdle, hyperextension of knee, anterior pelvic tilt, and flat foot. There is forward shifting of centre of gravity.[4,5]

Muscular imbalance: some muscle groups require to work more in order to maintain upright position in order to compensate changes in posture.[1] The muscles that goes into tightness are hip flexors i.e. quadriceps and hamstring and gluteus group of muscles goes into weakness.[4]

Laxity in ligament: laxity in ligament is present due to hormonal changes especially due to increased level of relaxin hormone.[6] knee anterior cruciate ligament laxity is mainly seen. According to the previous study it is seen that laxity had already reached its maximum value during the first half of pregnancy. And found to be constant until the end of pregnancy.

Knee joint dysfunction

Knee joint is modified hinge joint. The ligaments present in the knee are medial collateral ligament, lateral collateral ligament, anterior cruciate ligament and posterior cruciate ligament. These ligaments provide strength and stability to knee joint.[7]

Hyperextension of knee can further cause soft tissue damage, swelling and strain on the ligaments around knee. There is also increase in Q angle (excessive valgus quadriceps angle). [1,2] Any alteration in Q angle increases the lateral force on patella and may lead to subluxation of patella. Q angle is increased by increased femoral anteversion and external tibial torsion.

Static and dynamic stabilizers provide support to the knee. Ligaments, meniscus, and joint capsule play a role of static stabilizer. But there are hormonal changes in pregnancy; especially there is increase in relaxin hormone which causes increase in ligament laxity which further leads to joint instability. Oestrogen receptors are also present in anterior cruciate ligament. Anterior cruciate ligament provides two functions which are mechanical and sensory (proprioceptive). Due to increased level of estrogen, it affects ligament in a such way that it affects tensile properties.[8]

Oedema in the feet which occurs normally in latter part of pregnancy which results from extra blood accumulated during pregnancy and also enlarging uterus puts pressure on the blood vessels of pelvis and legs which causes circulation to slow down and blood to pool in lower extremity. [2,3]

Due to increased laxity in plantar calcaneonavicular ligament (spring ligament), there is also over pronation of feet, also called as flat foot. Flat foot is caused when persons arch flattens on weight bearing, the over pronated foot posture leads to femoral anteversion, external tibial torsion of knee. This produces shear stress on medial tibiofemoral and lateral patellofemoral compartment of knee. This causes pain in the knee. [1,6]

There is onset of pain during the second and third trimester of pregnancy. One of the most commonly seen is cramping pain of gastrocnemius soleus complex which lasts for several minutes. It may due to anterior displacement of center of mass which causes stress on lower extremity.

Proprioception is repetitive neutral input to central nervous system from specialized nerve ending called mechanoreceptors that are located in joints, capsule, ligament muscles, tendons and skin. proprioceptors gives about conscious and unconscious appreciation of joint position, kinaesthesia and perception of force which is essential for anticipation of movement and motor learning. Proprioception helps in carrying out smooth coordinated movements, it also regulate balance and postural control.[8] Proprioception depend mainly upon somatosensory system, visual system and vestibular system.

Increased ligament laxity can also alter joint proprioception. There is interruption of flow of impulses from the mechanoreceptors in a joint capsule into central nervous system, which results in disturbances in joint position and movement.[9] This may affect the balance and postural control in pregnant women which in turn may result in increased rate of falls. Joint pain and changed muscle activity, alteration in ligamentous condition results in narrowing of the joint space and which can

affect joint proprioception. Delayed muscle latencies have been seen due to impairment of proprioceptive activity. Hence assessment of proprioception is valuable for identifying proprioceptive deficit. During pregnancy especially during third trimester due to decrease in balance, a fall rate of 27% has been reported which in turn may cause maternal and fetal complication.[10]

Also it is seen that the changes that takes place during pregnancy may also last in postpartum period and can lead to musculoskeletal dysfunction. Women continue to use their gait pattern which was acquired during pregnancy.[1] There is paucity of literature in ruling out knee joint dysfunction in multiparous pregnant women.

Method

An approval for the study was obtained from the Protocol committee and the Institutional Ethical Committee of KIMSDU. Total 66 subjects were approached. Subjects were selected according to inclusion and exclusion criteria. The procedure was explained and written informed consent was taken from those who were willing to participate.

Demographic information of the subjects was taken. The subjects were explained about the purpose of the study. Also, they were informed about the procedure. Each of them was assessed for right and left Q angle and also knee joint proprioception was recorded by using universal goniometer. They were graded according to their signs and symptoms based on lysholm knee scoring scale. Data was recorded. Later statistical analysis was done in accordance to distribution of the age, lysholm knee scoring scale, Q angle measurement and knee proprioception.

Statistical Analysis

· Statistical analysis of the recorded data was done by using the graphpad instat.

· Arithmetic mean & standard deviation was calculated for each outcome measure.

· Arithmetic mean was derived from adding all the values together and dividing the total number of values.

· MS Excel was used for drawing various graphs with given frequencies and the various percentages that were calculated with the software.

· Standard deviation (SD) was calculated according to the following formula.

$$SD = \sqrt{\frac{\sum (X-\bar{X})^2}{N}}$$

Where, √= Square root of all the calculations under this symbol.

X = the individual score.

$\bar{X}$ = the mean score.

∑ = sum of all the calculations to the right.

N = the total number of frequency.

Results

Data Presentation, Analysis and Interpretation

TABLE NO 1: MEAN AND STANDARD DEVIATION OF AGE WISE DISTRIBUTION.

	Excellent joint condition.	Poor joint condition.
Mean+ SD	92.48+5.38	74.26+6.49

According to chi- square test, the difference is considered as not statistically significant (p=0.5722).

Association between Age Group and Knee Joint Condition.

This table shows that, association between age and joint condition by Chi-Square test, it's was found to be (0.3190) with 1 degree of freedom and p-value of (0.5722) which was not significant.

Lysholm Knee Scoring Scale:

Table No 2: Lysholm Knee Score

Excellent / good knee joint condition	Fair / poor joint condition
47	19

Interpretation: According to graph 2, 47(71%) subjects had excellent or good joint condition and 19(29%) subjects had fair or poor joint condition.

RIGHT SIDE Q ANGLE

	POOR	EXCELLENT
NORMAL(13.5-17.5)	14.18+1.34	14.82+1.54
ALTERED(>17.5)	18.93+0.77	18.53+0.55

TABLE NO 3: MEAN AND STANDARD DEVIATION OF RIGHT Q ANGLE

ASSOCIATION BETWEEN RIGHT SIDE Q ANGLE AND KNEE JOINT CONDITION.

Association between right side Q angle and joint condition by Chi-Square test, it's was found to be (0.7208) with 1 degree of freedom and p-value of (0.3959) which was not significant

Left Q Angle:

Table No 4: Mean and standard deviation of left Q angle

	Poor	Excellent
Normal(13.5-17.5)	14.18+1.34	14.82+1.54
Altered(>17.5)	18.93+0.77	18.53+0.55

Association Between Left Side Q Angle and Knee Joint Condition.

Association between age and joint condition by Chi-Square test, it' was found to be (0.7208) with 1 degree of freedom and p-va of (0.3959) which was not significant.

Right and Left Side Knee Proprioception:

Table no 5: Mean and standard deviation of right and left knee proprioception.

Joint Proprioception	Poor	Excellent
Right knee proprioception	13.68+8.75	12.93+7.83
Left knee proprioception	14.63+8.22	11.91+8.21

Disscussion

Knee joint is a important weight bearing joint. Normal functioning of the the knee joint during pregnancy is necessary because any malfunctioning in the knee joint can increase the risk of fall and which is harmful to mother as well as fetus.

Normally the forces transmitted across knee joint ranges between 2 to 3 times of body weight. There is approximately 20% increase in body weight during pregnancy which can place more stress over knee joint. So as a result forces transmitted across knee joint increases. Physiological changes in pregnancy like changes in collagen fibers, involuntary muscle, increase in blood volume, increased blood supply to fetus also contribute in increase in body weight which again can affect knee joint.

The purpose of this study is to find out the prevalence of knee joint dysfunction in multiparous pregnant women.

The objectives of this study were to observe the signs and symptoms of knee joint dysfunction in multiparous pregnant women, to assess their Q angle and to assess the knee joint proprioception.

The study was carried out and the result was drawn by lysholm knee scoring scale, universal goniometery.

Sample size was 66 and age group included were 25-40 years .The subjects were taken from Krishna hospital, karad. The included subjects were multiparous. They all didn't have any recent knee joint surgery, any recent trauma, history of patella subluxation or dislocation, and high risk pregnancy disorder. Then consent form was taken from the subjects.

It is seen during one of the study that there is onset of pain during the second and third trimester of pregnancy. One of the most commonly seen is cramping pain of gastrocnemius soleus complex which lasts for several minutes. It may due to anterior displacement of center of mass which causes stress on lower extremity.

According to table 1, it was found that in the age group between 25-30, 30(45%) subjects had excellent or good joint condition and 10(15%) subjects had fair or poor joint condition. Where in the age group between 31-35,17(26%) had excellent or good joint condition and 9(14%) subjects had fair or poor joint condition. According to chi- square Test, the difference is considered as not statistically significant (p=0.5722).

According to table 2, 47(71%) subjects had excellent or good joint condition and 19(29%) subjects had fair or poor joint condition.

According to table 3, 34(52%) subjects with excellent joint condition and 11(17%) with poor joint condition had normal left Q angle (13.5-17.5). and 13(20%) subjects with excellent joint condition and 8(12%) subjects with poor joint condition had altered left Q angle(>17.5).

Association between right side and left side Q angle and joint condition by Chi-Square test, it's found to be (0.7208) with 1 degree of freedom and p-value of (0.3959) which was not significant.

According to table 4, 34(52%) subjects with excellent joint condition and 11(17%) with poor joint condition had normal left Q angle (13.5-17.5). and 13(20%) subjects with excellent joint condition and 8(12%) subjects with poor joint condition had altered left Q angle(>17.5).

Association between age and joint condition by Chi-Square test, it's was found to be (0.7208) with 1 degree of freedom and p-value of (0.3959) which was not significant.

According to table no.5, the mean and standard deviation of the right side knee proprioception in excellent joint condition were 12.93 and 7.83 respectively. And while in poor joint condition it was 13.68 and 8.75 respectively.

According to table no.6, the mean and standard deviation of the left side knee proprioception in excellent joint condition were 11.91 and 8.21 respectively. And while in poor joint condition it was 14.63 and 8.22 respectively.

The study done by Dr Deepa Abichandani on Comparison of knee proprioception during three trimester of pregnancy was concluded that there is decline in knee joint position sense over three trimester of pregnancy.

According to calguneri et al observation there is 50% increase in joint laxity in multipara women compared to primipara women.

The study done by T. BANYAI, A. HAGA, et al. on knee joint stiffness and proprioception during pregnancy concluded that non pregnant women had better knee joint proprioception than pregnant women. According to this study we got knee proprioception is altered in some patient.

According to this study 21 subjects had altered Q angle (>17.5) out of 66 subjects. Prevalence of 29% of knee joint dysfunction in multiparous pregnant women was present.

Conclusion

According to the present study conducted prevalence of 71% subjects were having excellent or good knee joint condition with no or minimum symptoms of knee joint dysfunction and 29 % subjects were having fair or poor knee joint condition in multiparous pregnant women. 61% subjects had normal Q angle (13.5-14.5) and 31% subjects had altered Q angle (>17.5). According to statistical analysis significant changes were seen in knee joint proprioception in multiparous pregnant women.

Acknowledgement: The authors are very grateful to all the pregnant women who participated in the study.

Conflict of Interest: None.

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna institute of medical sciences, deemed to be university.

Source of Funding: Self funded.

References

1. Derek S. Anselmo, Ebony Love, Dana N. Tango, Lesly Robinson. Musculoskeletal effects of pregnancy on the lower extremity. J Am podiatry Med Assooc 107(1): 60-64, 2017. 8.

2. Peetha Ramchandra, Arun .G. Maiya, Pratap Kumar, Asha kamath. Prevalence of musculoskeletal dysfunction among Indian pregnant women. Journal of pregnancy, 2014.
3. Jill mantle, jeanette haslam, sue barton. Physiotherapy in obstetrics and gynacology. Second edition. Elsevier;2004
4. GB Madhuri. Physiotherapy for obstetric and gynaecological conditions. New delhi: jaypee brothers medical publishers; 2007.
5. Chidiebele Petronilla Ojukwu, Emeka Godson Anyanwu, Ginika Gladys Nwafo. Correlation between foot arch index and intensity of foot, knee, and lower back pain among pregnant women in south-eastern Nigerian community. Med princ pract 2017;26:480-484.
6. G.A Dumas, J.G. Reid. Laxity of knee cruciate ligament during pregnancy. JOSPT. July 2017;volume 26(1).
7. Carolyn kisner, lynn allen colby. Theapeutic exercises foundation techniques. sixth edition. Jaypee brothers medical publishers; 2013
8. Dr Deepa Abichandani, Dr Vanshika Gupta. Comparison of knee proprioception during three trimester of pregnancy. IJSR; April 2016; vol. 5 issue 4.
9. T. BANYAI, A. HAGA, L. GERA, B.G. MOLNAR, K.TOTH, E. NAGY. Knee joint stiffness and proprioception during pregnancy. Journal of orthopaedics. 2009; vol 1, no 1; 29-30.
10. Preetha R, John Solomon. Comparison of ankle proprioception between pregnant and non pregnant women. Online journal of health and allied sciences; April- June 2011; volume
11. Madhvi V Lokhande , Jaimala shety,et al. assessment of knee joint proprioception in weight bearing and in non weight bearing positions in normal subjects. JKIMSU, Vol. 2, june- dec. 2013.
12. chidiebele petronilla ojukwu, Emeka Godson Anyanwu, GInika Gladys Nwafor. Correlation between foot arch index and intensity of foot, knee and lower back pain among pregnant women in south eastern Nigerian community. Department of medical rehabilitation, faculty of health sciences and technology.

Effectiveness of Planned Teaching Program On Knowledge Regarding Prevention of Neonatal Hypothermia Among Postnatal Mothers

Sarika Yadav[1], Sonia[1]

[1]Assistant Professor, [2]Assistant Professor, Indian Nursing Council, SGT University, Budhera Gurugram

Abstract

Background:Neonatal hypothermia is increasingly recognized as a risk factor for newborn survival. The World Health Organization recommends maintaining a warm chain and skin-to-skin care for thermo protection of newborn children. **OBJECTIVE** To assess the knowledge of postnatal mothers regarding prevention of neonatal hypothermia.To prepare and conduct planned teaching program for postnatal mothers regarding prevention of neonatal hypothermia. To evaluate the effectiveness of planned teaching program for postnatal mothers regarding prevention of neonatal hypothermia.To find out the association of pretest knowledge score and selected demographic variables. **METHOD** The pre experimental (pretest-post test group) design was adopted . Convenient sample technique was used to select the 30 postnatal mothers as sample. Pretest was conducted using questionnaire after that pretest a planned teaching program was conducted for the post test . **RESULT** The findings of the study revealed that majority (90%) had low knowledge, 10% had average knowledge regarding prevention of neonatal hypothermia in pre test.Similarly, the post test scores depicted that majority (80%) had good knowledge, 20% had average knowledge and none of them had low knowledge regarding prevention of neonatal hypothermia. Most of demographic variables were not significantly associated with level of pre knowledge of postnatal mothers regarding prevention of neonatal hypothermia. Only mother's education status ($x^2 = 8.585$ in the pretest and df=2 and p=0.014) were found to be statistically significant at 0.05 level of significance. **CONCLUSION** This study showed that, the postnatal mother's knowledge regarding prevention of neonatal hypothermia was low and planned teaching program is effective to improve their knowledge.

Key words: *Neonatal Hypothermia, Warm chain, Postnatal Mother, planned teaching program, knowledge)*

Introduction

A neonate is a god's divine precious gift given to a mother. Hence the birth of a neonate is one of the most awe inspiring and marvellous joyful events that occur in every woman's life time. The cry of neonate is the only means of communication and brings a message that "I need care". This also aims at keeping the newborn safe from the environmental and practical harm such as maintaining the normal body temperature.

Corresponding Author:
Sarika Yadav
Assistant Professor, Indian Nursing Council, SGT University, Correspondence Address: SGT University, Budhera Gurugram, Email: sarika@sgtuniversity,.org
Contac No: 9560157710

Newborns are more prone to get hypothermia because of their limited ability to generate and conserve heat. Hypothermia is an essential aspect of neonatal care especially in the immediate neonatal period. So great care is necessary by cloth the baby properly and to maintain the surrounding temperature and humidity, which suits the individual infant.

Neonatal Hypothermia has been defined by WHO as body temperature below the normal range (36.5°C – 37.5°C) and has been sub-classified into three grades: mild (36.0°C – 36 .5°C), moderate (32.0°C – 35.9°C), and severe (<32.0°C) hypothermia.

Each year an estimated 3.6 million neonatal deaths occur, primarily due to infection, complications of preterm birth, and intra-partum related hypoxic events

Infections are estimated to account for approximately one-third of the global burden of neonatal death, with estimates rising to more than half in high mortality settings

Neonatal hypothermia is a major contributor to neonatal illnesses and deaths both in the developed and developing parts of the world of 150 babies aged 0 to 648 hours, 93 had hypothermia with an incidence of 62%. Mild and moderate hypothermia accounted for 47.3% and 52.7% respectively. The incidence of hypothermia was highest (72.4%) among babies aged less than 24 hours. It was also higher among out-born babies compared to in-born babies (64.4%). Preterm babies had significantly higher incidence of hypothermia (82.5%) compared with 54.5% of term babies.[3]

Caring for a newborn is one of life's biggest challenges to care for a newborn child and can be somewhat more difficult than caring for an older infant. a newborn baby's basic need is pretty clear; to be comfortable and to be fed. Hypothermia in neonate is a common problem and is associated with increased morbidity and mortality. Prevention of Hypothermia is therefore an essential aspect of neonatal care especially in the immediate neonatal period.

Objective

· To assess the knowledge of postnatal mothers regarding prevention of neonatal hypothermia.

· To prepare and conduct planned teaching program for postnatal mothers regarding prevention of neonatal hypothermia.

· To evaluate the effectiveness of planned teaching program for postnatal mothers regarding prevention of neonatal hypothermia.

· To find out the association of pretest knowledge score and selected demographic variables.

Hypothesis:

· **Null Hypothesis (H0)**: There will be no statistically significant association between pre-test knowledge scores and selected demographic variables

· **Research Hypothesis (H1):** There will be statistically significant association between pre-test knowledge scores and selected demographic variables

Material and Method

The research design selected for present study was pre-experimental one group pre-test and post-test design to assess knowledge of postnatal mothers regarding prevention of neonatal hypothermia. The present study was conducted at selected OBG Ward, SGT hospital, Gurugram . the population comprised of mothers admitted in OBG ward in SGT hospital, Gurugram.The samples in this study were 30 postnatal mothers. Non probability - convenient sampling technique is used for selecting the samples.

Sampling Criteria

Non probability - convenient sampling technique is used for selecting the samples. Primi and multi gravida mothers admitted in postnatal ward. Who are willing to participate and present during data collection were included. While Mothers who are illiterate. Mothers of neonate those who are severely ill at the time of data collection.

Description of the Tool:

Data collection tools and technique tools are given as under.

Section I: Items on selected baseline data include age, marital status, educational status of mother, religion, area of living, source of information, type of family.

Section II: Items assessing the knowledge of mothers

Part-I : .General questions related to neonatal hypothermia.

Part-II : Questions related to causes and sign &symptoms of neonatal hypothermia.

Part-II : Questions related to prevention & management of neonatal hypothermia.

For the 20 items on knowledge of prevention and management of neonatal hypothermia, a score of '1' was awarded to correct response, which a score of '(o)' was awarded to an incorrect response.

Procedure for Data Collection:

The research investigator obtained ethical clearance and formal permission from the Medical Superintendent, SGT hospital, Gurugram to collect data for the main study. The main study was conducted at Post natal ward

of OBG Ward SGT hospital, Gurugram from 25 April to 9 May 2017.

The steps used for data collection were mentioned below:

1. Written permission was obtained from Dean, Faculty of Nursing SGT University

2. Formal permission was obtained from the Medical Superintendent, SGT hospital, Gurugram.

3. Selected the subjects as per inclusion criteria.

4. On the day of pre-test, at the very beginning, self introduction of investigator to mothers and were explained the purpose of the study.

5. Informed written consent was obtained from each subjects for willingness to participate in the study.

6. The pre-test was conducted on 20 April 2017 Which included items to assess the

knowledge of mothers regarding neonatal hypothermia.

7. Planned teaching programme was administered at the end of pretest.

8. The post-test was taken after 30 minute after administration of PTP using the same

structured knowledge questionnaire used for the pre-test.

9. Data collected was tabulated and analyzed.

Content Validity:

The tool & lesson plan blue print and the lesson plan for planned teaching programme were evaluated by 5 experts in the areas of Child Health Nursing.

Reliability:

Reliability of an instrument is the consistency with which it measures the target attribute. An instrument is reliable to the extent that its measures reflect true reliability of the tool was assessed by administering the tool to 10 postnatal mothers who are admitted in OBG ward in SGT hospital, Gurugram. Reliability of the section of the tool consisting of knowledge questions was tested by Split Half method using Karl Pearson's co-efficient of correlation formula and the reliability computed was r = 0.78. The content validity index [CVI] across the expert's ratings of each item relevance was calculated. A CVI of 0.75 was found for the structured knowledge questionnaire. A CVI of 0.87 was found for planned teaching programme.

Plan For Data Analysis:

The data obtained was analyzed in terms of the objectives of the study using descriptive and inferential statistics. Experts in the field of nursing and statistics directed the development of data analysis plan, which was as follows:

· Organizing data on a master sheet

· Computation of frequency percentage to describe background data and computation of mean, standard deviation and range to describe the data on knowledge scores.

· Classifying knowledge scores using mean, and standard deviation as follows:

X + SD = Good score

X – SD to X+ SD = Average score

X– SD = Poor score

A score of '1' was awarded to a correct response while a score of 'O' was awarded to an incorrect response for the 20 knowledge items

Table 1: **Frequency and percentage distribution according to socio demographic variables.**

Socio-demographic variables		Frequency	Percentage
Age	Less than 20 year	3	10%
	Between 20-30 year	26	86.67%
	More than 30 year	1	3.33%
Marital status	Single	0	0%
	Married	30	100%
	Divorced	0	0%
	Widow	0	0%
Educational status	Illiterate	0	0%
	Under graduate	25	83.33%
	Graduate	5	16.67%
Religion	Hindu	30	100%
	Muslim	0	0%
	Sikh	0	0%
	Christian	0	0%
Area of living	Rural	23	76.67%
	Urban	7	23.33%
	Slum	0	0%
Source of information	Family and friends	15	50%
	Mass media	8	26.67%
	Health personals	4	13.33%
	Any other	3	10%
Type of family	Nuclear family	10	33.33%
	Joint family	20	66.67%
	Extended family	0	0%

Table 2: a. Assessment of level of knowledge of postnatal mothers regarding prevention of neonatal hypothermia in pre and post test.

Level of knowledge	Range of scores	Pre test		Post test	
		No. of respondent	Percentage of score	No. of respondent	Percentage of score
Good	15-20	0	0%	24	80%
Average	10-14	3	10%	6	20%
Low	0-9	27	90%	0	0%

The pretest scores displayed in the table-2 disclosed that majority (90%) had low knowledge, 10% had average knowledge regarding prevention of neonatal hypothermia.

Similarly, the post test scores depicted that majority (80%) had good knowledge, 20% had average knowledge and none of them had low knowledge regarding prevention of neonatal hypothermia.

Table-3: Description of evaluation effectiveness of planned Teaching Programme regarding Prevention of neonatal Hypothermia

	Mean	S.D	Standard error	Calculated t value	df	p value
Pre test-post test knowledge	6.000	2.803	0.511	11.720	29	0.000

The data presented in table-5 presents that the mean value of knowledge scores between pre and post test was 6.000, S.D was 2.803, Standard error was 0.511. The calculated "t" value was 11.720 (in 29 degrees of freedom) and p =0.000 which is significant at the level of 0.05.

So there is the significant difference between the knowledge of post natal mothers before and after the implementation of planned teaching program

Table-4 : Data on association between selected demographic variables of the postnatal mothers and their knowledge (Chi-square test) regarding prevention of neonatal hypothermia.

Demographic variables	Pre test x2 value	Df	P value
Age	5.275	4	0.260
Education status	8.585	2	0.014
Area of living	0.842	2	0.657
Source of information	9.231	6	0.161
Type of family	0.074	2	0.964

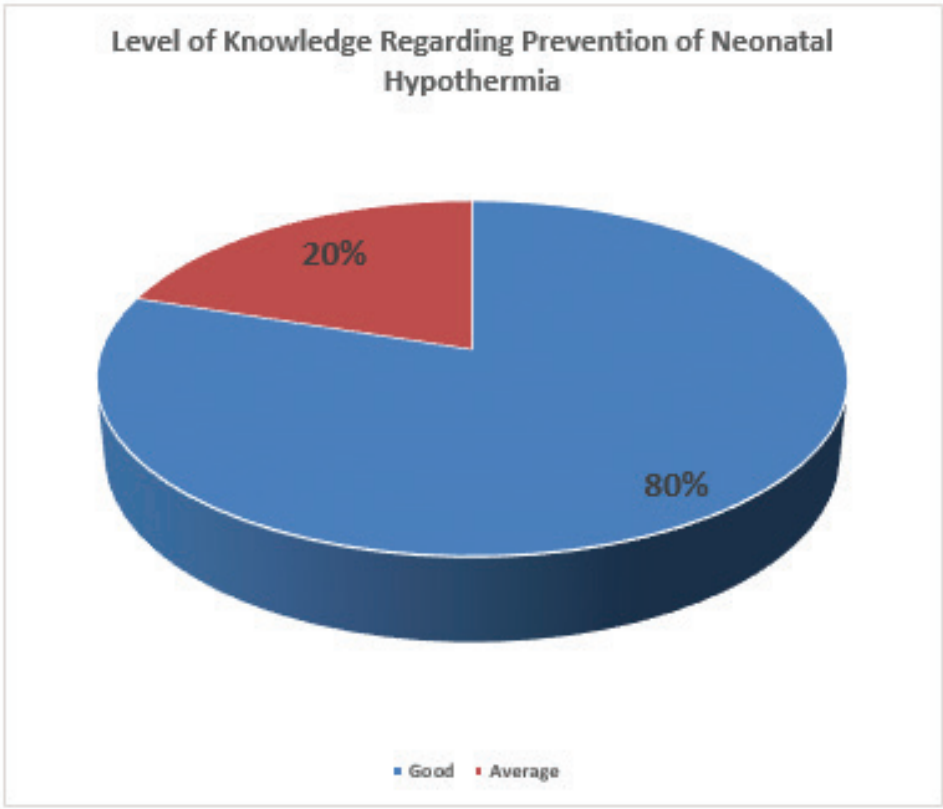
Above table reveals that the chi-square values showing the association between the selected demographic variables (age, education status, area of living, source of information, type of family) and the pre knowledge levels of the postnatal mothers regarding prevention of neonatal hypothermia.

It is seen in table that the chi-square values computed between pre knowledge scores and age (x^2= 5.275 in the pretest and df=4 and p=0.260), area of living (x^2 = 0.842 in the pretest and df =2 and p=0.657), source of information (x^2 = 9.231 in the pre test and df=6 and p=0.161) and type of family (x^2 = 0.074 in the pretest and df=2 and p=0.964) were not found to be statistically significant at 0.05 level of significance. So, there is no association of pretest knowledge score of post natal mothers with selected demographic variables.

Where as education status (x^2 = 8.585 in the pretest and df=2 and p=0.014) were found to be statistically significant at 0.05 level of significance. So, there is association of pretest knowledge score of post natal mothers with education.

FIG-2: Percentage Distribution of Pre Test knowledge regarding Prevention of Neonatal Hypothermia among post natal mothers

FIG-1: Percentage Distribution of post Test knowledge regarding Prevention of Neonatal Hypothermia among post natal mothers.



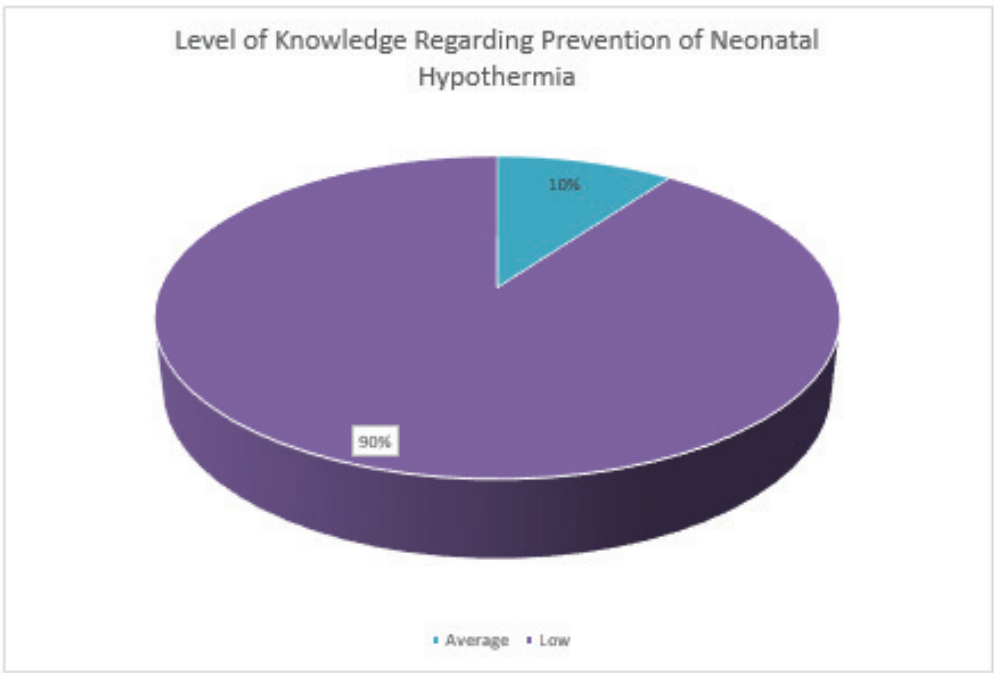


FIG-2: Percentage Distribution of Pre Test knowledge regarding Prevention of Neonatal Hypothermia among post natal mothers

Result

- The data reveals that 10% of the respondents were less than the age group of 20 years, 86.67% of them were between the age group of 20-30 years and only 3.33% were more than the age group of 30 year.100% of the respondents were married.
- None of them were single, divorced, widow.83.33% of the respondents were undergraduate, 16.67%were graduate, whereas no one was illiterate 100% of the respondents were Hindu.
- None of them were Muslim, Sikh, and Christian.76.67% of the respondents were living in rural area, 23.33% were living in urban area, whereas no one was living in slum area .
- The sources of information regarding prevention of neonatal hypothermia among the respondents from family and friends were 50%, mass media 26.67%, health personals 13.33% and from any other was 10%. respectively .
- The majority of respondent (66.67%) were living in joint family, 33.33% were living in nuclear family. None of them were living in the extended family.
- The mean knowledge scores in pretest was 10.133 and in post test was 16.133. This evidenced that there was a significant increase in the scores of post test when compared to pretest. So, we can summarize that the knowledge was increased after planned teaching program.
- The chi-square values computed between pre knowledge scores and age (x^2= 5.275 in the pretest and df=4 and p=0.260), area of living (x^2 = 0.842 in the pretest and df =2 and p=0.657), source of information (x^2 = 9.231 in the pre test and df=6 and p=0.161) and type of family (x^2 = 0.074 in the pretest and df=2 and p=0.964) were not found to be statistically significant at 0.05 level of significance.
- So, there is no association of pretest knowledge score of post natal mothers with selected demographic variables.Where as education status (x^2 = 8.585 in the pretest and df=2 and p=0.014) were found to be statistically significant at 0.05 level of significance. So, there is association of pretest knowledge score of post natal mothers with education.

Conclusion

1. The findings of the study revealed that majority (90%) had low knowledge, 10% had average knowledge regarding prevention of neonatal hypothermia in pre test. Similarly, the post test scores depicted that majority (80%) had good knowledge, 20% had average knowledge and none of them had low knowledge regarding prevention of neonatal hypothermia.

2. Most of demographic variables were not significantly associated with level of pre knowledge of postnatal mothers regarding prevention of neonatal hypothermia. Only mother's education status (x^2 = 8.585 in the pretest and df=2 and p=0.014) were found to be statistically significant at 0.05 level of significance.

3. There was significant difference between the knowledge of postnatal mothers before and after the implementation of planned teaching program (t = 11.720, P = 0.000 level).

This study showed that, the postnatal mother's knowledge regarding prevention of neonatal hypothermia was low and planned teaching program is effective to improve their knowledge.

Conflict of Interest – Nil

Source of Funding- self

Ethical Clearance – Yes, consent obtained from the concerned authority of SGT University

References

1. WHO. Thermal control of newborn. Maternal and safe motherhood programme. 2013.
2. Datta Paurl. Pediatric Nursing. 2 nd edition. Jaypee brothers medical publishers (P) Ltd. 2009. page no.124-140.
3. WHO. Neonatal care: report of WHO scientific group. Technical report. Series no.424.
4. Haliday HL, Jenkins JS. Interventions to prevent hypothermia at birth in preterm and/ or low birth weight infants. 2010.
5. Ghai OP, Paul K Vinod, Bagga Arvind. Ghai Essential Pediatrics. Seventh edition. New Delhi: CBS Publishers and Distributers Pvt Ltd;2009. p.96 to 122.
6. NNF Teaching AIDS: Newborn care; hypothermia in newborn.[on line]. [cited 17.7.2010]. Available

from: URL:http://www.newborn_whocc.org/pdf/teaching-aids/hypothermia.pdf (accessed on 9.9.2010).

7. Lalita Behl, Neelam Grover, Shyam L. Kaushik. Perinatal and Neonatal Mortality- A Hospital Based Study. Indian Pediatr 1998; (35):683-684. Available at URL: http://indianpediatrics.net/july1998/july-683-684.htm.
8. Kumar V, Shearer. Neonatal hypothermia in low resource settings: A review. Journal of Perinatology 2009;29:1-12.
9. A.Thimou, "Prevention of neonatal hypothermia in the childbirth ward",Revue des Sages Femmes,2001,[19],Pp 24-5.
10. Kaushik.L.Shayam et.al "Hypothermia in newborns at Shimla",Indian Pediatrics,1998,volume35, Pp 652-656.

Leeth Therapy (Jalaukavacharana) - A Novel Gift from Ayurveda for Treatment of Medico-Surgical Diseases

Saxena Varsha[1], Srivastava Niraj[2], Kumar Pradeep[3]

[1]Assistant Professor, Department of Shalya-tantra, Main campus, Uttarakhand Ayurveda University (UAU), Dehradun, Uttarakhand, [2]Associate Professor, Department of Kaumarbhritya / Bal-Roga, Sardar Patel Institute of Ayurvedic Medical Sciences & Research Centre. Lucknow, Uttar Pradesh, India, [3]Professor (Retd.), Department of Shalya Tantra, Faculty of Ayurveda, Institute of medical sciences Banaras Hindu University, Varanasi (U.P).

Abstract

Background: The first description of *Jalaukavacharan*a (leech therapy) was found in the text of *Sushruta Samhita* in 800 B.C. Recently, many researches proved that leech saliva have variety of bioactive compounds involving anti-thrombin (hirudin, bufrudin), anti-platelet (calin), factor Xa inhibitors, antibacterial and others property.

Aim: Main aim of present article is to explore about procedures of leech therapy and research works done over few decades on application of leech therapy in different medico-surgical diseases.

Methodology: The procedure of leech therapy is documented from authors own observations and Information of its application in different diseases was gathered from various published work of last ten years.

Result:-Many clinical researches show that leech therapy is very effective in various medico-surgical diseases. Total eight publications were included in the final selection after systematic analysis.

Conclusion: -Leech therapy or *Jalaukavacharan* is an ancient *Ayurvedic* bloodletting technique which having the great potential to manage many inflammatory, ischemic and infectious diseases. Leech's saliva contains many biologically and pharmacologically active compounds which exert effects anti-coagulant, profibrinolytic, anti-platelet, anti-inflammatory and anti-edema in the host's body. Arthritis, venous congestion, vascular diseases, abscess, ischemic heart disease etc. can be successfully manage by leech therapy/.

***Key words**: - Jalaukavacharan, Leech therapy, Hirudin, Vidradhi, Deep vein thrombosis (DVT).*

Introduction

Ayurveda is a system of medicine with historical roots in the Indian subcontinent and practiced from 5,000 years ago.[1] Leech sucks only impure blood so this is considered as blood purification therapy. *Sushruta Samhita* (dating 800 BC) is the treatise of surgery in which *"Jalaukavacharniya*" is one of its chapters, where everything about *Jalauka* and its application are scientifically described.[2] *Jalaukavacharana* forms by the addition of two words: *Jalauka* and *Avacharana*. *Jalaukavacharana* means the application of Leeches. The word 'leech' is derived from an old English word for physician, "laece". [3-4]. Therapeutic application of leech is practiced among the other system of medicine such as in *Unani* and *Siddha* also.[5] The treatment of disease with medicinal leeches is also known as Hirudotherapy (HT).[6] The bioactive substances that found in leech's saliva - commonly known as "hirudo substances" and also called Salivary Glands Secretion (SGS). SGS

Address of Correspondence
Assistant Professor, Department of Shalya-Tantra,
Uttarakhand Ayurveda University (UAU),
Harrawala, Dehradun (Main campus), Uttarakhand.
E Mail- drvarshasaxena2015@gmail.com

contains more than 120 bioactive substances, which have strong anaesthetic, anti-inflammatory, analgesic properties some of them are still being examined. Haycraft (1984) discovered "hirudin" which is most important component.[7]

Aim: -. Main aim of present paper is to discuss about leech therapy, its procedures and research works done over few decades in the field application in different diseases.

Leech therapy (Jalaukavacharana):-

Leech therapy (*Jalaukavacharana*) is being used to treat diseases through *Raktmokshan* which is part of *Panchkarm* in surgical stream of *Ayurvveda.* This traditional method of curing diseases is considered as magical therapy because of its wide range of application in almost all the diseases.

Indication of leech therapy:-

In *Ayurveda*, *Jalaukavacharan* are indicated in delicate or weak patients, female patients, old aged or too young patients suffering from *Rakta-Pradoshaj vikaras* (blood originated diseases).[8] *Jalaukavacharan* are very effective in *Vidradhi* (abscess), *Visarpa* (inflammatory skin disorders), *Gulma* (inflammatory condition of abdomen), *Pidika*, *Kustha*, *Charmadala* (skin diseases) etc. [9]

Leech therapy is widely used in modern medicine for treating a variety of challenging medical and surgical conditions such as plastic surgery [10], Arthritis (Osteoarthritis and Rheumatoid Arthritis) [11-12], venous congestion[13], vascular diseases[14], and Thrombophlebitis etc.

Contraindication of Leech therapy:-

In *Ayurveda*, Leech therapy is contraindicated in *Pandu Rogi* (Anemic patient), *Sarvanga Sotha* (generalized edema), *Arsha Rogi* (hemorrhoids patients) *Udar Rogi* (individual suffer from gastro intestinal tract disorders), *Shosha Rogi* (cachexia patient) and *Garbhini* (pregnant women).[15]

Leech therapy is absolutely contraindicated in HIV patients or who take immunosuppressive drugs, Hemorrhagic diseases, Hypotension, Hypotonia, Absolute Hemophilia, Pregnancies, Severe Anemia (<5g/dl) and Allergy to Leech. [16]

Complication of leech therapy:

In *Ayurveda* not any specific complications are mentions but some complication of *Raktamokshana* such as *Paka* (inflammation) and *Daha* (burning sensation) can occur.[17] but modern sciences mention many complications such as-

§ Excessive bleeding can occur with leech therapy; it can be controlled by applying direct pressure or topical thrombin.[18] Excessive blood loss may necessitate blood transfusion, so patients should be informed of the possibility.[19]

§ The most common infections involving leech therapy are caused by *A. hydrophila,* infections with *Serratia marcescens, A. sobria,* and *Vibrio fluvialis* have been reported.[20]

Material and Method

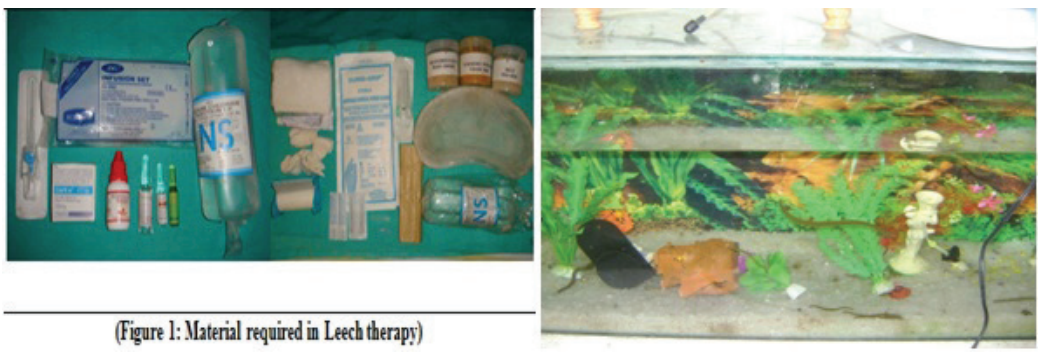
Material Required:-

§ Two small glass jar, kidney tray, one big bowl.

§ Sterilized gauze, swab, gloves, Sterile needle, sterile dispovan syringe (10 ml)

§ Savlon and dressing material.

§ Turmeric powder



(Figure 1: Material required in Leech therapy)

Monitoring during leech therapy:-

During leech therapy, it's common to measure and record pulse, blood pressure and skin temperatures every three hours, with the goal of keeping the temperature of the area at or above 86^0F. A reduction in temperature below 86^0F may indicate problems with either arterial or venous circulation. Baseline laboratory values should also be checked, including a complete blood count (CBC), clotting time (CT), prothrombin time (PT), bleeding time (BT), HIV& HBsAg.

Method of Jalauka-vacharan (Leech therapy):- Method of leech therapy completed in three steps-

A. Purva Karma (Pre-Procedure Protocols): In *purvakarma* mainly *snehana* (oleation) and *swedana* (sudation) of the patient is done and cleaning of part of the body to which leech is going to be. For leeches to suck maximum amount of blood very quickly without any problem, they must be stimulated and energized. This is done by applying the paste of mustard and turmeric powder on the body of leech or drop leeches in the water containing turmeric powder and it is found that an inactive leech becomes active.

(Figure 2: Purva Karma in Leech therapy)

B. Pradhana Karma (Main Procedure Protocols):- Main procedure are completed in following steps-

§ Before application of leeches, patient's affected part is clean and sterilize with boiled warm water.

§ First *Shodhita* (Clean) the leeches by putting them in turmeric mixed water for 15 minutes and keep in plain water for 5 minutes.

§ Then affected part of the patient was clean thoroughly with boiled warm water.

§ Then adequate numbers of leeches were applying to the area of maximal congestion one by one.

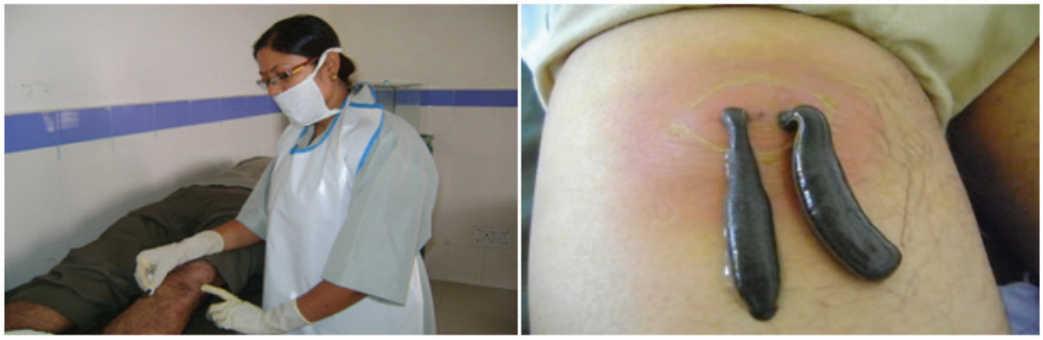
§ Once the leeches attached, it will remain safely in place until fully distended and then detaches spontaneously. (30-50 mm.)

§ The blood was allowed to ooze out for 20-25 minutes.

§ If, at the biting site, needling pain and itching appear it indicates that it is sucking pure blood and then it should be removed; if it does not leave due to the smell of blood, the powder of rock salt should be sprinkled up on its mouth.

§ Leeches were again applied to the patient on every 4th day as required.

§ So maximum of five times leeches were applied to a single patient with dressing with Haridra.



(Figure 3: Pradhana Karma in Leech therapy)

Paschatya-Karma:-

§ **Removal of blood from the leeches (*Jaluakas*) and when leech fallen away, its body should be massaged with rice powder and its mouth massaged with oil and salt and gently squeezed till signs of proper vomiting appear.**

§ **The properly vomited one should be placed as before. *Vagbhata* described that the solution of *Haridra* and *Sarsapa* is also helpful to them to void their excreta.**

(Figure 4: Paschata Karma in Leech therapy)

Amount of blood sucked by leech—

§ In person who are strong, who have great accumulation of *Doshas* and who are of suitable age (middle age) more than 16 and less than70 years of age, experts desire, and after *Vaman, Virechana,* one *Prastha* (Thirteen and half pal i.e. 540 ml) of blood be allowed to flow out.

§ For calculating the amount of blood sucked, leeches were weighed before and after application.

Bite of the leech during leech therapy- After detachment of leech it leaves "Y" shape scar at leech site. The leech saliva is filled with a chemical that contains a painkiller, which stops you from feeling the bite. The saliva also has a chemical, which keeps the blood from clotting.

(Figure 5: Bite of the leech during leech therapy)

Observation and Result:-

Various published articles on "application of leech therapy (*Jalaukavacharana)* on various diseases" were studied and analyzed according to aim of the study. Total eight publications were included in the final selection after systematic analysis.

Leech therapy in various diseases: - Medicinal leech is a small "factory" manufacturing many biologically active substances. Leech saliva contains several compounds that exert effects in the host's body.

Table 1: Components of Leech saliva that exert effects in the host's body –

Hirudin	**Inhibits blood coagulation by binding to thrombin**
Calin	Inhibits blood coagulation and collagen- mediated platelet aggregation
Destabilase	Dissolves fibrin and have thrombolytic effects
Hirustasin	Inhibits kallikrein, trypsin and chymotrypsin
Hyaluronidase	Antibiotic, increases the permeability of the host skin
Tryptase inhibitor	Inhibits proteolytic enzymes of host mast cells
Factor Xa inhibitor	Inhibits the activity of coagulation factor Xa.
Carboxypeptidase' A inhibitors	Increases the inflow of blood at the bite site
Histamine like substances	Vasodilator and increases the inflow of blood at the bite site
Acetylcholine	Vasodilator
Anesthetics substance	Anesthetic, this is equally potent to morphine.
Chloromycetyn	Potent antibiotic.

A. Leech therapy in Deep vein thrombosis:-

Deep vein thrombosis (DVT) is semisolid clot in the vein which has more chance to develop pulmonary embolism due to thrombosis formation in the calf muscle.[21] Leech therapy is very effective in DVT because saliva of leech contain much bio-active substance like Hirudin, calin, factor Xa inhibitor which hampers the coagulation of blood. Leech dissolves clots of blood by its thrombolytic effect. Leech saliva contains three compounds that act as a vasodilator agent like acetylcholine etc. The saliva of leeches also contains anaesthetic substance. All compound work together to decrease the viscosity of blood, making thinner consistency of blood to promote better flow. [22]

B. Leech therapy in Non healing ulcer:-

Leech saliva provides Carboxypeptidase A inhibitors enzyme to ulcer area which reduces vascular congestion. Leech saliva has Histamine like substances and Acetylcholine like substance which act as peripheral vasodilator effects, improves blood circulation and manage ischemia around the wound, thus promotes

wound healing.[23] It was found that leech application improves the hypoxic condition and provides a moist environment for wound healing. It was also observed that it stimulates the enzymatic debridement of the slough material present in the wound.

C. Leech therapy in Abscess (Vidradhi):-

Vidradhi is a clinical condition can be correlated with spreading inflammation of skin & subcutaneous tissue. In modern system of medicine there is no alternative of antibiotic and anti-inflammatory drugs to manage inflammation. Some compound of leech saliva such as Bdellin etc. has anti-inflammatory effect by inhibits trypsin, plasmin and acrocin.[24] As per *Ayurveda* probable mode of action of *Jalaukavacharana* is due to its capacity of removing *Rakta Dhatu* along with *Pitta Doshas*.

D. Leech therapy in Micro-vascular & Reconstructive Surgery:-

Micro-vascular reconstructive surgery involves the relocate of autogenous vascularized tissue to renovate extensive tissue defects. The most obvious developments have been procedures developed to allow anastomosis of successively smaller blood vessels and nerves. It has been used by different specialists today, like plastic surgery, gynecological surgery, general surgery, opthalmoscopic surgery, neurosurgery etc. Leeches are used to reduce that congestion by removing blood that can't exit via the venous system. [25]

E. Leech therapy in Arthritis: -

Leech saliva have factor Xa inhibitor which inhibits the activity of coagulation factor Xa. It have very important role during the treatment of Osteo-arthritis and Rheumatoid arthritis. Anti-inflammatory effect of Eglins compound inhibits the activity of alpha-chymotrypsin, chymase, substilisin and elastase. So Leech is very effective in osteoarthritis, periarthritis and rheumatoid arthritis. [26]

F. Leech therapy in cardiovascular diseases (CVD):-

Cardiovascular diseases mainly related to heart, veins and arteries. Leech saliva contains thrombin inhibitors and hirudin which improves blood flow by its thrombolytic and anti-platelet activity. [27] Many studies exposed that hirudin is more effective than heparin in preventing deep venous thrombosis (DVT) and cardio-vascular patients with unstable angina.[28]

Leech therapy is also effective in Cellulitis (*Vranashotha*), Hypertension, Hemorrhoids, Thrombophlebitis (*Shirashotha*), Hematomas, External ear and chronic ear infections, dental problems, like gingivitis, gingival edema etc. and Chronic skin diseases, like scabies, psoriasis, eczematous dermatitis. [29]

Conclusion

Jalaukavacharan (Leech therapy) is an ancient *Ayurvedic* bloodletting technique which having the great potential to manage ischemic, inflammatory and infective disease by in removing the blood pertaining to the deep seated regions. Saliva of leech contains a numerous bioactive constituents which possess analgesic, anti-inflammatory antiseptic & antibacterial property etc. Leech therapy in the effective in the field of plastic surgery, Arthritis (Osteoarthritis and Rheumatoid Arthritis),Venous congestion, vascular diseases, Thrombophlebitis, cellulitis, sciatica, inflammatory reactions, blood purification, ischemic heart disease and hypertension is expected to be of paramount importance due to the ease of leech application and minimum side-effect. Leech therapy is of *Ayurvedic* origin but it is equally acknowledged by modern medicine due to its effectiveness in healing various kinds of diseases and it is also considered as wonder therapy.

Future plan: Till date some of the bioactive ingredients are still unknown and there is only limited knowledge of mechanisms of action of bioactive compounds present in Leech Saliva. Hence, widespread studies are essential to find out the exact mode of action of other bioactive compound to re-establish the leech therapy on scientific ground.

Acknowledgement: I acknowledged the Uttarakhand Ayurveda University (Main campus), Harrawala, (Dehradun), Uttarakhand, for providing library facility.

Source of Support: Nil

Conflict of Interest: The authors declare that they have no conflict of interest.

Reference

1. Meulenbeld, Gerrit Jan (1999). "Introduction". A History of Indian Medical Literature. Groningen: Egbert Forsten.

2. Shstri Ambica Dutt, editor.Sushrut Samhita Sutra Sthan vol-1. Jalaukavacharaniya adhyaya. Hindi Commentary. 14th Edition. Varanasi. Chaukambha Sanskrit Sansthan; 2003. p.43.

3. Davis A, Appel T. Bloodletting Instruments in the National Museum of History and Technology. Smithsonian Institution Press, Washington, D.C., 1979; 34-36.

4. Irish JC, Gullane PJ, Mulholland S, Neligan PC. Medicinal leech in head and neck reconstruction. J Otolaryngol 2000; 29:327-332.

5. D.Periyasami, K.Aarthy, M.Monika, N.J.Muthukumar. Attai Vidal (Leech Therapy) in Siddha System of Medicine and Their Current Concept in Therapeutic Application - A Review. International Journal of Ayurveda and Pharma Research. 2018;6(5):48-53

6. Whitaker IS, Rao J, Izadi D, Butler PE. Historical Article: Hirudo medicinalis: ancient origins of, and trends in the use of medicinal leeches throughout history. Br J Oral Maxillofac Surgery 2004; 42:133-137.

7. Field WS. The history of leeching and hirudin, Haemostasis.1991; 21:3-10.

8. Singh SK, Rajoria K, Medical leech therapy in Ayurveda and biomedicine: A review, J Ayurveda Integr Med, https://doi.org/10.1016/j.jaim.2018.09.003.

9. Gangasahay Pandey (Ed.), Commentarator of Charaka Samhita of Agnivesha- 1st volume, Sutra Sthan (24/11-16), Chaukumbha Sanskrit Sansthan, Varanasi (2006), pp. 444-445

10. Henderson HP, Matti B, Laing AG, Morelli S, Sully L. Avulsion of the scalp treated by micro-vascular repair: the use of leeches for post-operative decongestion. Br J Plast Surg 1983; 36:235-239.

11. Glyova O. Modern Hirudotherapy — A Review. (Bio-therapeutics, Education and Research Foundation). The (BeTER) LeTTER 2005; 2:1-3.

12. Ahmad T, Anwar M. Clinical importance of Leech therapy. Indian Journal of Traditional Knowledge 2009;8:443-445

13. Weinfeld AB, Yuksel E, Boutros S, Gura DH, Akyurek M, Friedman JD. Clinical and scientific considerations in leech therapy for the management of acute venous congestion: an updated review. Ann Plast Surg 2000; 45:207-212.

14. Pospelova ML, Barnaulov OD. Hirudotherapy in the treatment of bilateral internal carotid artery occlusion: Case report. Curr Top Neurol Psychiatr Relat Discip 2010; 18:51-53.

15. Vaidya yadavji Trikamji Acharya (Ed.), Commentarator of Sushruta Samhita, Sutra Sthan (14/24), Chaukumbha Sanskrit Sansthan, Varanasi (2009), p. 53.

R. Stange, C. Moser, W. Hopfenmueller, U. Mansmann, M. Buehring, B. Randomised controlled trial with medical leeches for osteoarthritis of the knee *Compl Ther Med*, 20 (1–2) (2012 Feb-Apr), pp. 1-7

17. Vaidya yadavji Trikamji Acharya (Ed.), *Commentarator of Sushruta Samhita, Sutra Sthan (14/29), Chaukumbha Sanskrit Sansthan, Varanasi (2009), p. 53*

18. Whitaker IS, et al. *Hirudo medicinalis:* the need for prophylactic antibiotics. *Plastic Reconstrive Surgery* 2003; 112(4):1185-6.

19. Chepeha DB, et al. Leech therapy for patients with surgically unsalvageable venous obstruction after re-vascularized free tissue transfer. *Arch Otolaryngol Head Neck Surg* 2002; 128(8):960-5.

20. Ardehali B, et al. Delayed leech-borne infection with *Aeromonas hydrophilia* in escharotic flap wound. *J Plastic Reconstr Aesthet Surgery* 2006;59(1):94-5.

21. S. Das, A concise textbook of surgery, 9th edition, Das publication, 2016; 274.

22. Kaur Rimpaljeet, Chhabra Shailly, Singh Amitabh. Role of Ayurvedic medicine and leech therapy in management of deep vein thrombosis: A case study. *J Biol Sci Opin* 2015;3(2):87-90

23. Neelofer, Khalid.Z.Khan, F.S.Sherani; Leech therapy In Non-Healing Ulcer - a Case Study; International Journal of Medical Science and Innovative Research (IJMSIR). Volume – 3, Issue – 6, December - 2018, Page No. : 69 – 74.

24. Eldor A, Orevi M, Rigbi M. The role of the leech in medical therapeutics. Blood Rev 1996; 10:201-209.

25. Mutimer KL, Banis JC, Upton J. Microsurgical reattachment of totally amputated ears. *Plast Reconstr Surg* 1987;79:535-541

26. Eldor A, Orevi M, Rigbi M. The role of the leech in medical therapeutics. Blood Rev 1996;10:201- 209
27. Weinfeld AB, Yuksel E, Boutros S, Gura DH, Akyurek M, Friedman JD. Clinical and scientific considerations in leech therapy for the management of acute venous congestion: an updated review. Ann Plast Surg 2000;45:207-212
28. Corral-Rodríguez MA, Macedo-Ribeiro S, Pereira PJ, Fuentes-Prior P. Leech-derived thrombin inhibitors: From structures to mechanisms to clinical applications. J Med Chem. 2010; 53:3847–61.
29. Swaid Abdullah, Latief M. Dar 2, Adil Rashid3, Anita Tewari; Hirudotherapy /Leech therapy: Applications and Indications in Surgery Arch Clinical Exp Surgery; 2012; 1(3):172-180.

Barriers to Uptake of Eyecare Services amongst Commercial Truck-Drivers in North India: A Cross-Sectional Survey

Shalinder Sabherwal, Anand Chinnakaran, Birendra Pratap Singh, Ishaana Sood, Shantanu DasGupta[5], Rakesh Kumar[7]

[1]Head-Community Ophthalmology and Public Health Research, [2]Assistant Manager-Community Outreach,[3]Senior Optometrist-Community Outreach, [4]Officer-Community Ophthalmology and Public Health Research, [5]General Manager-Community Outreach, [6]Assistant Manager-Community Ophthalmology and Public Health Research, [7]Field Coordinator-Community Outreach, Kedarnath Road, Daryaganj, New Delhi, India

Abstract

Purpose: Determining barriers to eyecare amongst commercial truck-drivers in north India.

Method: Cross-sectional survey of 90 truck-drivers, of which 3 had visited a permanent eyecare facility before. Data was collected from the remaining 87, via a structured pre-tested questionnaire assessing demographics, previous eye check-ups, and eyecare awareness.

Results: 33.3% (95% CI:23.6-44.3%; n=29/87) drivers had never felt any need to undergo eye examinations and 53 out of the 87 (60.7%; 95% CI:49.9-71.2%) were unaware of the importance of undergoing routine eye examinations. These identified barriers to uptake of eyecare services were not associated with drivers' age, education level, marital status, or distance driven. 60.3% of drivers who marked lack of awareness and 68.9% of drivers who marked unfelt need as a barrier, were either illiterate, or educated only upto primary level. Cost of availing eyecare services and available time to undergo routine eye examination were least frequently marked barriers.

Conclusion: Drivers were unaware of the importance of undergoing routine eye examinations, with younger ones feeling no need to undergo one at all. Addressing these barriers could help improve eyecare service utilization amongst truck-drivers.

Keywords: *Truck-drivers, Eyecare services, Barriers, Awareness*

Introduction

Commercial truck-drivers in India are integral to a transport sector serving over one billion people. In 2007, Indian truck-drivers numbered five to six million,[1] reportedly leading a sedentary and unhealthy lifestyle,[2] with no fixed routine and irregular sleeping patterns. This has considerably deleterious effects on the health of this mobile population.[3]

50% of Indian truckers face health problems, of which 8% are eyesight issues.[4] Visual function, is the core of both safety, and performance, aspects of driving.[5-6] Lack of adequate visual function is also prohibitive to getting a commercial drivers' license- affecting livelihoods.

Our organization, in collaboration with Eicher Motors Limited, designed and implemented an eye screening program exclusively for these truckers, to better provide services. However, program reports indicate under-utilization of these services. Thus, this study assesses barriers to uptake amongst these truck-drivers. This knowledge would help program planners design interventions specific to truck-drivers' occupational situation and needs.

Methods

This prospective cross-sectional survey was conducted from January-April 2019, at transport hubs, workshops, local street-side restaurants, petrol pumps, transport unions, driver training institutes and parking areas. The pre-tested survey questionnaire was administered by a trained interviewer in the local language. All truck-drivers who gave informed consent were included. The study adheres to the tenets in the Declaration of Helsinki.

The study tool was developed with the help of experienced program managers and literature review. As per literature, the most common reported barriers to eyecare were cost,[7-12] trust,[8] lack of time,[9] unfelt need,[9,11-12] provider accessibility,[7-8,12] and awareness. The questionnaire encompassed seven demographic questions, three questions assessing awareness about eyecare, and four questions ascertaining previous eye check-ups. It was piloted on 30 in-house drivers not included in the final analysis.

Proportions were compared across categories through Chi-square test or Fisher's exact test using SPSS version 24. Further, cross-tabulation was done between barriers identified and drivers' demographics.

Results

90 drivers were administered the questionnaire, of which 87 had never visited a permanent eyecare facility. These 87 drivers were included in the barrier study.

Detailed demographics of these 87 drivers are given in Table 1. 74.7% (n=65/87) were below 35-years of age, and 25.3% (n=22/87) were of age 36 or above. The majority of drivers were either illiterate (18.4%) or educated upto primary level (47.1%), married (63.2%) and used to driving long haul (78.2%). In one tour, almost half the drivers were driving 16-30 days, and more than a quarter driving 8-15 days. Moreover, over a third of these drivers, covered more than 300 kilometers per day, with 62.1% reporting a resting time of less than 6 hours between consecutive days.

The barriers reported by the truck-drivers have been depicted in Figure 1. 60.7% reported lack of awareness (95% CI:49.9-71.2%; n=53/87) and 33.3% reported unfelt need (95% CI:23.6-44.3%; n=29/87) as the most common barriers. Out of the 5 drivers who reported time and cost as barriers, three drivers mentioned eye camps as sources of awareness, while the other two mentioned fellow drivers (one), and awareness sessions (one) as media of information regarding routine eye examinations.

The majority of both the illiterate drivers, and drivers who were educated till primary level, were unaware of the importance of routine eye screening (56.25% and 56.1%, respectively). The difference in awareness, across education levels was found insignificant. 68.9% of drivers who marked unfelt need as a barrier, were either illiterate or only educated upto primary level (Table 2).

Amid the married drivers, 60% (n=33/55) were unaware, 34.5% (n=19/55) reported unfelt need, and 5.5% (n=3/55) had time concerns. Within the unmarried drivers, 62.5% (n=20/32) were unaware, 31.25% (n=10/32) marked unfelt need, 3.1% (n=1/32) had time concerns, and 3.1% (n=1/32) had avoided eye examinations due to associated costs.

The majority (60%) of drivers below 35-years of age did not feel the need to undergo routine eye examinations, while the majority (63.6%) of drivers aged more than 35-years of age, lacked awareness regarding eyecare (Table 3). This difference was also found to be insignificant (p=0.63).

Lastly, comparing short and long-haul drivers, 61.7% of the short distance drivers were unaware, as compared, to 57.8% of the long-haul drivers (p=0.75). Further, 29.4% of the former and 6.7% of the latter, reported unfelt need for eye examinations. This difference was also insignificant (p=0.29).

Table 1: Demographics of truck-drivers

	Category	Frequency (%)
Education	Illiterate	16 (18.4)
	Primary	41 (47.1)
	10th	27 (31.0)
	12th	03 (3.4)
Marital Status	Married	55 (63.2)
	Unmarried	32 (36.8)
Type of Driving	Long-haul	68 (78.2)
	Short Distance	19 (21.8)
Duration of tour (Days)	< 7	19 (21.8)
	8-15	25 (28.7)
	16-30	41 (47.1)
	> 30	02 (2.3)
Total run/day (Kilometers)	200-300	29 (33.3)
	301-400	28 (32.2)
	401-500	15 (17.2)
	> 500	15 (17.2)
Resting time (Hours)	3-4	25 (28.7)
	5-6	29 (33.3)
	7-8	06 (6.9)
	> 8	27 (31.0)

Table 2: Cross-tabulation of education and barriers to eyecare

Education	Lack of Awareness (%)	Unfelt Need (%)	Cost (%)	Time (%)	Total
Illiterate	09 (56.3%)	06 (37.5%)	0 (0%)	1 (6.3%)	16
Primary	23 (56.1%)	14 (34.1%)	1 (2.4%)	3 (7.3%)	41
Secondary	19 (67.9%)	09 (32.1%)	0 (0%)	0 (0%)	28
Senior Secondary	02 (66.7%)	01 (33.3%)	0 (0%)	0 (0%)	03
Total	53 (60.9%)	29 (33.3%)	1 (1.1%)	4 (4.6%)	87

Table 3: Cross-tabulation truck-drivers' age and barriers to eyecare.

Age (Years)	Lack of Awareness (%)	Unfelt Need (%)	Cost (%)	Time (%)	Total
21-35	22 (33.8%)	39 (60%)	1 (1.5%)	2 (3.1%)	65
36-50	7 (31.8%)	14 (63.6%)	0 (0%)	1 (4.5%)	22
>50	0 (0%)	0 (0%)	0 (0%)	1 (100%)	1
Total	28 (32.2%)	53 (60.9%)	1 (1.1%)	4 (4.6%)	87

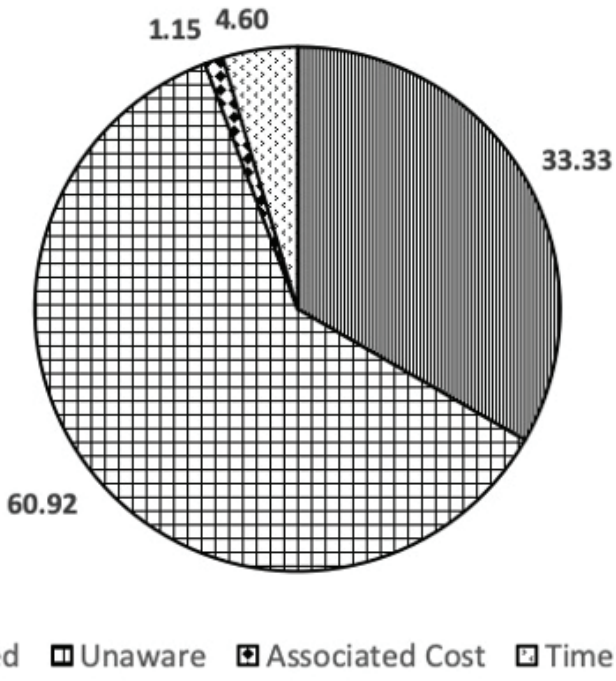


Figure 1: Barriers reported by truck-drivers (In Percentage)

Discussion

This study highlights the need of awareness about necessity of routine eye examinations amongst truck-drivers. 60.7% of surveyed drivers cited being unaware as the primary reason behind not getting their eyes examined, while unfelt need was the second most commonly reported barrier (33.3%). Only 8 of 90 drivers were aware regarding the need of eye check-ups, and of those only 3 had ever visited. Additionally, demographic factors-age, education, marital status and distance driven, were found not to be significantly associated with the barriers.

Global health issues of truck-drivers have been reported on extensively earlier, ranging from chronic, systemic conditions and occupational hazards, to even psychosocial problems.[2,3,13-17] However, literature on eyecare amongst truck-drivers, particularly in India, has focused on prevalence and types of refractive errors.[18-19] While a report does discuss spectacle usage by this mobile population,[20] our study would be the first of its' kind, both globally, and in India, to assess barriers to eyecare services for truck-drivers.

An earlier study amongst the general south Indian population reported unfelt need and cost as the most common barriers to uptake of eyecare services.[9] The former was reiterated in another south Indian study conducted seven years later, alongwith old age.[12] However, both these studies had a large proportion of participants over the age of 60-years, both male and female, while our study had men, mostly under 35-years of age. Although our study results did not show significant association with demographic characteristics, the referenced studies found socio-economic status, and level of visual impairment,[9] as well as, age, to be significantly associated with their results. Similar to our study, both studies had high proportions of illiterates, who have been shown to have a lower odds-ratio of accessing eyecare services.[9,11]

Low awareness about eyecare was one of the key findings of this study; a figure much less than those in studies of the general population emanating from both the north,[21] and the south,[9,12,22] of the country. This is further corroborated through later studies of the general population published across the world.[23-25] A main reason for this finding would be the nomadic lifestyle of truckers, rendering effective dissemination of information regarding eyecare problems difficult. Travel at odd hours, in the country's interiors, may also restrict availability of media through which information is transmitted, such as phone and data connectivity. Moreover, the sample participants surveyed by us had a high proportion of illiterate (18.4%) and semi-educated (47.1%) truckers, who have been shown to have less awareness of services, (56.25% and 56.1%, respectively). This could be a key determinant affecting their understanding and absorption of health-related information provided to them, thus decreasing uptake. Further, access to healthcare facilities where they could not only access eyecare, but are made aware of it's need, might be limited.[26] In our study, of the drivers aware about need for regular eye examinations, 60% mentioned eye camps as their primary source of information. Increasing access to sources of health and eyecare information may increase awareness amongst this mobile population. Lastly, 63.6% of drivers above the age of 35-years were less aware as compared to the younger drivers, a demographic characteristic found to be significant in explaining person-related barriers such as unawareness, in an earlier general population study.[12]

Unfelt need was the second most reported barrier to uptake of eyecare services (33.3%). It is part of person-related barriers, found to be significantly explained by age, in a general south Indian population.[12] 68.9% of these drivers, were either illiterate or semi-educated, possibly affecting their understanding and interpretation of signs and symptoms potentially manifesting and throwing light on their deteriorating visual function. Moreover, 60% of our study's truckers, below 35-years did not feel the need to undergo eye examinations. A possible explanation for this would be that functional vision in these young truckers may be good, regardless of the overall visual function. In a US study of long-haul truckers, 75% reported good health, but were later diagnosed with a range of lifestyle diseases.[27] Studies from north and south India, report prevalence of refractive error in truck-drivers to be 17.14% and 28.57%, respectively,[18-19] depicting the persistence of the problem, despite low felt need and awareness. Another explanation for this could be drivers' remuneration, which they may perceive as being adversely affected by sick days, thus, building pressure for non-top work to maximize earnings.[28]

Eye health promotion in developing countries has three components: education to increase service uptake; service improvements to increase accessibility and acceptability; and partnerships with the government

for prevention policies.[29] A 2003 sexually transmitted disease reduction program established clinics on specified corridors frequented by truckers,[30] introducing awareness activities like street plays, truckers' festivals, free consultation, etcetera. These clinics can be partnered with and eyecare programs included. Further, pictorial hoardings and billboards on national highways and roadside restaurants frequented by these truckers, would also help increase awareness regarding the need for routine eye examinations. Lastly, partnership with the government to run awareness campaigns via the radio, such as that for the Swachh Bharat Abhiyan, would help disseminate information via a medium truck-drivers are familiar and comfortable with.

This study had a few limitations, especially the low number of drivers surveyed, and the sample being restricted to north India. Bias may also have been caused due to the high level of illiteracy in the sample. However, a seminal strength of this study would be that it is the first of it's kind to report on barriers faced by truck-drivers in India.

Visual function is important to ensure safety while driving, as it affects drivers' reflexes on the road. This study found that very few truckers had ever undergone eye examinations, citing lack of awareness and unfelt need as the main barriers. Thus, interventions targeted at generating awareness and education in these truckers as to the need for regular eye examinations need to be brought under the umbrella of existing healthcare and road safety programs to overcome their unique occupational limitations.

Ethical Clearance: Taken from Institutional Review Board of Dr Shroff's Charity Eye Hospital (IRB/2019/OCT/08).

Reference

1. National AIDS Control Organization- Ministry of Health & Family Welfare. Targeted Intervention for Truckers: Operational Guidelines, NACP III. New Delhi; 2007.
2. Udayar SE, Rajesh KK, Praveen BAK, Vairamuthu S, Thatuku S. Study of Cardiovascular Risk Factors Among Transport Drivers In Rural Area Of Andhra Pradesh. Ntl J of Community Med. 2015;6:566-570.
3. Kartikeyan S, Gurav RB, Joshi SD, Wayal R. Health and socio-demographic profile of transport workers. Indian J Occup Environ Med 2004;8:8-10.
4. Castrol. Driving the economy: health & well-being of truck-drivers; 2018.
5. Owsley C, McGwin G. Vision and driving. Vis Res 2010;50:2348-61.
6. Mäntyjärvi M, Tuppurainen K, Rouhiainen H. Visual function in professional truck-drivers. Int Arch Occup Environ Health. 1998;71:357-62.
7. Chou CF, Sherrod CE, Zhang X, Barker LE, Bullard KM, Crews JE, et al. Barriers to eyecare among people aged 40 years and older with diagnosed diabetes, 2006-2010. Diabetes Care. 2014;37(1):180–188.
8. Gower EW, Silverman E, Cassard SD, Williams SK, Baldonado K, Friedman DS. Barriers to attending an eye examination after vision screening referral within a vulnerable population. J Health Care Poor Underserved. 2013;24(3):1042–1052.
9. Kovai V, Krishnaiah S, Shamanna BR, Thomas R, Rao GN. Barriers to accessing eyecare services among visually impaired populations in rural Andhra Pradesh, South India. Indian J Ophthalmol. 2007;55(5):365-371.
10. Venkataswamy G, Brilliant G. Social and economic barriers to cataract surgery in rural south India. Visual Impairment Blindness. 1981;405-68.
11. Dandona R, Dandona L, Naduvilath TJ, McCarty C, Rao GN. Utilization of eyecare services in an urban population in southern India. Br J Ophthalmol. 2000;84:22-7.
12. Marmamula S, Khanna RC, Shekhar K, Rao GN. A population-based cross-sectional study of barriers to uptake of eyecare services in South India:the Rapid Assessment of Visual Impairment (RAVI) project. BMJ Open. 2014;4(6):e005125.
13. Apostolopoulos Y, Peachey AA, Sönmez S. The psychosocial environment of commercial driving: Morbidities, hazards, and productivity of truck and bus drivers. Handbook of Stress in the Occupations. 2011;431.
14. Sharma PK, Ganguly E. Morbidity profile of long-haul truck-drivers in Hyderabad city, India. J Dr NTR Univ Health Sci. 2014;3(4):234–237.
15. Cavagioni LC, Pierin AMG, Batista KM, Bianchi ERF, Costa ALS. Health problems, hypertension and predisposition to stress in truck-drivers. Revista da Escola de Enfermagem da USP. 2009;43(s2):1267-

1271.

16. Hege A, Lemke MK, Apostolopoulos Y, Sönmez S. Occupational health disparities among U.S. long-haul truck-drivers: the influence of work organization and sleep on cardiovascular and metabolic disease risk. PLoS One. 2018;13(11):e0207322.
17. Apostolopoulos Y, Sonmez S, Shattell M M, Belzer M. Worksite induced morbidities among truck-drivers in the United States, AAOHNJ. 2010;58:285–96.
18. Prasad RJ, Krishna MB, Satyanarayana U. Refractive errors and color blindness among truck-drivers: A pilot study. J NTR Univ Health Sci. 2013;2:89-91.
19. Slathia A, Dhar RH, Mahajan P. The Prevalence of Refractive Error and Color Blindness in Truck-drivers. Journal of Medical Science and Clinical Research. 2017;5:28703-28707.
20. Sightsavers. EYES OK PLEASE: A report on the access to eye health services among truck-drivers in India. New Delhi;2017.
21. Misra V, Vashist P, Singh SS, Malhotra S, Gupta V, Dwivedi S N, et al. Awareness and eye health-seeking practices for cataract among urban slum population of Delhi: The North India eye disease awareness study. Indian J Ophthalmol. 2017;65:1483-8
22. Marmamula S, Keeffe JE, Raman U, Rao GN. Population-based cross-sectional study of barriers to utilisation of refraction services in South India: Rapid Assessment of Refractive Errors (RARE) Study. BMJ Open. 2011;**1:**e000172.
23. De-Gaulle VF, Dako-Gyeke P. Glaucoma awareness, knowledge, perception of risk and eye screening behaviour among residents of Abokobi, Ghana. BMC Ophthalmol. 2016;16(204).
24. Al Rashed WA, Bin Abdulrahman AK, Zarban AA, Almasri MS, Mirza AS, Khandekar R. Public Awareness regarding Common Eye Diseases among Saudi Adults in Riyadh City: A Quantitative Study. J Ophthalmol. 2017;2017:9080791.
25. Shrestha GS, Sigdel R, Shrestha JB, Sharma AK, Shrestha R, Mishra SK, et al. Awareness of Eye Health and Diseases among the Population of the Hilly Region of Nepal. J Ophthalmic Vis Res. 2018;13(4):461–469.
26. Gupta SK, Murthy GV. Where do persons with blindness caused by cataracts in rural areas of India seek treatment and why? Arch Ophthalmol. 1995;113:1337–40.
27. Apostolopoulos Y, Sönmez S, Shattell MM, Gonzales C, Fehrenbacher C. Health survey of U.S. long-haul truck-drivers: work environment, physical health, and healthcare access. Work Read Mass. 2013;46:113–23.
28. Belzer MH, Sedo SA. Why do long distance truck-drivers work extremely long hours?. ELRR. 2018;29(1):59–79.
29. Hubley J, Gilbert C. Eye health promotion and the prevention of blindness in developing countries: critical issues. Br J Ophthalmol. 2006;90:279-284.
30. World Bank. Corporate Responses to HIV/AIDS: Case Studies from India. Washington, DC: The World Bank; 2007.

Benefits of Cochlear Implants in Children with Hearing impairment : Parental Perspectives from Tertiary Care Hospitals in Tamilnadu

Shankar S[1], Dawson Gladys Prathiba[2]

[1]District Differently Abled Welfare Office, Kanyakumari District, Tamil Nadu, [2]Department of Speech Language and Hearing Sciences, Sri Ramachandra Institute of Higher Education & Research (Deemed to be University), Porur, Chennai, India

Abstract

Aim: The current study explores the benefits in children with cochlear implants (CI) from the parental perspective. The objective is to understand the concerns of parents in order to plan appropriate recommendations for habilitation and educational programs.

Method: Fifty-three parents of children with CI completed the questionnaire titled, "Parental Perspectives on CI". The questionnaire consisted of 106 statements with 10 subsections that analyse the different aspects related to the pre and post –implantation process.

Results: The study reported that parents are satisfied with the overall development of the child. However, they expressed significant concerns regarding recurring cost of the implant, distance, travel and also the future of the child with CI.

Conclusion: Parents recognize that CI has made an overall positive impact on their children. They also recognize CI as a heavy financial liability post implantation that may not allow children to obtain the optimal benefit. The study also indicated that the government should initiate financial policies to provide the necessary support for habilitation and equipment maintenance.

Key words: *Cochlear implantation, Early intervention, Habilitation, Parental perspectives,*

Introduction

Cochlear implantation is established as a standard care of treatment for children with profound hearing impairment especially for children who do not benefit from hearing aids [1]. The development of spoken language and listening are cited as the most significant outcomes of children with cochlear implant [2]. Documenting outcomes or benefits of CI has radically changed the candidacy, patient care and habilitation of individuals with CI. There is a range of audiological assessment tools available to document the benefits of CI. However, these formal assessment tools are not designed to provide the information beyond the clinical setup. Though, formal audiological assessments measure the auditory response to speech, it does not reflect the outcomes in terms of speech, language and other related challenges in various environments of a child with CI. Earlier the benefits and limitations of cochlear implants have been discussed using questionnaire based studies. Parents have expressed concerns in educational and social settings post implantation [3]. Such specific information can be obtained using parents as informants to document functions of the child at home and in other challenging environments.

Corresponding author:
Ms. Dawson Gladys Prathiba
Assistant Professor, Dept. of Speech, Language and Hearing Sciences, Sri Ramachandra Institute of Higher Education & Research (Deemed to be University)
Porur, Chennai-600116, India.
+91-(0)44 – 24768027-33 Ext 320,8969
prathiba.dawson@sriramachandra.edu.in

In this context the parental interview provide valuable information that help to understand the child's level of activities in different educational and social environments besides their clinical performance [1][4][5] in India, the numbers of CI recipients have increased in the last decade. The actual benefit from an implant may vary with the data from the rest of the world, due to cultural variations, different health care systems and the costs of the implants.

The aim of the current study is to explore the benefits in children with CI from a parental perspective using a questionnaire. The data was collected from three tertiary care cochlear implant centres from three different districts of Tamilnadu. Appropriate permission was obtained from these CI centres for data collection. A contact list of 80 parents of children with CI in the age range between 2.6 to 10 years was obtained from the hospital database. Parents were contacted and briefed about the purpose of the study over the phone to obtain appropriate consent to participate in the study. Out of 80 parents only 53 parents complied to participate in the study.

Method

A validated closed – set questionnaire (Appendix I) developed by O'Neill et al. [6] was used for the study. The questionnaire was administered to the participants of the current study. The statements in the questionnaire included aspects covered under the pre-implantation and post-implantation process. The questionnaire consists of 106 questions divided under 10 subsections. The aspects covered under the post-implantation were Communication (7), General functioning (7), Self-reliance (5), Well-being and happiness (8), Social relationship (13), Education (11), Effect of implantation (9), Supporting the child (9). The aspects of pre-implantation are covered under two sub sections, Process of implantation (23), Decision of implantation (14). The questionnaire consisted of a series of statements for which the responses were rated on a five point Likert scale from 'strongly agree' to 'strongly disagree'. The responses were coded in the range of 1-5, 1 being 'strongly disagree' to 5 being 'strongly agree'. A failure to respond was classified as a missing value and coded as 0. At the end of this questionnaire, parents were asked to give general comments about the benefit of CI which were not covered in the questionnaire.

Statistics Analysis

Percentage analysis was used to analyze the response of the parents of children with CI. Spearman's correlation was applied to detect the possible relationship between different subscales related to benefits of CI. Statistical significance was accepted at $p<0.05$ level. All data was calculated by using with SPSS 16. 0 versions.

Results

The following results are the analysis of the pre-implantation subscales the "Process of implantation" and "Decision to implant". Within the subscale of "Process of implant" there are 23 statements. It was noted that 94% scores were obtained for statement "The whole process of implantation was intrusive". 90% of the parents strongly agreed to the statement that "Only experienced teams should carry out cochlear implantation. There was high agreement (90%) among parents for statement 6 i.e., "It is important to observe his use of the implant as school/ home". Nearly 98.1% of parents showed agreement for the statement "A positive attitude is a great help towards successful use of the implant".

The statements 11-20 were related to support from the implant centre. The results indicate that the parents strongly supported statement 11 (94%) "Regular tuning and checking of implant system are essential" (94.3%), Statement 12 (98%) "Feedback from assessment at the implant centre is very useful. Parents also agreed to statement 13 (94.3%) "The most important factor in choosing a device is it's reliability. It was noted that parents agreed to the statements 16 (98%) "There is a need for life time support from the implant centre" and statement 19 (98%) "Travelling to the implant centre was a burden".

The other subscale under this aspect is the "Decision to implant" that consisted of 14 statements. All parents unequivocally agreed to the statements 4 (100%) "The whole process of implantation is stressful". Statement 5 (100%) "I am happy about his progress in school" and 11 (100%) "It was a difficult time waiting for results of the assessment before implantation". In this subscale of statements statement 2(38%) "I worry that he will blame me for my decision for him to have an implant".

The box plot (fig. 1) show that the mean scores of the subscales. The parents expressed themselves to be beneficiaries and were highly satisfied particularly in the aspect of supporting the child (mean 4.8, SD 0.23, range

4.5- 5.0), communication (mean 4.6, SD 0.13, range 3.0- 5.0) and education (mean 4.007, SD 0.08, range 3.0- 5.0).

Relationship between subscales in parental perspective:

Spearman's correlation coefficient was used to identify a possible degree of association between subscales such as communication, general functioning, self-reliance, Well- being and happiness, social relationships and education. It has been noted that the sub scale of spoken language communication (p=0.009) and self–reliance (p=0.003) had a strong significant correlation with supporting the child. Education (p=0.035) had significant correlation with supporting the child. Also, wellbeing and happiness (p=0.015) had significant correlation with effect of implantation.

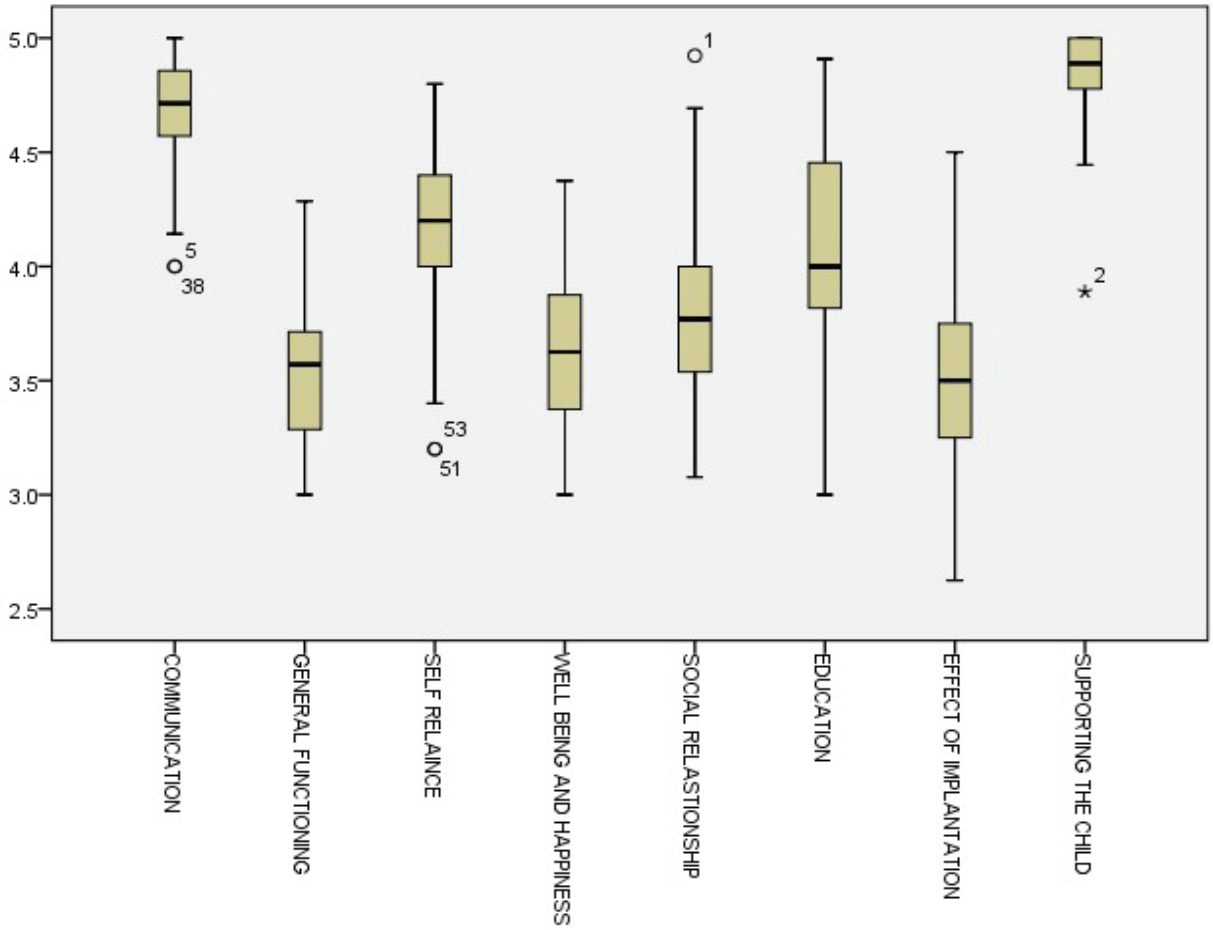


Fig . 1 : Indicates the mean scores of the subscales

Discussion

The present study strongly suggests that parents play an important role in assessing the day to performance of children with implantation. It is apparent from the responses to the questionnaire that the entire process of implantation, pre-implantation and post – implantations were reported to be highly stressful. The study also indicated that all parents who participated in the study considered implant as an option as they expected their children to be a part of the hearing world. Such high agreement has been reported only in India in comparison with the other parts of the globe. This decision to implant strongly suggests that in a country like India parents view implantation as a treatment for deafness that will allow their child to participate in the hearing world. The other reason that can be attributed is that parents feel tremendous stress to raise a child with a hearing impairment. Due to the above reason, their decision to implant was also directed to a treatment option that

will help the child to be an effective participant in the community. It is consequential that parents have perceived that only by learning verbal communication their child will be able to have a secure future with employment [1]. Parents agreed that CI has helped their child be employed in the future [7]. However, it is also suggestive that parents who participated in the study had high expectations for an implant. For this reason the professionals should establish a realistic view regarding the outcomes of CI during the pre-implantation counseling.

The qualitative subscales of the questionnaire that focuses the post -implantation benefits of the implant suggest, parents express satisfaction in various areas of development. They expressed that there was significant progress in the area of communication and academic achievement and also observed that communication changes post- cochlear implantation. The study also reflected that as the usage of implant increased the child performed better in speech production and speech perception. It also indicated that the parents were satisfied that the child was able to hear and communicate [8][4]. Children with CI also demonstrated significant development in the areas of mainstream education and social interactions. Parents also noted that children with CI performed in par with their hearing peers in academic skills. Similar results were also documented [4]. It also indicated that the parents have perceived that overall their child had become more self-reliant and social post -implantation.

The questionnaire explored the perceptions of parents to the entire process of implantation. The parents recognize that a good working relationship has to be established with the implant centre for future support. They also identify that periodic visits to the implant centre is extremely necessary post implantation.

Apart from the benefits of cochlear implantation parents had specific concerns regarding travel and distance to the implant centre [7]. The issue seemed to persist in Western world that parents had to travel distances to visit the implant centre. This was stressful as the parent had to organize logistics for the rest of the family, while they had to bring the child to the centre. Demands of rehabilitation often yield to high parental anxiety post-implantation. The current study demonstrated that 75% of the parents in India expressed great concern related to the cost of implantation. Parents also reported that implantation is expensive and is beyond the paying capacity, Unlike the West where CI is reported to fall within acceptable economic range. Until, recently the implant cost was paid by the parents. However, in the year 2013, the Government of India had initiated cochlear implant programs supported by the state government that provides free cochlear implants and rehabilitation for the economically underprivileged. Most of the parents participated in the study had received CI under this scheme in the state of Tamilnadu. The greatest concern of 75% of the parents was to pay for the recurring cost associated with the implants. Parents were extremely concerned with the high costs that will be incurred to maintain the device in the future.

Conclusion

The above information obtained from parents provides a better understanding to plan the individual habilitation programs and educational recommendations for the child with CI. The information can help the professionals to address the parental concerns during counseling and provide a realistic view of cochlear implantation. Specifically, parents expressed concerns regarding the recurring costs and maintenance of the CI device. As all the participants of the study received CI from the government scheme. It may be suggested that the government should initiate policies that can provide financial support for maintenance and accessories of the device. Travel to the implant centre was an important challenge indicated by the parents both physically and financially. In order to address the issue, it may be worthwhile to explore the possible network between the implant centres and district early intervention centres throughout the state of Tamilnadu. This network can be used to provide services at the nearest geographical distance eventually reducing the cost and time related to travel.

Also, India is going through digitization and making remarkable progress in the field of tele-health in reaching the remote areas of the country. It is imperative that the tele-health technology can be explored to deliver rehabilitation service to the children with CI to reduce travel time, costs and distance. The implant centres should be directed by the state government bodies to consider the above options during the candidacy for implantation. Understanding the parental perspectives help professionals and families to facilitate optimal benefit with CI for a child with hearing impairment.

Ethical Clearance: The ethical clearance was obtained from the department research committee prior to the study

Source of Funding: - Self funding

Conflict of Interest - NIL

References

[1] D.M.R. Kelsay, R.S. Tyler, Advantages and Disadvantages Expected and Realized by Pediatric Cochlear Implant Recipients as Reported by Their Parents., Otol. Neurotol. 17 (1996). http://journals.lww.com/otology-neurotology/Fulltext/1996/11000/Advantages_and_Disadvantages_Expected_and_Realized.11.aspx.

[2] J.K. Cunningham, Parents' Evaluations of the Effects of the 3M/House Cochlear Implant on Children, Ear Hear. 11 (1990) 375–381.

[3] Y. Zheng, S.D. Soli, Z. Meng, Y. Tao, K. Wang, K. Xu, H. Zheng, Assessment of Mandarin-speaking pediatric cochlear implant recipients with the Mandarin Early Speech Perception (MESP) test, Int. J. Pediatr. Otorhinolaryngol. 74 (2010) 920–925. doi:https://doi.org/10.1016/j.ijporl.2010.05.014.

[4] A.E. Geers, J. Nicholas, N. Tye-Murray, R. Uchanski, C. Brenner, L.S. Davidson, G. Toretta, E.A. Tobey, Effects of Communication Mode on Skills of Long-Term Cochlear Implant Users, Ann. Otol. Rhinol. Laryngol. 109 (2000) 89–92. doi:10.1177/0003489400109S1239.

[5] A. Weisel, T. Most, R. Michael, Mothers' Stress and Expectations as a Function of Time Since Child's Cochlear Implantation, J. Deaf Stud. Deaf Educ. 12 (2007) 55–64. doi:10.1093/deafed/enl020.

[6] C. O'Neill, M.E. Lutman, S.M. Archbold, S. Gregory, T.P. Nikolopoulos, Parents and their cochlear implanted child: questionnaire development to assess parental views and experiences, Int. J. Pediatr. Otorhinolaryngol. 68 (2004) 149–160. doi:http://dx.doi.org/10.1016/j.ijporl.2003.09.015.

[7] K. Huttunen, S. Rimmanen, S. Vikman, N. Virokannas, M. Sorri, S. Archbold, M.E. Lutman, Parents' views on the quality of life of their children 2--3 years after cochlear implantation, Int. J. Pediatr. Otorhinolaryngol. 73 (2009) 1786–1794.

[8] S.M. Archbold, M.E. Lutman, S. Gregory, C. O'Neill, T.P. Nikolopoulos, Parents and their deaf child: their perceptions three years after cochlear implantation, Deaf. Educ. Int. 4 (2002) 12–40. doi:10.1179/146431502790560962.

Type of manuscript: Original article.

Prevalence of Performance Related Pre- Competition Anxiety in Recreational Marathoners: An Observational Study

Sharvari. D. Wagh[1], Prasannajeet Pramod Nikam[2]

[1]Intern, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India, [2]Assistant professor, Department of Sports Physiotherapy, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra India

Abstract

Background: Anxiety in recreational marathoners is a common trait observed recently. These marathoners not only go through a lot of physical but as well as mental exertion due to which it burdens them and triggers more anxiety in them. Anxiety before the marathon creates an impact on the marathoner's performance. Anxiety is a natural human state and a vital part of an individual's life.

Objective: the primary objective of this study was to find if there was any relation between the level of anxiety and the performance of the marathoner. The secondary objective was to quantify the extent of pre-competition anxiety in recreational marathoners.

Methodology: 40 recreational marathoners, both male, and female who consented to participate were included in this observational study. Their previous marathon timing and level of anxiety were checked before the marathon and they were asked to record their current marathon timings.

Result: There was a positive correlation seen between the level of anxiety and performance of the marathoner. Females were found to have more significant somatic trait and concentration disruption whereas male marathoners were found to have more worry component significant.

Conclusion: This study concluded that there was a significant correlation between the performance of the recreational marathoner and the level of anxiety was found.

Keywords: *recreational marathoners. Anxiety, pre-competition, performance, somatic, trait, state*

Introduction

Anxiety is referred to as an emotional state consisting of subjective, consciously experienced feeling of tension, apprehension, nervousness and worry, and heightened arousal or activation of the autonomic nervous system[(1)]. It is an adaptive motivating behavior that helps an individual to cope with a threatening situation and the intense anxiety is found more prevalent in most psychiatric disorder[s (3)]. The study of stress in sports-related fields is of greater interest in both the academics researching and teaching sports science and to professionals who support and train the sports performers[(4)].The causes can be mainly due to a mental condition, a physical condition, effect of the drug or a combination of the above. Anxiety is found as a central explanatory concept in contemporary theories, and it is regarded as a principal causative agent for such diverse behavioral consequences such as insomnia, instances of creative self-expression, psychological and psychosomatic symptoms, etc[(10)].

State anxiety is one of the anxieties which varies in intensity and fluctuates over time; the physiological changes include elevated heart rate and blood pressure, faster, shallower, more intense breathing, dryness of mouth, dilatation of pupils, erection of hair and perspiration [(1)]. Arousal of state anxiety involves a process that may be initiated by an external stimulus [(10)]. Trait anxiety may or may not be manifested directly in behavior but can be inferred from the frequency that an individual experiences elevations in state anxiety; they perceive and/or appraise a wider range of situations as more dangerous or threatening than do individuals who

are low trait anxiety[1].

The pressure of competing on a larger scale affects the performance of a marathoner. Experimental evidences show that anxiety is a common occurrence in competitive situations and that the effects of anxiety on sports performance are extremely debilitating[12]. Training intensities is also one of the key factors in the performance of the marathoner as previous detraining and initial performance level could jeopardize success in spite of good adaptation to training[5].In some situations, it was found that where stressors gave rise to negative appraisals and emotions, through further appraisals of their experience, the athletes were able to interpret the thoughts and feelings as facilitative for upcoming performance through an increase in the focus and efforts [6]. Also, increasing self- control strength could reduce the negative anxiety effects of the individual in sports and improve athletes' performance under pressure [7]. Though findings suggest that before the competition the performer encounters more stress, he should consider these when preparing and implementing interventions to manage competition stress [8].

There has been an interest in the role of anxiety in sports competition has stimulated a substantial amount of research among sports psychologist over the past twenty years[1]. Each marathoner has his/her way of coping in these situations. Hanin has found that the athletes can predict their pre-competition anxiety up to several days before the competition, and the predictions tend to be more accurate in the difficult competition[11]. The experience of threat is essential, a state of mind which has two main characteristics one of which is future-oriented, involving the anticipation of a potentially harmful event that has not happened and the other is mediated by complex mental processes that are perception, memory, and judgment which are involved in appraisal process[1]. The setting of high standards is an integral part of an elite sports player and often beneficial for the athletes' performance whereas for a recreational marathoner are characterized by frequent cognitions about the attainment of ideal, perfectionistic standards, etc[9]. Anxiety is considered a normal and natural response that is necessary for survival but it may become a problem when it becomes a norm, rather than the exception, where the efforts executed by the recreational marathoners interfere with their ability to conduct the social events and competitions. . Anxiety before a marathon can be detected early and treated with a simple maneuver that will prevent the severity of the condition and improve the performance of the recreational marathoner which may affect the performance of the marathoner.

Aim

To study the prevalence of performance-related pre-competition anxiety in recreational marathoners.

Objective

The purpose of this study was to explore the performance-related anxiety in recreational marathoners, specifically the relationship with other psychological constructs involved in undertaking and maintaining participation a given sport.

Methodology

After obtaining the approval from the institutional ethical committee, the participants who fit in the inclusion criteria were elected. The participants were screened and an informed written consent was obtained. In this observational study 40 recreational marathoners (N= 40), where the number of male marathoners was 25 (n=25) and 15 female recreational marathoners (n=15), were included. Simple Random sampling method was used for choosing the individuals. Individuals who were not willing to participate and those who were elite marathoners were excluded. The study was conducted using the modified SPORTS ANXIETY SCALE-2 .

Statistical Analysis

Table 1 : Descriptive statistics of different study factors in recreational marathoners.

Factors	N	Minimum	Maximum	Mean	Std. Deviation
Somatic	40	6.00	15.00	10.5250	2.50115
Worry	40	5.00	18.00	11.1750	3.12055
Concentration	40	5.00	19.00	10.5250	3.61611

Statistical analysis of the recorded data was done by using the software Statistical Package for Social Science version2.0. Arithmetic mean & standard deviation was calculated for each outcome measure. The arithmetic mean was derived from adding all the values together and dividing the total number of values. MS Excel was used for drawing various graphs with given frequencies and the various percentages that were calculated with the software.

Table 2: Shows Gender wise Distribution in Marathoners.

Gender		**Somatic**	**Worry**	**Concentration**
F	Mean	10.6667	10.5333	10.3333
	N	15	15	15
	Std. Deviation	2.99205	3.62268	3.13202
M	Mean	10.4400	11.5600	10.6400
	N	25	25	25
	Std. Deviation	2.21886	2.78508	3.93573
Total	Mean	10.5250	11.1750	10.5250
	N	40	40	40
	Std. Deviation	2.50115	3.12055	3.61611

Table 3: Gender wise Distribution.

Gender	**Frequency**	**%**
Male	25	62
Females	15	38

Table 4: Shows Gender wise Distribution of among Marathoners.

Age (in years)		**Somatic**	**Worry**	**Concentration**
19-23	Mean	10.5833	11.1667	10.5833
	N	36	36	36
	Std. Deviation	2.55650	3.21159	3.65181
24-27	Mean	10.0000	11.2500	10.0000
	N	4	4	4
	Std. Deviation	2.16025	2.50000	3.74166
Total	Mean	10.5250	11.1750	10.5250
	N	40	40	40
	Std. Deviation	2.50115	3.12055	3.61611

Table 5: Age-wise Distribution.

Age (in years)	Frequency	%
19-23	36	90
24-27	4	10

Table 6: Correlation between marathon completion timing and Anxiety.

The difference in Time Vs. Anxiety	Correlation Value	r2	95% CI	p-value
Pearson's R	.320	.103	0.01 to 0.57	0.0436

Discussion

This study "performance related pre competition anxiety in recreational marathoners", conducted in Krishna hospital, Karad, is a theoretical and methodological proposal mainly aimed to find the relation between the performance of the recreational marathoners. A gender wise study was done for the 25 males and 15 females participated in this study. Under the three components namely somatic anxiety, worry and concentration disruption, study was conducted.

A remarkable effect was found in females on the basis of somatic anxiety score compared to that of males. The subjects aged between 19-23 (10.58±2.55) also had a more significant somatic anxiety score. Somatic complaints were more often among anxiety- disordered youth with complaints including a range of physical symptoms such as headaches, stomachaches, muscle tension/pain, difficulty breathing, shaking, pounding, or racing heart, sweating, blushing, and fatigue.[15]

However, the female recreational marathoners and subjects aged between 19-23 years were also found to have more significant worry score. Excessive rumination and worry associated with cognitive anxiety had shown to interefere with attentional and cognition processes necessary for an adequate cognitive performance, such as test taking but had interference on motor- based tasks was suggested by John S. Raglin.[17]. Stressors which have been found to facilitate the development of anxiety in practice or competitive settings also contribute to sport injury occurrence thus an individual's poor stress response to a stressful practice or competitive situation can influence their increased risk of sport injury[20] .

The "concentration disruption" was also taken into consideration which showed more significance in males (10.64±3.93) compared to that of the females and in the subjects categorized in the age group of 24-27 years. Relationship between emotions, cognitive interference, concentration disruption was done which showed that anxiety and dejection were associated with more interfering thoughts and greater disruptions in concentration whereas the effects of anger and happiness showed that interfering thoughts were differed. [18]

Anxiety has been considered to play a major role in an athletes life as the athlete's skills are being evaluated which often regards to a typical response which can be characterized by a psychological, behavioral and/ or cognitive signs and symptoms[20]. Every athletes will have an unique response to the stress and anxiety which will differ in the signs and symptoms, as in the cognitive signs and symptoms of a stress disorder are frustration, worries, distortion, exaggeration, unrealistic performance expectations, self-defecting statements and self- handicapping, which makes it difficult to diagnose and treat[2].

At the highest level, athletes are well-matched in terms of their physical abilities, conditioning, and skill level. But often that is not enough to win and perform on the biggest of stages which is why developing strategies and techniques to get athletes minds in the best possible condition for optimal performance is increasingly important for sports teams and coaches.

A study suggested that female participants utilized social support, emotional release, and humor/fun as their primary coping responses which is much more different mechanism compared to that of males which might be the primary reason for the differences in the components of the anxiety evaluated. The factors which can increase stress and anxiety can be physical demands, psychological demands, expectations and pressure to perform to a higher standard according to which the coping mechanism of the athletes should be considered. [2]. The earlier studies that suggested that when the athletes from Spain, Belgium and Portugal competed as a an individual alone, the pressure built up to achieve a desired outcome increases which then intensifies the total anxiety score [19].

Positive correlation between the difference in time after anxiety using its score and it was found significant. This indicated that there was a definite relation between the difference of the previous marathon timing and current marathon timings and the anxiety score with positive correlation (which mean time for recreational marathoners increases with increase of anxiety) where $p<0.05$. The results derived from this study conclude that there is a significant correlation between the level of anxiety and the performance of the recreational marathoners.

Conclusion

By this study it is concluded that there is a marked significance between the anxiety level and performance of recreational marathoners.

Conflict of Interest

The authors declare that there is no conflict of interest concerning the content of the present study.

Ethical Clearance

An ethical clearance certificate was obtained from the instituitional committee Krishna Institute of Medical Sciences Deemed to be University, Karad.

Acknowledgment: We acknowledge the guidance and support of the faculty of physiotherapy.

Source of Funding : Self

References

1. Hackfort D, Spielberger CD, editors. Anxiety in sports: An international perspective. Taylor & Francis; 1990.
2. Fullerton CM. Stress and anxiety in athletics. The Sports Digest. Retrieved from. 2010.
3. Harricharan S, McKinnon MC, Tursich M, Densmore M, Frewen P, Théberge J, van der Kolk B, Lanius RA. Overlapping frontoparietal networks in response to oculomotion and traumatic autobiographical memory retrieval: implications for eye movement desensitization and reprocessing. European Journal of Psychotraumatology. 2019 Jan 1;10(1):1586265.
4. Jones J, Hardy LE. Stress and performance in sport. John Wiley & Sons; 1990.
5. Mujika I, Chatard JC, Busso T, Geyssant A, Barale F, Lacoste L. Effects of training on performance in competitive swimming. Canadian Journal of Applied Physiology. 1995 Dec 1;20(4):395-406.
6. Neil R, Hanton S, Mellalieu SD, Fletcher D. Competition stress and emotions in sport performers: The role of further appraisals. Psychology of sport and exercise. 2011 Jul 1;12(4):460-70.
7. Englert C, Bertrams A. Anxiety, ego depletion, and sports performance. Journal of Sport and Exercise Psychology. 2012 Oct 1;34(5):580-99.
8. Mellalieu SD, Neil R, Hanton S, Fletcher D. Competition stress in sport performers: Stressors experienced in the competition environment. Journal of sports sciences. 2009 May 1;27(7):729-44.
9. Koivula N, Hassmén P, Fallby J. Self-esteem and perfectionism in elite athletes: Effects on competitive anxiety and self-confidence. Personality and individual differences. 2002 Apr 5;32(5):865-75.
10. Raglin JS, Morgan WP, Wise KJ. Pre-competition anxiety and performance in female high school swimmers: A test of optimal function theory. International journal of sports medicine. 1990 Jun;11(03):171-5.
11. Hackfort D, Spielberger CD, editors. Anxiety in sports: An international perspective. Taylor & Francis; 1990.
12. Martens R, Vealey RS, Burton D. Competitive anxiety in sport. Human kinetics; 1990.
13. Barsky AJ, Peekna HM, Borus JF. Somatic symptom reporting in women and men. Journal of general internal medicine. 2001 Apr;16(4):266-75.

14. Bahrami F, Yousefi N. Females are more anxious than males: a metacognitive perspective. Iranian journal of psychiatry and behavioral sciences. 2011;5(2):83.
15. Crawley SA, Caporino NE, Birmaher B, Ginsburg G, Piacentini J, Albano AM, Sherrill J, Sakolsky D, Compton SN, Rynn M, McCracken J. Somatic complaints in anxious youth. Child Psychiatry & Human Development. 2014 Aug 1;45(4):398-407.
16. Grossbard JR, Smith RE, Smoll FL, Cumming SP. Competitive anxiety in young athletes: Differentiating somatic anxiety, worry, and concentration disruption. Anxiety, Stress, & Coping. 2009 Mar 1;22(2):153-66.
17. Raglin JS. Anxiety and sport performance. Exercise and sport sciences reviews. 1992 Jan 1;20:243-.
18. McCarthy PJ, Allen MS, Jones MV. Emotions, cognitive interference, and concentration disruption in youth sport. Journal of Sports Sciences. 2013 Mar 1;31(5):505-15.
19. Ramis Y, Viladrich C, Sousa C, Jannes C. Exploring the factorial structure of the Sport Anxiety Scale-2: Invariance across language, gender, age and type of sport. Psicothema. 2015;27(2):174-81.
20. Ford JL, Ildefonso K, Jones ML, Arvinen-Barrow M. Sport-related anxiety: current insights. Open access journal of sports medicine. 2017;8:205.

Assessing the effect of *"Ushnodaka Pana"* (Warm Water Consumption) on the Overall well being of I.T Professionals in Pune - A Clinical Study

Sheetal D. Gadhe[1], Shital R. Rasane[2], Shital P. Pachpute[3], Pradnya Kakodkar[4]

[1]Lecturer, Department of Ayurved Samhita, Ashtang Ayurved College, Pune, [2]Associate Professor, [3]PG Scholar, [4]Dy Director, Department of Ayurved Samhita & Siddhanta, Dr D Y Patil Vidyapeeth, Dr. D. Y. Patil College of Ayurveda and Research Centre, Pimpri, Pune

Abstract

Context (Background): Amongst the IT professionals, the consumption of nutritious food and sufficient quantity of water is greatly reduced which has resulted in health problems like complains of regular headache, migraine, acidity and other digestive problems.

Aim: To explore the beneficial effects of "USHNODAKA PANA" (warm water consumption) on the overall well being of the I.T professionals in Pune.

Method and Material: 60 participants from IT field having sedentary lifestyle aged 25 to 50 were recruited from two IT companies. In this "before and after" clinical study, the participant had to prepare and consume USHNODAKA for 7 days. Baseline data (information on appetite, digestion, feeling of lightness, belching, flatulence, bowel habit and consistency, urination, oral malodor, taste sensation and senses stimulation) was collected through interview using a closed ended 12-item questionnaire. Follow up data through telephonic conversation was obtained on 2nd, 4th and 8th day. Z test was use for comparison at $p<0.05$.

Result: At the end of second day, maximum improvement was seen in bowel habits and urination. On the fourth day, maximum improvement was seen in belching (77.77%) and flatulence (69.56%). At the end of 7th day most improvement was seen in oral malodor (80%) and taste sensation (76.47%). There was a statistically significant difference before and after in the 10 parameters except for one (senses stimulation) which did not change even at the end of 7 days.

Conclusion: Overall, it indicates that USHNODAKA can improve the well being of the IT professionals.

Key words*: warm water, IT professional, digestion, well being.*

Introduction

The science of Ayurveda, has put forth two methods for the maintenance of health. They are: "*Swasthasya Swasthya Rakshana"* (maintaining health by adopting proper preventing measures) and "*Aturasya Vikara Prashamana"* (curing of disease by giving suitable treatment for the ailment)[1] .

Globalization has changed the way people do their jobs and business across the world. New employment opportunities are created worldwide on daily basis in Engineering, Medical, Law, Entertainment, Real estate, service sector etc and these sectors need skilful and dedicated workforce willing to put extra efforts to achieve business objectives. The sedentary lifestyle, long working hours and consumption of food at abnormal time explains the lifestyle of a working corporate. Amongst the IT professionals, the consumption of

Corresponding Author:
Dr Shital R. Rasane
Associate Professor, Department of Ayurved Samhita & Siddhanta Dr. D. Y. Patil College of Ayurveda and Research Centre, Pimpri, Pune
Email:- shitalrasane@gmail.com
Phone No:+919503330831

nutritious food and sufficient quantity of water is greatly reduced. Now a days the fast life forces people to take fast food and soft drinks[2]. Most of the times, their meals include fast food along with different *ANUPANA (*liquid consumption after food) like cold coffee, hot coffee, tea, ice-creams, juices and milkshakes. The liquid medium which is consumed with or after food or medicine is called as *ANUPANA*[3].

Ayurvedic science has given utmost importance for choosing the right *ANUPANA* during food. It should not have opposite properties of food. The wrong choice of *ANUPANA* has created health problems among the IT professionals like complains of regular headache, migraine, acidity and other digestive problems[4] .

Water is the best *ANUPANA* which is easily available and can be taken as USHNODAKA[3] **.** It refers to the warm water which is prepared by boiling and reducing it to one half [5]. Aacharya Sushruta said, "***USHNODAKA"*** is *pathyakar (for consumption)* for anytime to everyone and it has potential to bring changes in people who are having sedentary lifestyle[6]. It has surprising health benefits on kidney, leads to more energy, better mood and metabolizes body's excessive fat[7] .

As against this background, the present study was undertaken to explore the beneficial effects of "*USHNODAKA PANA*" (warm water consumption) on the overall well being of the I.T professionals in Pune.

Materials and Method

60 healthy participants from IT field having sedentary lifestyle (persons who are working in sitting posture more than 6 hours/day, since 6-12 months in A.C or without A.C) of both sex and aged 25 to 50 years , willing to participate in the study were recruited. Two IT companies were contacted to obtain the required number of samples. *Pitta prakruti* dominating people were excluded. Approval was obtained from the scientific committee and Institutional Ethics committee (No: AY/ PG/130/2014/15/IEC) . Every participant signed an informed consent form before starting the study. Baseline data regarding the following *LAKSHANAS* (parameters) were recorded (Table 1) : Daily intake of water , *AGNIDEEPANA (*appetite*)*, *PACHAN* (digestion), *UTTAM RASBODH* (taste sensation), *LAGHAV* (feeling of lightness), *UDGAR VISHUDI* (belching) , *MUKHA VISHUDDHI (*oral malodor), *SHOUCH VIDHI* (bowel habits), *SRUSHTA MALA PRAVRUTTI* (consistency of stool) , *SRUSHTA MUTRA PRAVRUTTI* (frequency of urination), *ADHOVATA SARANA* (flatulence) and *INDRIYA NIRMALATA* (senses stimulation).

The enrolled participant had to consume *USHNODAKA* for 7 days as and when the participant felt thirsty. The participant had to prepare fresh *USHNODAKA* everyday morning for the use throughout the day[5]. For example if the participant consumed 2 litres throughout the day, than 4 liters of water had to be boiled and reduced to half (2 litres) , stored in thermoflask and used. During the study period the participant can have their routine food, however they are restricted from consumption of cold water and any other cold beverages.

Follow up data through telephonic conversation was obtained on 2nd, 4th and 8th day. The collected data was entered in Microsoft Excel 2013 and descriptive and inferential analysis using z test was performed. P value of <0.05 was considered as statistically significant.

Results

A total of 38 males and 22 females participated in the study. All the 60 participants completed the study. 12(20%) participants were working in the IT field for <2 years, 16(27%) for 2-4 years and 32(53%) participants have >4 years experience.

5(8.47%) belonged to *Vata Kapha Prakruti*, 13(22.03%) belonged *to Vata Pitta Prakruti,* 20(33.90%) belonged to *Kapha Vata Prakruti* , 12(20.34%) belonged to *Kapha Pitta Prakruti ,* 7 (11.86%) belonged to *Pitta Vata Prakruti* and 2 (3.39%) belonged to *Pitta Kapha Prakruti*.

During the study period , 1(1.67%) participant reported that he consumed 1 litre of water, 16 (26.67%) drank 2 litres, 33 (55%) drank 3 litres and ≥ 4 litres consumption was reported by 10 (16.67%) participants per day.

Table 2 shows the frequency distribution of the11 parameters considered in the study. There was a statistically significant difference in all the *LAKSHANAS* except for one (senses stimulation) which did not change even at the end of 7 days.

Table 3 shows the frequency distribution of the participants as per improvement in their *LAKSHANAS.* At the end of second day, improvements in five *LAKSHANAS* was observed among 4.25% to 9.8% participants, bowel movement improved in 19.35% participants , urination in 22.72% participants and no

change was noted for three *LAKSHANAS (*oral malodor, senses stimulation and taste sensation). Further, on the fourth day, improvement was seen in seven *LAKSHANAS* in the range of 20% -77.77%. Maximum improvement was seen in belching (77.77%) and flatulence (69.56%). At the end of 7th day maximum improvement was seen in oral malodor (80%) and taste sensation (76.47%). Improvement in other LAKSHANAS was in the range of 26.08% to 61.29%. Throughout the seven days there has been no change in the senses stimulation. After 7 days of *USNODHAKA PANA* , all the 60 participants showed normal values for 10 parameters.

Table 1: Data collection proforma

S.No	Questions	Options
1.	What is your daily intake of water?	1lt /2lt /3lt />3lt
2.	Do you feel hungry during meal time? (breakfast/lunch/dinner)?	Yes/No
3.	Do you have any problem in digestion?	Yes/No
4.	Do you have normal taste sensation?	Yes/No
5.	Do you feel heaviness after meal?	Yes/No
6.	Do you get normal belching after intake of food?	Yes/No
7.	Do you feel unpleasant odour in mouth?	Yes/No
8.	Do you have normal bowel habits?	Yes/No
9.	What is the consistency of stool?	Hard/sticky/loose/normal
10.	What is your daily urine frequency?	Less than 3 times/ 3-5 times/ 5-7 times/ more than 7 times
11.	Do you have flatulence problem?	Yes/No
12.	Do you feel all the senses are normal?	Yes/No

Table 2: Comparison of the baseline and follow up *LAKSHANAS*.

	Before (baseline)		After (end of 7 days)			
Parameters (LAKSHANA)	Normal	Not Normal	Normal	Not Normal	Z value	p value
Appetite	13	47	60	0	-8.78	<0.00001
Digestion	10	50	60	0	-9.25	<0.00001
Lightness	9	51	60	0	-9.41	<0.00001
Belching	16	44	60	0	-8.33	<0.00001
Bowel habit	24	36	60	0	-7.17	<0.00001
Bowel consistency	10	50	60	0	-9.25	<0.00001
Urination	16	44	60	0	-8.33	<0.00001
Flatulence	14	46	60	0	-8.63	<0.00001
Oral malodor	45	15	60	0	-4.14	<0.00001
Taste Sensation	43	17	60	0	-4.45	<0.00001
Senses Stimulation	36	24	36	24	0	Not significant

Table 3 : Improvement chart for the 7 day *USHNODHAKA* consumption.

	Improvement					
Parameters (LAKSHANA)	2nd Day		4th Day		8th Day	Normal through out
Appetite (n=47)	2 (4.25%)		17(36.17%)		28 (59.57%)	13 (22%)
Digestion (n=50)	3 (6%)		21(42%)		26 (52%)	10 (17%)
Lightness (n=51)	5 (9.8%)		20(39.21%)		26 (50.98%)	9 (15%)
Belching (n=36)	2 (5.55%)		28(77.77%)		14 (38.88%)	16 (27%)
Bowel habit (n=31)	6 (19.35%)		11(35.4%)		19 (61.29%)	24 (40%)
Bowel consistency (n=50)	1(2%)		21 (42%)		28 (56%)	10(16.67%)
Urination (n=44)	10(22.72%)		26 (59.09%)		8(18.18%)	16 (27.12%)
Flatulence (n=46)	2 (4.34%)		32(69.56%)		12 (26.08%)	14 (23%)
Oral malodor (n=15)	0 (0%)		3 (20%)		12 (80%)	45 (75%)
Taste Sensation (n=17)	0 (0%)		4 (23.52%)		13 (76.47%)	43 (72%)
Senses Stimulations (n=24)	0 (0%)		0 (0%)		0(0%)	36 (60%)

Discussion

USHNODAKA PANA is the best favor we can do to our body[7]. It not only quenches thirst but also helps in the maintence of health of an individual[8]. The result of this study indicate that the overall well being of the IT professional improves by *USHNODAKA PANA* .

It is found to stimulate appetite and digestion[6-9]. It maintains the *samastithi* (balance) of *AGNI* (digestive fire)[4] . Literature reports that consumption of warm water cause expansion of STROTAS (channels) carrying digestive juices, leading to increase in its flow which results in proper digestion of food[10].

USHNODAKA PANA induces noteworthy changes in feeling of lightness in the body after eating meals. This is because it improves the digestion and softens the *DOSHAS*[11] . It is found that *USHNODAKA PANA* reduces belching due to indigestion[12].

USHNODAKA PANA also has notable effect on bowel movements and constipation . The property of warm water is such that , it softens the stools and pushes it out, hence clearing the obstructions of STROTAS (channel)[7,13].

USHNODAKA PANA cleanse the urinary bladder[9,11]. The process of boiling changes the nature of the water making it lighter. This warm water allows it to cleanse the STROTAS (channels) and penetrate in the deeper levels, causing hydration of the tissues and thus making it easier for the body to flush out toxins and impurities[10]. Further, warm water has marked effect on flatulence[12]. It relieves the obstruction of the STROTAS (channels), thus relieves *APANA VAIGUNYA* (*Vata* defect) .

Impressive effects on oral malodor and taste sensation are noted due to *USHNODAKA PANA*, because it helps in downward movement of *Vata* , stimulation of *Agni* (digestive fire) , easy digestion and drying of *kapha*. All these factors put together has an effect on eliminating oral malodor and improving taste sensation[14] .

USHNODAKA PANA on senses stimulation takes a longer time to show beneficial effects[11]. The present study was undertaken for only 7 days and hence no

effect has been noticed on senses stimulation.

There are a few limitations in the present study. The assessment parameters are subjective in nature and are based on the response of the participants. There were no physical checks, if the person prepared and consumed warm water as instructed. However, daily reminders were given to the participants. The ideal study deign would have been the randomized controlled trial, but in the present study the "*before and after study*" design was used.

Conclusion

USHNODAKA is the easily available *ANUPANA* . The study result show that the people with sedentary lifestyle and working in the IT field for more than 4-6 years who have complains of constipation, flatulence, poor appetite, belching, malodor and heaviness in the body after meals have shown noteworthy improvements in these symptoms after taking *USHNODAKA* for 7 days. Overall it indicates that *USHNODAKA* can improve the well being of the IT professionals.

Conflict of Interest: Nil

Source of funding: Self

Ethical Clearance: Obtained from Institutional Ethics Committee, DR D Y Patil College of Ayurveda and Hospital, Pimpri, Pune.

References

1. Charaka Samhita of Agnivesha, Sutrasthana. Ch.6, *ver*.22-26. Reprint ed. Varanasi: Chaukhamba Surbharati Prakashan. 2009; pp.187.
2. Sree Lekshmi G. Role of Ahara and Ushnodaka in health. International Ayurvedic Medical Journal. 2015:3;1495-1500.
3. Ashtanga Sangraha: Saroj hindi commentary :Vagbhata Sutrasthana. Ch10, ver42. Reprint ed.Varanasi:Chaukhamba Surabhi Prakashan.2001;pp.221
4. Sheetal Dattatraya Gadhe, Shital R Rasane. Conceptual study of USHNODAKA in relation to anupana. International Journal of Recent Trends in Science . 2017:22;100-102.
5. Aacharya YT, ed. Commentary: 'Nibandhasangraha'on Sushruta Samhita of Maharshi Sushruta, Sutrasthana. Ch. 45, *ver* 40, Varanasi: Chaukhamba Sanskrit Sansthan.2010; pp.200
6. Aacharya YT, ed. Commentary: 'Nibandhasangraha'on Sushrutasamhita of Maharshi Sushruta, Sutrasthana. Ch 45, ver 39, Varanasi:Chaukhamba Sanskrit Sansthan. 2010; pp.200
7. Brijesh R Mishra, Shraddha P Katre , Abhishek B Mishra . A review article on ushnodakapaana: the key of good health. Ayurlog: National Journal of Research in Ayurved Science 2017:5; 1-6.
8. C H Arun , Hussain Gazala, P K Anu, Ganti Y Basavraj . A review: Role of Ushnodaka in Ayurveda. Journal of Biological and Scientific Opinion 2015: 3; 290-92.
9. Paradakara HS, ed. Ashtanga Hridaya of Vagabhatta with Arunadatta and Hemadri commmentry, Sutrasthana. Ch 5, *ver* 16, Reprint ed. Varanasi; Chaukhamba Sanskrit Sansthan.1995;pp 65.
10. Ushnodaka: extension of water therapy. 2004 . See at : http://www.indiadivine.org/content/topic/1158527- ushnodaka-extension-of-water-therapy/
11. Aacharya YT, ed. Commentary: 'Nibandhasangraha'on Sushruta Samhita of Maharshi Sushruta, Sutrasthana. Ch 39, ver 107, Varanasi:Chaukhamba Sanskrit Sansthan. 2010; pp.680.
12. Aacharya YT, ed. Commentary: 'Chakrapanidatta'on Charak Samhita of Maharshi Charak, Kalpasthana. Ch12, ver71, Varanasi: Chaukhamba Sanskrit Sansthan;2010;pp 674.
13. Vedavyas. Role of Ushnodakapana in Vibhanda. Dissertation submitted to Rajiv Gandhi University of Heal Sciences, Bangalore. See at http://52.172.27.147:8080/jspui/bitstream/123456789/6857/1/vedavyas.pdf.
14. Aacharya YT, ed. Commentary: 'Chakrapanidatta'on Charak Samhita of Maharshi Charak, Vimansthana. Ch 3, ver 40, Varanasi:Chaukhamba Sanskrit Sansthan;2010; pp:246.

Does Maternity Care Expenditure is Catastrophic? A Cross-Sectional Study of Household`s Expenditure on Maternal Health Care Services in EAG States of India

Shekhar Saroj[1], Rajesh Kumar Shastri[2], Ravindra Tripathi[3]

[1]Research Scholar, [2]Associate Professor & Head, [3]Associate Professor, Department of Humanities and Social Sciences, Motilal Nehru National Institute of Technology Allahabad, Prayagraj, UP, India

Abstract

Objectives: The main aim of this study is to analyze the differentials in average expenditure on prenatal, delivery and postnatal care by socio-economic characteristics of households in EAG states and assessment of the number of households incurred catastrophic health expenditure on maternity care.

Method: We have used 71st round of the NSSO data held on June 2014. For the analysis of prenatal care, delivery care, postnatal care, total maternity expenditure and Out of Pocket Expenditure (OOPE) have been taken as dependent variables and the independent variables have been chosen based on previous studies as well as socio-economic aspects, especially in EAG states of India. Bivariate analysis and binary logistic method have been used for the data analysis.

Results: Results shows that MCE is high in urban sector specially in Orissa among all EAG states. We also found that Orissa has the maximum number of household that incurred high catastrophic-health-expenditure.

Conclusion: We can conclude that women belong to better socio-economic condition spent more money on maternity care and incurred high OOPE where is, it is less among women who belong to poor socio-economic condition, due to lack of awareness and other socio-economic hurdles.

Keywords: *Prenatal Care, Delivery, Postnatal Care, Maternity Care, Out of Pocket Expenditure, Catastrophic Health Expenditure.*

Introduction

India is a developing country comes under the South Asian region, facing a high MMR of 190 per 100,000 livebirth.[1-2] EAG states & Assam covered maximum share of MMR and IMR, out of which 71% of infant deaths, 72% of under age-5 deaths, and 62% of maternal deaths.[3] Xu et al., (2003) found that the proportion of households is positively associated with the catastrophic-health-expenditures and the share of out of pocket payments in total health expenditure.[4] Leone et al., (2013) found that the expenditures on delivery care are substantially higher in socio-economically weak states than the average spending on delivery care in India.[5] The current pattern of health care expenditure shows that only 71% of their total health expenditure born by the household and remaining 29% expenditure covered by the government and other welfare agencies in which 20% (Central), 6% (State) and 2% expenditure covered up by different internal and external welfare agencies, respectively.[6] The rises in OOPE on health care disrupts the consumption of other consumable goods and services which directly affect the living standards of the household, in result health care expenditure become catastrophic.[7]

Catastrophic expenditure is defined as the share of out of pocket payments in total health expenditure, the share of total health expenditure in Gross Domestic Product (GDP/NI) and the percentage of households below the capacity to pay or poverty line.[8] Here, catastrophic expenditure on maternal care are considered those expenditure who covers the expenditure of maternal care from conception to postnatal period.

Although lot of studies have been done on OOPE on delivery care at the country level, this study is the first of its kind to explore the burden of overall maternity care on

households in EAG states. So, there is need for separate research of EAG states to know the consequences and nature of expenditure on maternity care, especially the nature of the OOPE of the households.

Objectives

- To assess the differentials in expenditure on prenatal, delivery and postnatal care by socio-economic characteristics of the households in EAG states.
- To analyze the households incurring catastrophic health expenditure.

Methodology

Data Source

The 71st round of the NSSO data has been used for the analysis which was conducted from January to June 2014 on the title of "Key Indicators of Social Consumption in India: Health." For the analysis, women aged 15–49 years were included who were pregnant in the 365 days before the survey or who delivered the baby and received any maternal care services. For analyzing the maternity care expenditure (MCE), we received the data from those 4,811 women who gave birth in any public or private hospitals. However, information on prenatal and postnatal care expenditure was collected as an aggregate level. Total Maternal expenditure was collected by the source of all three components of health care from prenatal, delivery and postnatal care.[9]

Method

Dependent Variables:

In this analysis, dependent variables have been taken from the four different aspects of Maternal Care Expenditure such as prenatal care, delivery, postnatal care, and total maternal expenditure. Additionally, we have taken OOPE as a dependent variable to examine whether the household incurred any catastrophic medical expenditure (CME) on maternal care. OOPE or net expenditure derived by subtracting insurance reimbursement to total medical expenditure. Prenatal care expenditure, delivery care expenditure and postnatal care expenditure includes expenses incurred in obtaining prenatal, delivery care and postnatal care services separately, whereas the total MCE is the summation of all three expenditure (prenatal, delivery, and postnatal care).

Independent Variables:

The independent variables in this analysis were selected based on social and economic characteristics of the EAG states of India. The variables which have more significance in this analysis is the socio-economic disparities, level of female education (Illiterate & Literate), religion (Hindu & Others), social groups (SC/ST, OBC and General), economic status (Monthly Per Capita Consumption Expenditure of household (MPCE)) and working status of women. We have also used some demographic variables of women such as age (15-24, 25-29, and 30-49) and place of residence (Rural and Urban).

Model for Catastrophic Expenditure:

We have used the proportion method to estimate the catastrophic health expenditureas given by Wagstaff & Van Doorslaer, (2003). This method categorizes the proportion of household incurring catastrophic health expenditure based on the share of health expenditure in the household's total consumption expenditure at 10 percent cut-off levels. This cut-off level provides a chance to estimate the concentration of the problem. An OOPE for healthcare turn into catastrophic expenditure when the payment exceeded some threshold (cut-off) level and defined as a part of total household non-food consumption. If T represents OOPE for healthcare, x represents total households expenditure, and f(x) stands for food expenditure, then a household is said to have incurred catastrophic payments when T/x or T/[x-f(x)] exceeds a specified threshold, Z.[8]

Statistical Method

In this study, we have used descriptive statistics to explain the charrecterstics of the variables, and Bivariate-analyses to examine the unadjusted association among dependent and independent variables. A Binary-logistic-regression model was also used to assess the independent association between dependent and independent variables. We have taken the net maternity expenditure 1 when it is higher for the cut off level and 0 when it is less than cut off level to run the binary logistic model where 1 shows the high OOPE. The whole analysis has been carried out in STATA-13 software.

Result

Average Expenditure on Maternity Care:

Table 1 explain the expenditure pattern of households by their various socio-economic characteristic among all age groups. The MCE, prenatal, delivery and postnatal care expenditure is highest in 15-24 age group and lower in 30-49 age group. The MCE is high in urban sector (Rs.10274) as compared to the rural (Rs. 6369). The literate woman incurred high MCE as compared to illiterate woman, and delivery care expenditure is higher (Rs. 6944) among all three MCE. The General category women incurred higher MCE which is twice higher than women belongs to SC/ST category. Table-1 shows that as quintiles increases (poorest to richest), expenditure on all maternity care also increases. MCE is highest (Rs. 17247) in richest quintile and lowest (Rs. 4907) in poorest quintile. Women involved in casual labour spend less than Other working groups. There is high MCE incurred by Orrisa (Rs 8050) followed by Bihar and Uttar Pradesh and least expenditure incurred by Chhattisgarh (Rs. 5246).

Out Of Pocket Expenditure on Maternal Care at 10% Cut off Level

Table 2 shows the percentage of households incuring high OOPE. In the age group (25-29), maximum (9.2%) of household incurred high OOPE. Percentage of household having high OOPE is higher, where women are literate and belongs to Hindu religion and in a social group, it is highest (7.5%) in the general category women. In MPCE quintile, percentage of household incurred high OOPE is showing an increasing pattern as wealth quintile shifting from poorest to richest quintile. In Orrisa (9.1%) of household are incurring high OOPE on maternity care followed by in Bihar (6.8%) and Uttar Pradesh (6.4%) where is household of Rajasthan incur least OOPE.

Age group (30-49) shows the significant association where age group (30-49) is 54% more likely to incur high OOPE on maternity care. Table 2 shows the general category is significantly associated with the net MCE where the odds of occurrence of high OOPE on maternity carries 20% more as compared to SC/ST category. An increasing trend can be observed in case of wealth quintile where odds of incurring high OOPE on maternity care is increasing as wealth quintiles shifting from poorest to richest quintile. In EAG states, Bihar is 34% more likely to incur high OOPE on maternity care.

Table-1: Average Expenditure on Maternity Care

Background Variable	Prenatal care expenditure		Delivery care expenditure		Postnatal care expenditure		Maternal care expenditure (MCE)	
	Mean	Obs	Mean	Obs	Mean	Obs	Mean	Obs
Age (years)								
15-24	2038.254	2952	6141.2	2031	1780.4	1880	7160.8	3036
25-29	1972.178	2455	6082.2	1719	1670.2	1906	7062.2	2507
30-49	1853.039	1623	5632.2	1061	1522.4	1257	6724.1	1675
Place of Residence								
Rural	1831.3	4445	5285.0	2931	1586.5	3094	6369.4	4575
Urban	2683.9	2585	9259.6	1880	2133.8	1949	10274.1	2643
Level of Education								
Illiterate	1300.5	2244	4252.6	1311	1383.9	1537	4834.3	2337
Literate	2394.3	4786	6944.1	3500	1875.9	3506	8400.8	4881
Religion								
Hindu	1968.5	5930	5925.2	4150	1635.6	4271	7007.9	6073
Other	2015.9	1100	6541.7	661	1920.8	772	7159.8	1145
Social Group								
SC/ST	1400.2	2190	4117.7	1455	1356.9	1531	4882.2	2252
OBC	2018.5	3419	5980.0	2281	1692.9	2423	6993.9	3518
General	3089.4	1421	9398.4	1075	2248.4	1089	11847.7	1448
MPCE quintile								

Cont... **Table-1: Average Expenditure on Maternity Care**

Poorest	1434.5	2434	4117.1	1521	1360.4	1658	4907.9	2512
Poorer	1647.4	1706	4866.2	1175	1591.0	1234	6028.4	1755
Middle	2518.9	1264	6774.9	889	1780.7	907	7743.6	1293
Richer	2461.0	988	7992.0	714	2114.6	745	9969.1	1013
Richest	4218.2	638	14232.9	512	2876.5	499	17247.2	645
Working status								
Self emp.	2156.5	4688	6638.0	3258	1805.2	3372	7827.5	4801
Regular wage	2451.4	769	6122.8	541	1845.9	575	7954.2	792
Casual labour	1284.1	1284	4070.9	804	1326.1	874	4682.7	1328
Other	2504.3	289	7137.277	208	1686.8	222	7936.2	297
States								
Uttarakhand	1786.7	193	4204.3	137	1545.3	142	5803.2	200
Rajasthan	2141.7	872	4770.5	717	1829.8	576	6575.1	909
Uttar Pradesh	1925.2	2396	7208.2	1435	1929.6	1658	7714.7	2461
Bihar	2405.3	961	6950.8	565	1523.5	732	7879.0	992
Jharkhand	1247.7	489	5007.7	377	1058.2	380	5499.3	509
Orissa	2490.9	696	6183.6	569	1495.2	570	8049.8	707
Chhattisgarh	1278.0	361	5383.3	204	1369.1	245	5246.6	364
Madhya Pradesh	1586.9	1062	4205.7	807	1699.5	740	5276.8	1076
Total	1976.1	7030	6013.5	4811	1683.5	5043	7032.6	7218

Table-2: Out of Pocket Expenditure on Maternal Care at 10% Cut off Level

10% cut off level	**% of Household incurred OOPE**				**95 % CI**	
Background Variable	**no. of %**	**Obs.**	**Total obs.**	**Odds Ratio**	**Lower lev.**	**Upper lev.**
Age (years)						
15-24®	6.7	1,684	25,324	1.00		
25-29	9.2	1,103	12,026	1.01	0.9	1.1
30-49	8.1	2,402	29,740	1.55***	1.4	1.7
Place of Residence						
Rural®	6.4	5,152	80,539	1.00		
Urban	6.5	3,225	49,938	0.87***	0.9	0.9
Education Level						
Illiterate®	5.8	2,759	47,423	1.00		
Literate	6.3	5,139	82,114	1.04	1.0	1.1
Religion						
Hindu®	6.6	7,201	109,442	1.00		
Other	5.6	1,176	21,035	0.91**	0.8	1.0
Social Group						
SC/ST®	5.9	2,115	36,181	1.00		
OBC	6.3	3,999	63,995	1.13***	1.0	1.2
General	7.5	2,263	30,301	1.20***	1.1	1.3
MPCE quintile						
Poorest®	5.4	2,312	42,681	1.00		
Poorer	6.0	1,789	29,959	1.09*	1.0	1.2
Middle	6.7	1,583	23,528	1.25***	1.1	1.4
Richer	7.1	1,392	19,533	1.38***	1.2	1.5
Richest	8.8	1,301	14,776	1.46***	1.3	1.6
Working status						
Self emp. ®	6.3	5,658	90,446		1.00	
Regular wage	6.3	831	13,155	1.06	1.0	1.2

Cont... **Table-2: Out of Pocket Expenditure on Maternal Care at 10% Cut off Level**

Casual Labour	6.0	1,239	20,649	1.06	1.0	1.2
Other	10.4	649	6,227	1.29***	1.1	1.5
EAG States						
Chhattisgarh®	6.2	378	6,073		1.00	
Madhya Pradesh	6.2	1,198	19,280	1.14	1.0	1.3
Jharkhand	5.5	460	8,378	0.95	0.8	1.2
Uttarakhand	6.3	202	3,185	1.05	0.8	1.3
Rajasthan	5.1	846	16,766	0.81**	0.7	1.0
Uttar Pradesh	6.4	3,031	47,421	1.12	1.0	1.3
Bihar	6.8	1,197	17,718	1.34***	1.1	1.6
Orissa	9.1	1,065	11,656	2.07***	1.7	2.4
Total	6.4	8,377	130,477			

*** p<0.01,** p<0.05,* p<0.1

Discussion

This paper is a quantitative analysis of expenditure incurred in the utilisation of maternal health care services in EAG states, and also talks about the critical socio-economic and demographic factors influencing the catastrophic health expenditure of the households. Study said that literate women are more concern about their health and to avoid the maternity related complications they spent more on maternity care services than illiterate women. The MCE is high among women belong to the urban area than their rural counterparts because of education and decision making power. We also found the same result where socially and economically better off women spent more on maternity care than economically poor and socially disadvantaged group of women.[10-11] Similarly, Average OOPE is higher among the literate women who belongs to higher quintile than illiterate women who belongs to lower quintiles, because mostly literate and economically strong women have the ability to pay higher prices and they ask for better quality health care services.[12] In rural areas, women are mostly less educated, dependent, poor and unaware about the maternity-related services and complications than urban area, in result they spent less money on maternity care. In our study, we found that OOPE on maternity care is higher among women those belong to General Category and Non-Hindu religion than their counterparts.[10] We found the differentials in MCE and OOPE among EAG states where Orrisa incurred the highest MCE than other EAG states and also maximum number of household incurred OOPE in this state.

Conclusion

Based on the above findings, we can conclude that women belong to poor socio-economic condition spent less money on maternity care due to lack of awareness and other socio-economic hurdles. The government should give more emphasis on policy implementation on community level and give more focus on maternal and child health-related awareness programmes especially in EAG states where people are less educated and economically poor. The government should also look into policy consideration on the implementation of community health insurance to reduce the economic burden of maternity care, especially in EAG states.

Due to the limitation of NSS dataset, we could not do extensive and in-depth study on factor influencing on catastrophic expenditure on maternal care, it can be suggested that the state-wise rural-urban analysis and public-private hospital based differencial analysis could be done in the future for in-depth information about catastrophic expenditure on maternal health care.

Ethical Clearance- This study is based on secondry data base, NSSO 71st round survey which were conducted by Government of India. So, there is no need of ethical clearance for data collection from any research committee.

Source of Funding- The authors have not received any funding or benefits from industry elsewhere to conduct this study.

Conflict of Interest - Nil

References

[1] Motala S, Ngandu S, Mti S, Arends F, Winnaar L, Khalema E, Makiwane M, Ndinda C, Moolman B, Maluleke T, Chola L. Millennium development

goals: Country report 2015.

[2] World Health Statistics, Part – 3: Global Health Indicators. World Health Organization; 2014.

[3] Annual Health Survey Report 2013 -14, Office of the Registrar General & Census Commissioner, India.

[4] Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicountry analysis. The lancet. 2003 Jul 12;362(9378):111-7.

[5] Leone T, James KS, Padmadas SS. The burden of maternal health care expenditure in India: multilevel analysis of national data. Maternal and child health journal. 2013 Nov 1;17(9):1622-30.

[6] Ministry of Health and Family Welfare (MoHFW). Annual Report to the people on health. Ministry of Health and Family Welfare. Government of India, New Delhi; 2009

[7] World Health Organization. The world health report 2000: health systems: improving performance. World Health Organization; 2000.

[8] Wagstaff A, Doorslaer EV. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993–1998. Health economics. 2003 Nov;12(11):921-33.

[9] NSSO. Key Indicators of social consumption in India, health: NSSO 71st Round (January June 2014). National Sample Survey Organization, Ministry of Statistics and Programme Implementation, Government of India, New Delhi; 2015

[10] Goli S, Rammohan A, Pradhan J. High spending on maternity care in India: What are the factors explaining it?. PloS one. 2016 Jun 24;11(6):e0156437.

[11] Mukherjee S, Singh A. Has the Janani Suraksha Yojana (a conditional maternity benefit transfer scheme) succeeded in reducing the economic burden of maternity in rural India? Evidence from the Varanasi district of Uttar Pradesh. Journal of public health research. 2018 Feb 5;7(1).

[12] Mohanty SK, Srivastava A. Out-of-pocket expenditure on institutional delivery in India. Health policy and planning. 2012 Jun 17;28(3):247-62.

[13] Bonu S, Bhushan I, Rani M, Anderson I. Incidence and correlates of 'catastrophic' maternal health care expenditure in India. Health policy and planning. 2009 Aug 17;24(6):445-56.

[14] Registrar General of India. (2011). Maternal Mortality in India and States from Special Survey of Deaths, Registrar General of India, New Delhi (http://nrhm-mis.nic.in/).

[15] UNICEF, WHO, World Bank, UN-DESA Population Division. Levels and trends in child mortality, United Nations Children's Fund (UNICEF); 2015. Available. http://www.unicef.org/media/files/IGME_Report_ Final2.pdf.

Evolving Patterns of Adjustment to Maintain the Functional Health of Elderly Living Alone in NCR

Shikha Kumari[1], Alka Sharma[2]

[1]Doctoral Research Scholar, Department of Humanities and Social Sciences, Jaypee Institute of Information Technology, Noida, [2]Dean, Department of Humanities and Social Sciences, Jaypee Institute of Information Technology, Noida

Abstract

Background- One of the most important determinants of the quality of life of older people is their functional health status that refers to their capacity to perform normal daily activities. With the advent of globalization and changing family structures, there are elderly who are left alone to fend for themselves without any formal support. **Aim & Objective:** to find out the evolving patterns of adjustment in the absence of care giver of elderly who are living alone in Delhi/ NCR. **Material and Method:** The study is carried under descriptive research design. One Household Proforma was used for the purpose of obtaining their demographic information and a pretested scale is used to elicit the information on their IADL after taking consent from the elderly. Snowball sampling technique is incorporated for data collection. Data is collected from a structured questionnaire and Focus Group Discussions with 80 respondents above the age of 60 years, living alone from Delhi/NCR to find their adjustment patterns. **Result:** the results show that respondents are independent for their ADL and IADL and in case of dependency the respondents have two types of support- support on daily basis i.e, house-help and support available for in absentia of routine care takers i.e, their kin living in the vicinity and elderly groups formed in the community. **Conclusion:** The respondents have formed their own community networks that provide assistance to them in case of need or they reconcile to avoidance.

Keywords: *elderly living alone, functional health, instrumental activities of daily living, community support*

Introduction

Recently, the proportion of elderly people in India has risen at a high rate, and this trend is likely to be similar in the decades to come. The elderly would represent about 34 percent of the nation's total population before the end of the 21st century [1]. There are nearly 104 million elderly people in India, consisting of 53 million females and 51 million males, according to the 2011 Population Census. Around one-fifth live either alone or with the partner of life alone. Those who live alone or just with their partner in life have to deal with their own material, physical needs and health needs. Older people living alone without a partner (living alone) have increased over time from 2.4% in 1992–1993 to 5% in 2004–2005 [1]. Approximately 5% of the elderly live alone, while another 4% live with other relationships and non-relationships. The well-being of older people depends heavily on who they live with [1], especially in developing countries where the elderly have a limited option for the formal social care system, including other related welfare services [2]. Living alone elderly persons have to face different type of challenges in their day to day activities. The major reason behind these challenges is their deteriorating health. A number of studies show that elderly living alone in the community has to face lack of support and limited resources [3], they are in need of medical facilities, leisure and social settings and financial subsidies [4]. The lack of familial support and social services in monitoring their health status and medical appointments [5] and caregiving [6] are linked with poor self-management of the health of elderly living alone. Based on the desire and constraints of their children's

Corresponding Author:
Shikha Kumari
Doctoral Research Scholar, Department of Humanities and Social Sciences, Jaypee Institute of Information Technology, Noida

daily lives, the children may or may not support the elderly. By and large the welfare state is unable to pay for or provide for the delivery of formally organized health and social care programs and associated support services like personal care services for the elderly [7]. Functional status assessment is important for the care of older adults. Functional health can be described as the ability to carry out all one's daily living activities [8]. Daily living tasks are self-care, such as washing, dressing, using the toilet, shaving and feeding yourself. These are the activities that need to be done every day. IADLs (Instrumental activities of daily living) are not necessary for essential functioning of the individual but they allow them to live independently in the community [9]. Changes in aging, disease, deteriorating chronic disease, and hospitalization may lead to a decline in the capacity to perform these tasks needed to live independently in the community.

Aims & Objectives: to find out the evolving patterns of adjustment in the absence of care giver of elderly who are living alone in Delhi/ NCR.

Material & Method

Study Type: Exploratory and Descriptive study

Study Area: National Capital Region (NCR) has been selected as the location for conducting present research work.

Sampling Frame: Residential colonies

Sampling techniques: Purposive and snowball sampling methods have been employed for identifying the respondents.

Sample Size- For the collection of data the researcher has identified 100 respondents to get the questionnaire filled but some of the respondents were not able to continue the interviews due to their non-availability as they went to their children's home and ill-health. So they had to drop out. 80 complete questionnaires were filled.

The study is carried under descriptive research design. One Household Proforma was used for the purpose of obtaining their demographic information such as age, gender, religion, educational qualification, current work status, income, expenditure and savings. Assessment of older people: self-maintaining and instrumental activities of daily living by M.P. Lawton & E.MBrody[10] is used to elicit information on their functional health after taking consent from the respondents. Focus group discussions are conducted to explore the evolving patterns devised by the respondents to maintain their functional health in the absence of care givers. Snowball sampling technique is incorporated for data collection. Data is collected from a semi structured interview schedule with 80 respondents above the age of 60 years, living alone in Delhi/NCR to find their adjustment patterns.

Results

The above table represents socio-demographic profile of the study participants. Out of the total 80 participants, 60% of participants are in the age bracket of 65 to 70 while 20%- 20% are of 60-65 and 70 and above. 80 % are female while 20% are male participants. A large percentage of respondents, i.e. 80% are widow/ widower, 10% are never married and 10 % are divorced or separated. 40% of the respondents are graduate. In the work status, the researcher finds that 10%, 40%, 10%, 10%, 30 % are retired from government services, Retired from private service, Self-employed, Home maker and take care of properties respectively.

Assessment of functional health in terms of ADL and IADL

The scale developed by Lawton and Brody 10 is used to measure the ability of respondents to perform IADL (instrumental activities of daily living). The instrument has been widely accepted as a valid and reliable measure for use in elderly community populations. This scale is consists of eight items. The questionnaires are completed by the respondents and researcher (in cases where elderly are illitrate) at their homes. Responses were recorded for each item, regardless of a client's sex. Scores increased with level of dependence on the range of 1-5, and the same scoring system was used for both sexes.

Frequency data were obtained from the IADL scale to determine dependency in each of the IADLs. All the respondents are fully independent for self-care activities such as toilet, bathing, feeding and grooming. For IADL activities, most of the respondents (90%) reported being independent in using the telephone and 10% reported being partially dependent. 60% of the respondents reported being independent for shopping while 40% are partially dependent. Half of the respondents reported being self-sufficient in food preparation and 20% and 30% are partially and fully dependent for preparation of food. Majority of respondents (70%) were dependent for their housekeeping needs out of which 30% and 40% are

partially and fully dependent. 50% of respondents are fully dependent for their Laundry on someone. 80% of respondents are fully independent for their transportation activity. A large no of respondents, i.e, 90% said they take their medicines without others help. 75% of older adults said they are fully independent in handling their finances while 25% are partially dependent [Table 1].

Emerging patterns of IADL support

All the respondents are self-dependent for activities such as toilet, bathing, feeding and grooming. Some of the respondents reported being slow and clumsy sometimes in self-care activities but they are not dependent on anyone for self-care activities. They avoid such activities that time. In case of dependency the respondents have two types of support- support on daily basis and support available for in absentia of routine care takers. For day to day assistance in telephone use, 8 respondents reported relying on house help while 3 get some help from their grandchildren. House help, daughters, niece and son are reported to provide help for the shopping activities of elderly. 36 respondents reported to be dependent on house help for food preparation and housekeeping in case of need. House help is again the main point of care provider for 56 elderly for their laundry needs. In case of in absentia routine care takers dependency the elderly rely on their friends, the elderly group from their residential societies of which they are also a part and sometimes the children of their friends. In some situation their coping mechanism is avoidance [Table-2]. For IADL, the support can be divided into three categories- self, paid and unpaid. House help are the paid care providers and community support provides the unpaid help to the elderly. In every residential society, elderly have formed their own groups.

These elderly groups (formed on the basis of activity for example, laughing clubs, walking groups and yoga groups) of the same society are connected through personal and telecommunication modes such as WhatsApp and always support, promote and motivate each-others. If the house help is absent, others cook food and bring it to them. If anyone needs anything, they post it on WhatsApp and others try to facilitate and help.If someone does not turn up for the get together, others call them to enquire and if necessary pay visits. If someone is found to be in low mood, the others invite them to their houses or visit them for a chat to make them feel good. Sometimes such persons are accompanied to temples or shopping complexes for an outing. If someone is down with routine medical issue such as fever, cough and cold, pain etc, others help them homemade remedies. Most of the times they themselves prepare the remedies and bring it along with some tea and snacks to the houses of the ones they are visiting,so that the host is freed of chores. These finding is in line with the study published by Black in 2012 which had revealed that older adults themselves were actively helping each other in maintaining their home. Black's study also suggested that the older adult with similar life experiences value other's opinion [11].

Table-1 (Assessment of functional health in terms of ADL and IADL)

	Independent	**Dependent**		
Activities of Daily living	**Self**	**Partially Dependent**	**Fully Dependent**	**N**
Toilet	80	0	0	80
Feeding	80	0	0	80
Dressing	80	0	0	80
Grooming	80	0	0	80
Physical Ambulation	80	0	0	80
Bathing	80	0	0	80
Instrumental Activities of Daily Living				
Ability to use telephone	72	8	0	80
Shopping	48	32	0	80
Food preparation	40	16	24	80

Cont ... **Table-1 (Assessment of functional health in terms of ADL and IADL)**

Housekeeping	24	24	32	80
Laundry	24	16	40	80
Transportation	64	8	8	80
Own medication	72	8	0	80
Ability to handle finances	60	20	0	80

Table 2 (IADL support)

Instrumental Activities of Daily Living	**Dependent On daily basis**		**In absentia of routine care takers dependency**	
	Person	**Frequency**	**Person**	**Frequency**
Ability to use Telephone	House help	8	Elder group	16
	grandchildren	3		
Shopping	House help	7	Friends	10
	daughter	9	Elder group	34
	niece	3	Children of friends	12
	son	5		
	grand children	8		
Food preparation	House help	36	Elder group	56
	daughter	4	Children of friends	14
Housekeeping	House help	36	Avoidance	60
	Society maintenance	20		
Laundry	House help	56	Avoidance	70
Transportation	House help	8	Elder group	42
	daughter	4	Friends	21
	son	4		
Taking medication	House help	8	Elder group	34
Ability to handle finances	daughter	8	Avoidance	15
	son	12		

Conclusion

In this study setting, the family is absent. Also, there is no formal system of providing assistance in home based care of elderly. This situation has led the elderly to find and create their own ways to adjust to this situation. The immediate solution to this situation is house help but this help is unskilled, uneducated and untrained for their needs and care taking. They have to deal with their absenteeism, irregularity, misbehavior. There are also the issues of their reliability.

It is in this background that the elderly appears to have reconciled to community networks. There seems to be an evolving pattern of adjustment where elderly persons form and become part of community networks

of similar age cohorts that support, promote and motivate the group members.

However, when the support from the community network is unavailable at times, the elderly seems to avoid performing daily activities. This avoidance may lead to functional health decline.

Limitation of the study-

Future research should be done on larger populations. There is a scope of exploring more ways of adjustment of elderly. Level of community support should also be measured.

Relevance of the study-

This study explores the emerging patterns of adaptation of elderly to maintain their functional health. It reports new emerging social phenomena where older adults are active care providers to self and others. This study also adds to the existing body of knowledge on the emerging living arrangements of older people in India.

Ethical Clearance- It will take 15-20 days to get the ethical clearance from the committee.

Source of Funding- Self

Conflict of Interest –Nil

References

1 United Nations Population Fund (UNFPA), United Nations Population Fund. Caring for Our Elders: Early Responses – India Ageing Report, New Delhi, India. 2017. http://india.unfpa.org/sites/ default/ files/pub-pdf/India%20Ageing%20Report%20 -%202017%20%28Final%20Version %29.pdf

2 Government of India, Ministry of Statistics and Programme Implementation, Central Statistics Office Elderly in India. 2006. http://mospi. nic.in/sites/default/files/publication_reports/ ElderlyinIndia_2016.pdf

3 Garnett A, Ploeg J, Markle-Reid M, Strachan PH. Self-management of multiple chronic conditions by community-dwelling older adults: A concept analysis. SAGE Open Nursing. 2018 Jan;4:2377960817752471.

4 LHuang LH, Lin YC. The health status and needs of community elderly living alone. The journal of nursing research: JNR. 2002 Sep;10(3):227-36.

5 Prohaska TR, Glasser M. Patients' views of family involvement in medical care decisions and encounters. Research on aging. 1996 Mar;18(1):52-69.

6 Stone R, Cafferata GL, Sangl J. Caregivers of the frail elderly: A national profile. The Gerontologist. 1987 Oct 1;27(5):616-26.

7 Kumari S, Sharma A. Spirituality: a tool for learning, change and adaptation of elderly in changing Indian family. International Journal of Learning and Change. 2018;10(1):33-53.

8 https://qol.thoracic.org/sections/key-concepts/ functional-status.html assessed on 23 Dec, 2019 at 1:09 am

9 Bookman A, Harrington M, Pass L, Reisner E. Family caregiver handbook. Cambridge, MA: Massachusetts Institute of Technology. 2007.

10 Edelstein B, Staats N, Kalish KD, Northrop LE. Assessment of older adults. InPsychological treatment of older adults 1996 (pp. 35-68). Springer, Boston, MA.

11 Black K, Dobbs D, Young TL. Aging in community: Mobilizing a new paradigm of older adults as a core social resource. Journal of Applied Gerontology. 2015 Mar;34(2):219-43.

Correlation between BMD Level and Preventive Osteoporotic Practice among Menopausal Women

Shiney Paul[1], Timi Thomas[2], Agy Sebastian[3]

[1]HOD- Department of OBG (N), Nitte Usha Institute of Nursing Sciences, Paneer, Mangalore, [2]Assistant Professor, Department of OBG (N), Nitte Usha Institute of Nursing Sciences, Paneer, Mangalore, [3]Staff Nurse, Justice K.S Hegde Charitable Hospital, Deralakatte

Abstract

Introduction: According to Asian Audit Report 2009, Osteoporosis is the most emerging health problem among Asians. Rapid bone loss occurs when menopause is attained. It is found to be the greatest in the early stage of postmenopausal period. The objectives of the study were: assess the BMD level and preventive osteoporotic practice among menopausal women, find out the correlation between BMD level and preventive osteoporotic and to find the association between BMD levels with selected demographic variables. Lifestyle practices like adequate exposure to sunlight, regular exercise and appropriate diet proves to have positive impact on bone health among menopausal women. These measures prove to be safe and cost-effective. Promoting and maintaining health of women by educating them to adopt healthy lifestyle practices is role of an advanced nurse practitioner. Therefore, the investigator was interested in preparing an information booklet on preventive practices for osteoporosis among menopausal women.

Method: Non-experimental research approach was used and the design selected for the study was cross sectional survey. Sample comprised of 100 menopausal women attending orthopaedic OPD at K.S Hegde hospital, Deralakatte, Mangaluru. Convenience sampling technique was used to select the samples. Data was collected from 05/09/2018- 28/12/2018 by using demographic performa, BMD level and osteoporotic preventive practice checklist. The collected data were entered systematically in the SPSS for data analysis.

Results: The results of the study shows that the P value of chi square test for association between BMD level with demographic variables such as age (0.000), total number of children (0.005), age at menopause (0.003) and source of information (0.000) are at 0.05 level of significance. Hence the research hypothesis interpreted that there is significant association between BMD level with selected demographic variables.

Conclusion: The measures adopted by menopausal women to achieve and sustain an optimum level of bone health vary from individual to individual, community to community and country to country. The nurse practitioner has a primary responsibility of enhancing the knowledge, positive attitude, good health status among menopausal women.

Keywords: *Menopausal women, osteoporosis, BMD level*

Introduction

Osteoporosis is the major fitness concern in the world affecting greater than 200 million menopause women. No symptoms are found in it as such but responsible for over 80% of all fractures in post-menopausal women[1]. The prevalence of hip fracture throughout the world is 17 lakhs and it is likely to increase to 2.6 million by 2025. Women are four times at greater risk to develop this condition when compared to men. Twenty- eight percentage of women die in a year due to sustainment of hip fracture[2]. In developing countries hip fracture consumes more hospital bed days than heart attack, stroke and diabetes in overall.

Corresponding author:
Timi Thomas, MPhil (N),
Assistant Professor, Department of OBG (N), Nitte Usha Institute of Nursing Sciences, Paneer, Mangalore.
e-mail: timjith@gmail.com

In India osteoporotic fractures commonly occurs at younger age when compared with that of the West. A study published in recent times enumerates the prevalence of vitamin-D deficiency all across the country particularly in the urban areas including both the gender and all age groups[3].

Background of the Study

According to Asian Audit Report 2009, Osteoporosis is the most emerging health problem among Asians. Most of the elderly population in our country is prone to get fragility fractures at the hip, spine and wrist which are associated with osteoporosis. Hip fracture is more serious than the other fractures associated with osteoporosis, because of the complications like chronic pain, disability and diminished quality of life[4].

WHO reports that osteoporosis accounts greater co-morbidity second only to cardiovascular disease and studies proved that post-menopausal women chance of getting hip fracture and breast cancer risk is almost equal to it. The burden among health care system on elderly population which escalates day to day is more as the treatments are costly. Rapid action need to be taken to counter this economic threat[5].

Need for the study

After the onset of menopause women are generally at greater risk of osteoporosis due to lowering of oestrogen hormone in the body. Reduced level of this hormone initiates bone loss with subsequent reduction in bone production leading to osteoporosis[6]. Surgical menopause also may pave way to the condition when the ovaries are removed surgically resulting in lowered oestrogen level[7].

As elderly women population continues to climb, the incidence of osteoporosis will increase. Osteoporosis is caused by a combination of genetic, hormonal, environmental and dietary factors[8]. Attempts to monitor, identify and where possible, control these factors are the only ways to prevent this diseases. Health care providers must also explore strategies to deal with the increasing numbers of elderly people who are susceptible to a condition known as osteoporosis.

Good lifestyle practices like adequate exposure to sunlight, regular exercise and appropriate diet proves to have positive impact on bone health and metabolism among Indians. These measures prove to be safe, cost-effective and efficient to large populations and are recommended as an important health measure to overcome the condition[9]. Promoting health is the role of a advanced nurses practitioner in maintaining and improving client and community well-being[10]. Educating and empowering the individuals to integrate healthy lifestyles practices is an important task in the hand of health care provider Therefore, the investigator was interested in preparing an information booklet on preventive practices for osteoporosis among menopausal women.

Title of the study

Correlation between BMD (Bone Mineral Density) level and preventive osteoporotic practice among menopausal women attending Orthopaedic OPD at selected hospital in Mangalore with a view to develop an information booklet.

Objectives

1. To assess the BMD level among menopausal women.

2. To assess the preventive osteoporotic practice among menopausal women.

3. To find out the correlation between BMD level and preventive osteoporotic practice among menopausal women.

4. To find the association between BMD level with selected demographic variables.

Protection of human subject

1. Ethical clearance was obtained from Institutional ethics committee after presenting the research proposal.

2. Permission for conducting the study was obtained from concerned authority of NUINS College and Justice K.S. Hegde Charitable Hospital, Mangaluru.

3. Informed consent and subject information sheet was explained and the same was obtained from the subjects prior to the study. Assurance was given regarding confidentiality of personal information and no harm to the participants during the study period.

Research Methodology

Quantitative non-experimental research approach was adopted in the study and the research design was

cross sectional survey. The study was conducted in Orthopaedic OPD at Justice K.S hedge Hospital, Deralakatte. A total of 100 menopausal women who are attending the Orthopaedic OPD and who met the inclusion criteria were selected for the study. The inclusion criteria's were women who have attained menopause and who are both physically and mentally sound. Menopausal women with Gout, bone TB, and rheumatoid arthritis diseases were excluded from the study. The data collection instruments were used for the study was demographic performa, BMD level and preventive osteoporotic practice checklist. The demographic Performa included: age, education, occupation, monthly income, total number of child, religion, source of information, age at menopause. The preventive osteoporotic practice checklist consists of 25 items related to life style practices. Content validity of the tool was done by 8 experts in the field of Obstetrics and gynaecology and the corrections were incorporated in the tool as per the suggestions given by the experts. The data collection instrument on preventive osteoporotic practice checklist was administered to 10 menopausal women to measure the reliability and the internal consistency and the same was measured with Cronbach's Alpha using SPSS statistics and it is found to be reliable with the score of 0.889. The data was collected between 05/09/2018- 28/12/2018 from 100 menopausal women who aged above 50 and attained menopause and the data were entered systematically in the SPSS for data analysis.

Result

The data were analyzed and presented under the following headings.

Section I: Description of demographic characteristics.

Section II: Description of BMD level among menopausal women.

Section III: Description of preventive osteoporotic practice among menopausal women.

Section IV: Correlation between BMD level and preventive osteoporotic practice

Section V: Association between BMD level with selected demographic variables.

Section I: Description of demographic characteristic

The demographic details shows that, majority of the menopausal women (40%) were between the age group of 41-50 years, out of 100 samples 46% menopausal women were having primary education, 47% of the menopausal women were homemaker, 67% were having a monthly income of <10,000, 50% is having 4-6 number of children, In this study out of 100 sample 43% attained menopause at 49 years of age and none of the participants had source of health information regarding osteoporosis.

Section-II: Description of BMD level among menopausal women.

Table 1: Frequency and percentage distribution of subjects according to BMD level n=100

BMD Level	Frequency (f)	Percentage (%)
-1 or above	85	85
-1 to -2.5	10	10
-2.5 or below	5	5

The data in the table 1, shows that out of 100 sample 85% is having a BMD level of -1 or above, 10% having -1 to 2.5 and 5% having -2.5 or below.

Section- III: Description of preventive osteoporotic practice among menopausal women.

Table 2: Frequency and percentage distribution of preventive osteoporotic practice among menopausal women. n=100

Items	Never (0)		Sometimes (1)		Always (2)	
	f	%	f	%	F	%
Consume dairy products such as milk, curd and cheese	9	9.0	56	56.0	35	35.0
Consume sea foods such as sardines and salmon with bones	21	21.0	50	50.0	29	29.0
Consume fatty fish (mackerel or tuna) and egg yolks	28	28.0	55	55.0	17	17.0
Eat fruits like papaya, banana, orange, apple and grapes	5	5.0	53	53.0	42	42.0
Eat green leafy vegetables, cabbage, spinach, beet root and cauliflower	3	3.0	34	34.0	63	63.0
Consume protein rich food like beans, peas, legumes, black gram, dal and chicken liver	15	15.0	57	57.0	28	28.0
Consumption of soft drinks like sprite, pepsi, coca cola and lime soda	25	25.0	41	41.0	34	34.0
Drink coffee	22	22.0	58	58.0	20	20.0
Consume red meat like pork and mutton	37	37.0	57	57.0	6	6.0
Eat nuts like ground nut and almond	41	41.0	40	40.0	19	19.0
Consume cereals like ragi gingelly and whole wheat	19	19.0	53	53.0	28	28.0
Expose to sunlight minimum of 6 minutes/day	30	30.0	30	30.0	40	40.0
Consume canned food, pickle or papad	16	16.0	66	66.0	18	18.0
Consume alcohol	100	100	0	0	0	0
Use smokeless pan	100	100	0	0	0	0
Perform weight bearing exercise such as lifting the objects or stair climbing	14	14.0	69	69.0	17	17.0
Walks for minimum of 20-30 minutes per day	21	21.0	39	39.0	40	40.0
Perform yogic measures like suryanamaskara	74	74.0	23	23.0	3	3.0
Does household activity such as mopping the floor, cleaning and washing clothes	25	25.0	45	45.0	30	30.0
Use of drugs like corticosteroids, chemotherapeutic drugs, anticonvulsants and proton pump inhibitor	4	4.0	96	96.0	0	0
Personal history of medical illness like hyperthyroidism or hypothyroidism	61	61.0	27	27.0	12	12.0
Perform Bone Mineral Density test to assess bone loss	83	83.0	14	14.0	3	03.0
Check the nutritive value of the content in the packed food	66	66.0	23	23.0	11	11.0
Check the serum calcium and vitamin D in the blood as per physicians advice	66	66.0	29	29.0	05	5.0
Consult a health care provider for any falls or aches and pain	12	12.0	58	58.0	30	30.0

The data in the table 2 shows that out of 100 menopausal women, 56% are consuming dairy products sometimes. 29% are consuming sea foods always, 28% are not consuming fatty fish and egg yolks. 53% are taking fruits sometimes, majority 58% are consuming coffee sometime, 28% are consuming cereals always. Majority 69% are performing weight bearing exercise regularly. Out of 100 menopausal women only 3 participants are performing yogic measures very regularly and 11 menopausal women check for the nutritive value of the product before they buy. In the study none of the research participants had a habit of chewing smokeless pan or consuming alcohol.

Section IV: Description of correlation between BMD level and preventive osteoporotic practice among menopausal women. The study findings showed that there is no correlation between the BMD level and preventive osteoporotic practice.

Section- V: Description of association between BMD level with selected demographic variables.

Table 3: Association between BMD level with selected demographic variables

Demographic variables	Chi square	df	P value
Age in years	33.797	1	0.000
Education	12.103	1	0.017
Occupation	12.138	1	0.059
Monthly income	4.478	1	0.345
Total number of children	15.012	1	0.005
Religion	13.863	1	0.008
Age at menopause	19.737	1	0.003
Source of information	33.797	1	0.000

The table 3 shows that the P value of chi square test for association between BMD level with demographic variables such as age ($\chi 2$ =33.797, p= 0.000), total number of children ($\chi 2$ =15.012, p=0.005), age at menopause ($\chi 2$ =19.737, p=0.003), and source of information ($\chi 2$ =33.797, p= 0.000) are at 0.05 level of significance. Hence the research hypotheses interpreted that there is significant association between BMD level with demographic variables like age, total number of children, age at menopause and source of information.

Discussion

Section I: Description of demographic characteristics.

Majority of the menopausal women (40%) were between the age group of 41-50 years, out of 100 samples 46% menopausal women were having primary education, 47% of the menopausal women were homemaker, 67% were having a monthly income of <10,000, 50% is having 4-6 number of children, In this study out of 100 sample 43% attained menopause at 49 years of age and none of the participants had source of health information regarding osteoporosis. The study findings are supported by another study conducted by Seang-Mei Saw et.al, in which the results are showed that, 68.8% women were post-menopausal and none of the participants heard about osteoporosis[11].

Section II: Description of BMD level among menopausal women.

This study shows that out of 100 sample 85 (85%) is having a BMD level of -1 or above, 10 (10%) having -1 to 2.5 and 5 (5%) having -2.5 or below.

Section III: Description of preventive osteoporotic practice among menopausal women

The study shows that out of 100 sample majority of the menopausal women (56%) are consuming dairy products sometimes. The present study was compared

with another study conducted by Roberto HR et.al[12] shows that the risk factors vary from one another: women with low calcium intake (85.7%), lack of exercise (43.7%) and family history of osteoporosis (30.5%) had high incidence. Majority (79.1%) of the females are of the opinion that osteoporosis is not serious but only a proportion (15.2%) of it considers that osteoporosis was more serious than cancer.

Section IV: Description of correlation between BMD level and preventive osteoporotic practice among menopausal women. Comparative studies are not found.

Section V: Association between BMD level with selected demographic variables. No comparative studies are found.

Conclusion

The measures adopted by menopausal women to achieve and sustain an optimum level of bone health vary from individual to individual. The nurse practitioner has a primary responsibility of enhancing the knowledge, positive attitude, good health status among women. Awareness about maintenance of health status and reducing the risk among post-menopausal women can be created and followed by guidance and counseling and even referral services can be provided after screening.

The limitation of the present study was shorter duration period.

Recommendations for future research:

- The study can be replicated in different settings, with different categories of participants
- Interventional study can be conducted in high risk samples with calcium supplements, regular exercise, appropriate dietary pattern and exposure to sunlight.

Acknowledgment: The authors deeply acknowledge the menopausal women for their participation in the study.

Conflict of Interest: Nil

Source of Funding: Self

References

1. Malhotra N, Mithal A. Osteoporosis in Indians. Indian J Med Res. 2008; 127: P. 263-268.
2. Gupta AK, Samuel KC, Kurian PM, Rallan RC. Preliminary study of the incidence and etiology of femoral neck fracture in Indians. Indian Journal of Medical Research 1967; 55: P. 1341-1348.
3. Johnell O, Kanis JA. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. Osteoporos Int. 2006; 17(12): P. 1726-1733.
4. Schwartz AV, Kelsey JL, Maggi S, Tuttleman M, Ho SC, Jonsson PV, et al. International variation in the incidence of hip fractures: Cross-national project on osteoporosis for the World Health Organization Program for Research on Aging. Osteoporos Int. 1999; 9: P.242–253.
5. Mithal A, Dhingra V, Lau E. The Asian Audit: Epidemiology, costs and burden of osteoporosis in Asia. An International Osteoporosis Foundation (IOF) publication. 2009; 3(1): P.73-79.
6. Melton LJ, Chrischilles EA, Cooper C, Lane AW, Riggs BL. Perspective: How many women have osteoporosis? Journal on Bone Miner Res 1999; 7(1): P. 1005-1010.
7. Joshi VR, Mangat G, Balakrishnan C, Mittal G. Osteoporosis approach in Indian scenario. J Assoc Physicians India. 1998; 46: P. 965-967.
8. Afraa TB et al. Osteoporosis: a study of knowledge, attitude and practice among adults in Riyadh, Saudi Arabia. Journal of Community Health. 2013: 38 (6): P. 1098-1105.
9. Malhotra N. Osteoporosis in Indians. Indian Journal of Medical Research 2008; 127(3): P. 263-268.
10. Gupta A. Osteoporosis in India the nutritional hypothesis. National Med J India. 1996; 9: P. 268–274. 13. Rao H, Rao N, Sharma LR. A clinical study of bone mineral density using heel ultra densitometer in Southern Maharashtra. Indian J Orthop. 2003; 37: P. 9-12.
11. Seang-Mei Saw.et.al. Awareness and health beliefs of women towards osteoporosis: Osteoporos International. 2003: 14 (7): P. 595-601.
12. Roberto HR et.al. Osteoporosis related life habits and knowledge about osteoporosis among women in El Salvador: A cross sectional study. BMC musculo-skeletal disorders; 2004. P. 5-29.

Rural Oral Health: Challenges and Pit Falls: Time to Recover And Rebuild the Pathway: A Review Article

Shivanjali Grover[1], Meetika Pahuja[2], Sanchit Pradhan[3], Mohd. Akif, Kanchan Shukla[4]

[1]Associate Professor, [2]Assistant Professor, [3]Assistant Professor, [4]Lecturer. Department of Public Health Dentistry; Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut

Abstract

Health or oral health is right of every individual. Oral Health is basically a complete state of health which is free of all discomforts. A state where eating, smiling and speaking is not hampered by any kind of discomfort or disability.

Rural oral health care faces challenges both ways for dentists as well as for people residing in the particular vicinity. These challenges can be listed as follows: dentist: population Ratio, literacy rate, accessibility, availability, affordability, socio – economic status, malpractice.

There are few common barriers that a dentist faces while thinking of serving at a rural area. They can be summarized as safety, basic amenities, monetary constraints, lack of professional skills, distance and a compromised lifestyle.

Government and various Dental Associations are making repeated efforts to overcome these challenges and pitfalls to uplift the rural oral health care.

***Key Words**: Rural Oral Health, Dentist: Population ratio, accessibility, affordability, challenges*

Introduction

Oral health is right of every individual as good health is right of every individual. Oral health can be defined as "a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infections and sores, periodontal diseases, tooth decay, tooth loss and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial well-being"[1].

According to World Bank every country has a percentage of rural population that is deprived more of oral health services. In India 66% of the population resides in rural parts of the country. There are countries which have a large percentage of rural population like Nepal (80%), Sri-Lanka (82%), Zimbabwe (68%), and many more such countries are there that have a large number of population residing in the remote part of their countries. Such kind of population generally has quacks that provide all sorts of malpractice treatment which are not only threat for oral health care of the patients but they are also threat for the field of dentistry[1].

As per Kimberly K. McFarland et al., approximately 20 percent of the U.S. population lives in rural areas, whereas only 14 percent of the dentists practice in rural locations. 4 percent of small areas and 2 percent is isolated in rural areas that are deprived of all kind of dental services. As per Nastaran Sharifian et al., there is chronic shortage of dentists in rural communities of Canada may affect the quality of care provided to these communities.

Hence this article has been written to focus on the common challenges and pit falls that the population and the dentist face due to which the rural population still is deprived of good oral health care.

Challenges and Pit Falls

Challenges for Establishment of Successful Oral

For Correspondance:
Dr. Shivanjali Grover
Email id: drshivanjali10@gmail.com
Mobile: 9919974709.

Health Care Delivery

1. Dentist: Population Ratio:

There is huge imbalance in the dentist population ratio. This imbalance is not only faced in India but also in various developed countries. As per World Health Organization the idle dentist population ratio is 1:7500 but there are only 93% of the members short of this ratio either the ratio is more or less that the idle ratio. Therefore, it is resulting in Imbalance.

In India the dentist: population ratio is 1:9000 in the urban areas and 1: 200,000 in rural areas. Similarly, dentist: population ratio in U.S. is 1:1000, in U.K. it is 1:2000, in Canada 1:1500, Australia 1: 2573. These are the data for urban population mostly. Repeated studies have shown chronic shortage of dentist in rural areas of almost every country.

2. Literacy rate:

Literacy rate plays an important role in maintaining of oral hygiene. This statement is false and true both ways. In India highest literacy rate is 93.68% and lowest is 63.52% but still the oral health of the population varies from good to very poor. Even the rural population where literacy rate is low there also there are people who have good oral hygiene. Literacy rate of the particular family matters as generally we tend to inculcate habits and routine seeing the family members. A well literate family who has a hygienic lifestyle generally have the trend of good oral hygiene in the complete family.

In India, use of dantoons and various kinds of toothpowders is still prevalent in remote parts of the country. Even after companies like Colgate – Palmolive run oral health month campaign every year in which they distribute toothpaste and toothbrush to population of rural areas of India.

In India there are few barriers which play a significant role in rising of oral health services. They are:

1). Lack of Respect and trust on dentists. The population is rural areas are at times blinded with myths. These myths act as barrier for reaching of right kind of oral health care to the population.

2). Different mindsets: Myths play a very negative role when it comes to providing of dental services in the rural population.

3). Poor listening skills: Reinforcement of things is a kay to successful rural oral health. Repeated awareness programs need to be conducted for implementation of successful oral health services.

4). Knowledge deficits

5). Lack of alignment around goals

6). Internal Competitiveness

7). Information Hoarding

3. Accessibility and Availability

Accessibility of services for upliftment of oral health at rural areas is a real challenge. With increase in number of dentists yearly the congestion of clinics is more in urban areas as compared to rural areas. Even the government has started taking initiative to place dentists in primary health centers with the aim to uplift the oral health of the rural population. Accessibility and availability are inter-related. With 313 dental colleges across India availability of dentists have become little easier. On a positive every dental college has mandatory Department of Public Health Dentistry which works with the motive to uplift rural oral health mostly.

4. Affordability

Dental services that are provided to population has a range of fees for all kinds of treatment available. When deciding on the fees for dental services with the aim to treat rural population one thing should always be kept in mind to work with aim of no profit. At a less or a nominal fee the treatments can be provided very much.

The government also should launch health schemes that include coverage for oral health services as well.

5. Malpractice

It is one of the challenges which is on rise extremely. Every rural locality has some quack present who is providing malpractice and the treatment provided are so reasonable that the population in mass is blinded with the treatment irrespective of whether it would really cure the problem or aggravate the problem. Such kind of malpractice is a big threat. This threat is not only in India abut across the world.

Challenges for the Dentists:

There are certain challenges that a dentist has to face when planning for a rural setup.

1. Safety:

We are well aware about the attacks happened at doctors by patients or their relatives while treatment of the patients. Such incidences have questioned the safety issue of the dentists. A fear or threat to life in rural areas is prevalent. Lack of awareness is the basic problem that is faced. Repeated Awareness programs for the masses is one solution to this challenge.

2. Basic Amenities.:

It is a well-known fact that rural areas are deprived of basic amenities like electricity, water, etc. But as of now the government has worked immensely on such issues therefore making it little easier. But schools and education system in rural localities is still quite compromised. Any dentist who plans to setup a clinic is rural areas always has a hesitation as compared to setting up clinic in urban areas.

3. Monetary constraints:

As the population in rural areas are employed in a basic manner where their income is very nominal, so affording dental treatment is a big challenge for them as well. The income at rural setup is challenging. Where patients in urban areas are ready to pay fees for the treatment modalities rural population is still on the back foot for it. Therefore, monetary constraint is always a challenge too.

4. Lack of professional skills:

Rural dentistry demands only basic oral health care treatments. Specialization work in rural population is a rare. Public Health Dentists are trained during the post-graduation period in the similar manner so that they can serve the rural population efficiently.

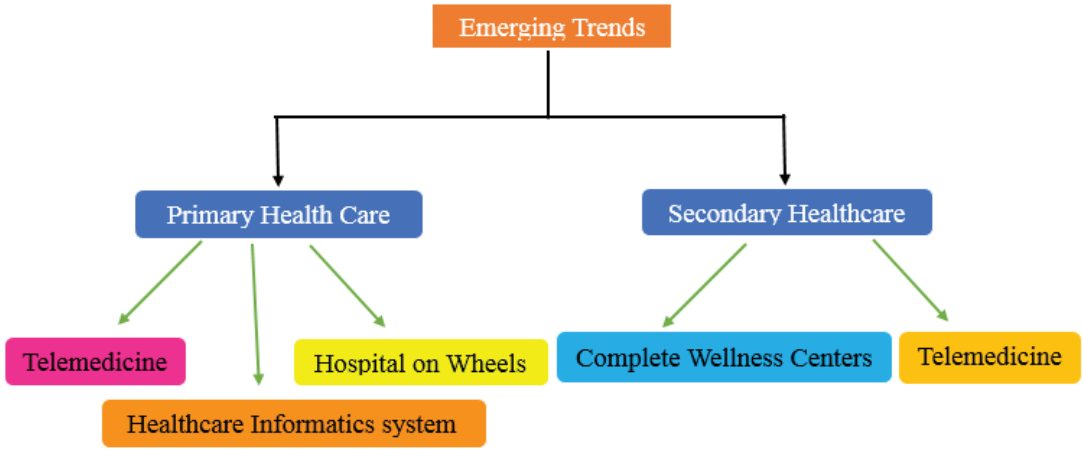
5. Distance and Compromised lifestyle:

It is another one big challenge for any dentist who plans to setup to serve in rural area. As the rural areas are at a respectable distance from the cities therefore the lifestyle is also compromised. But on the other side with number of dental colleges in the country this challenge has also come to some ease for people. As most of the dental colleges are located at a place that surrounds number of villages and are at the outskirts of the city, making it easier for the population of rural areas easier to access dental services.

Role of Government and Different Dental Associations for Upliftment of Rural Oral Health

Government is presently actively working in the field of rural areas for strengthening of health services as well as oral health services at primary and secondary health care level.

The emerging trends in India in field of health services is changing. Earlier the trend was strengthening of tertiary level health care but now with the changing concept the trend has shifted to strengthening of primary and secondary level health care.



Ayushmann Bharat.

Some of the initiatives taken by the Health ministry and Government of India are Ayushmann Bharat Scheme. The Scheme was started by our Hon' Prime Minister on 23rd September 2019 with a goal for universal healthcare for all. This goal was initially the aim of World Health Organization. The scheme has been formulated completely on Public private partnership model[3].

This scheme is specially formulated for the upliftment of rural health sector. The main motive of the scheme is to convert all the primary health center to complete wellness centers. It is an overall national health protection mission.

National Oral Health Programme

The vision of this program is networking for optimal oral health of the nation that contributes to lead healthy and satisfying life. To develop the standard of health, free from diseases, which enables a person to eat, speak, socialize and carry out the activities of daily living without pain, discomfort or embarrassment and contribute to general well – being.

There are various programmes/ initiatives that have been started under this programme which are basically designed to uplift overall oral health for all.

1. Tobacco cessation Initiative.
2. Child Dental Care
3. Oral Cancer Foundation
4. Healing Smile Foundation
5. National Oral Cancer Registry
6. National School Oral Health Programme
7. Swwach Mukh Abhiyan

Role of Public Health Dentist.

Public Health Dentistry is branch of dentistry that trains the person to work not only in rural areas but also evaluate and plan schemes to uplift the oral health of the population in mass. In a similar term it is population-based dentistry.

In India there are 313 dental colleges across the country. These dental colleges have a mandatory Public Health Dentistry Department. This department of every institute works to uplift the rural oral health for the population around the institute. They evaluate and plan schemes to benefit the population with the oral health services in a very cost – effective way.

Conclusion

Health is necessary for all similarly oral health is also part of general health. Maintaining oral health is as mandatory as maintaining of health. With a mass population residing in rural parts of country creating awareness and planning schemes to uplift the rural is one of the missions of Government as well as dental associations[4,5].

Awareness programmes along with outreach activities time to time need to be planned to make the mass aware and reinforce the importance of oral health. Strengthening of primary and secondary level health care on the model of public private partnership is the only key to achieve success completely in the mission.

Conflict of Interest: Nil

Funding: Self-Funded

Ethical Clearance: Ethical Clearance from the Ethical committee of Swami Vivekanand Subharti University taken.

References

1. Ajay Narayan, Suraj J Thomas, Augustine Daniel, Sabba Fatima. An Overveiw of Oral Health in India: Current Scenario and challenges. International Journal of Oral Care and Research. October – December 2016; 4(4): 280 – 283.
2. Om Prakash Kharbanda and Kunaal Dhingra. Oral Health inequality in India: Perspectives and solutions. Nature India Special Issue. March 2017.
3. Kimberly K. McFarland, John W. Reinhardt, Muhammad Yaseen. Rural Dentists: Does growing up in a small community matters?. Journal of American Dental Association. September 2012; 143 (9): 1013-1019.
4. Coruh Turkshel Dulgergil and Hakan Colak. Rural Dentistry: Is it an imagination or obligation in community dental health education? Niger Medical Journal. January – March 2012; 53 (1); 1- 8.
5. Nasataran Sharifian, Christophe Bedos, John Wootton, Issam J el-Murr, Anne Charbonneau,

Elham Emami. Dental Students perspectives on rural dental practice: a qualitative study. Journal of Canadian Dental Association. December 2015; 81.

6. Balaji Subramoniam Muthiah and Vijay P Mathur. Dental Practice, education and researcher in India. Nature India Special Issue. March 2017.
7. Ramandeep Singh Gambhir, Amanpreet Kaur, Arshdeep Singh, Anmol Rattan Singh Sandhu, Angad Prakash Singh Dhaliwal. Journal of Family Medicine and Primary Care. October – December 2016; 5(4); 747 – 751.
8. Viswas Chaityana Chandu, Srinivas Pachava, Viswanath V. Strategies for improving accessibility to oral health care services in rural India: An insight. International Journal of oral Health and Medical Research. July – August 2017;4(2): 44-46.

Marathi Translation, Cross-cultural Adaptation, Reliability and Validity of Motion Sickness Susceptibility Questionnaire-Short form

Rasika Panse[1], Tushar Palekar[2], Ujwal Yeole[3], Kartikee Patange[4], Saloni Gundecha[5]

[1]Assistant Professor, Department of Physiotherapy,Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India,
[2]Professor and Principal Dr D.Y Patil College of Physiotherapy, Pimpri Pune Maharashtra, India,
[3]Associate Professor, [4]Intern, [5]Student BPT, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India

Abstract

Background: Marathi is the fourth most common spoken language in India. English serves as a barrier to the population of the state where Marathi is the prime language. A Marathi version of the Motion sickness susceptibility questionnaire would provide Maharashtrian community Children and adults would be provided opportunity to communicate more effectively with their therapist. Hence, there is the need to translate the MSSQ short form into Marathi for the ease of its use. Motion sickness is a feeling of unwellness and introduces a significant safety risk. Motion sickness is nausea caused by motion, especially when travelling in a vehicle. Other symptoms include vomiting, headaches, sweating, increased salivation, drowsiness dizziness and warmth/flushing. Motion sickness susceptibility questionnaire Short form can be used for paediatric population. Validity of MSSQ Short form is better than other motion sickness scale hence Cross Cultural Adaptation and translating the scale was done for the better understanding in paediatric population. **Methodology:** The main version of the MSSQ short form was translated into the Marathi language. The translation and cultural adaptation Guidelines given by WHO were as follows , Forward translation, expert panel back-translation, pre-testing and cognitive interviewing, and final version. The Final agreed Marathi version was administered to 50 patients. **Results:** After an exact translation process, the Marathi version MSSQ short form was found to exhibit face validity. The reliability was tested by measuring internal consistency and test-retest method. The Cronbach's alpha for MSSQ = 0.94 with 95% confidence interval. Correlation between MSSQ-M on day 1 and day 15 were highly significant. The interclass coefficient was 0.8 with 95% confidence interval. **Conclusion:** The Marathi, non-English version MSSQ-short form is reliable and valid.

Keywords: *MSSQ short form, Translation, Marathi version, Motion sickness, Reliability , Validity, Children.*

Introduction

Motion sickness is a unpleasant feeling of unwellness exhibiting varied signs and symptoms[1] . Motion sickness is physiological state that can be defined along four dimensions: gastrointestinal, central, peripheral, and sopite. Broadly the symptoms are nausea caused by motion, especially when travelling in a vehicle. Gastrointestinal symptoms include queasiness, disorientation, vomiting, and stomach discomfort. Central symptoms include feeling faint-like, dizzy, lightheaded, and a sensation of spinning ,also exhibit pallor. Peripheral symptoms include feeling clammy, sweaty, and hot/warm. Sopite related symptoms include feeling annoyed, drowsy, fatigued, and uneasy.(2)

Motion sickness occurs when spatial orientation- in which direction the body is pointed, in which direction it is moving, and about which axes it is rotating- is disrupted. Motion is sensed by the brain through 3 pathways of the nervous system, (1) the inner ear(sensing motion, acceleration, and gravity), (2) the eyes(vision), and (3) the deeper tissues of the body surface(proprioceptors). Feedback from the muscles and joint sensory receptors can also be important. A second explanation is the postural instability theory and the importance of the

vestibular system in maintaining a stable posture and minimizing swaying.[3]

Motion sickness susceptibility is important for research related to motion sickness for two reasons. Firstly, repeating and understanding research results depends upon who the subjects were, and some means to identify the susceptibility of those serving as subjects is therefore important. Second, there is often a desire to screen out subjects who are particularly susceptible because getting people sick is sometimes a consequence to be avoided. The original standard questionnaire for this is Reason and Brand (1975) Motion Sickness Susceptibility Questionnaire (MSSQ). Golding (1998) describes research to improve that standard questionnaire, but only found moderate correlations between MSSQ scores with sickness tolerance to laboratory motion devices (r=0.45). Golding (2006) examined individual differences using a short version of the Motion Sickness Susceptibility. The short form was developed by removing items with low sickness prevalence such as wide screen movies and virtual reality. It was found to be a reliable and valid alternative to the long form.[2] Motion sickness susceptibility questionnaire (MSSQ) predict individual differences in motion sickness caused by a variety of stimuli. [4]

India is diverse nation with varying cultures and languages. Marathi is the language that is spoken widely along the western coastal region in the state of Maharashtra. However, English serves as a barrier in the state where Marathi is the prime language.[5] Hence, the MSSQ short form needs to be translated into Marathi for the ease of its use.

The translation and cultural adaptation of instruments is an internationally recognized and valid method. The process involves translation of instrument from one language to another, synthesis, back translation, expert committee review to finalise the pilot testing, pretesting, feedback, and psychometric evaluation.[5]

Therefore, the present study had two objectives. In the first phase, cultural adaptation and translation of the MSSQ short form into Marathi were performed. In the second phase, preliminary assessment of the reliability was conducted for the final version of the MSSQ short form Marathi (MSSQ-M) in patients with Motion Sickness.

Materials and Method

After seeking permission from the Institutional Research Review Committee, the study was conducted in two phases.

Phase 1 involved translating the original MSSQ into Marathi using forward-backward translation process given by WHO.

Stage I: Initial translation- The first stage in adaptation is the forward translation. Two forward translations were made from the original language (English) to the target language (Marathi). In this way, the translation was compared for discrepancies. It is necessary for the bilingual translators to have the target language as their mother tongue. Discrepancies was then discussed and resolved with unbiased bilingual translator who was not involved in previous translation.

Stage II: Backward translation- Totally blind to the original version, a translator then translated the MSSQ short form of Marathi back into the original language (English). This is a process of validity checking to make sure that the translated version is reflecting the same item content as the original versions.

Stage III: Expert Committee Review- The composition of this committee is crucial to achievement of cross-cultural equivalence. The committee consisted of translators and two senior physiotherapists. Committee reviewed all the translation and reached a consensus on discrepancies. This formed the prefinal version.

Stage IV: Preliminary Pilot Testing- A group of 10 students with Motion sickness were selected for pretesting the prefinal version. These students spoke and understood both English and Marathi language equally well. Each of them were given the translated MSSQ-M and MSSQ English. They were also asked for their general comments on the questionnaire.

Phase 2 consisted of testing the reliability of the MSSQ-M.

A study population of 30 participants, age group between 7-12 years, with motion sickness participated in the study. Patients not experiencing motion sickness and not willing to participate were excluded. To assess the test-retest reliability MSSQ-M was administered twice, the repeat administration being after 2 weeks in order to minimize the clinical and cognitive changes.

OUTCOME MEASURE

Motion sickness susceptibility questionnaire-short form

STATISTICAL ANALYSIS

Test-retest reliability was tested in a test-retest design and was evaluated using the intra-class correlation coefficient (ICC). The ICC was interpreted as follows: <0.40,poor reliability; 0.40-0.75,moderate reliability; 0.75-0.90, substantial reliability; and >0.90, excellent reliability. The internal consistency was evaluated by cronbach's α coefficient, which is considered statistically significant when between 0.70 and 0.95.

Results

The study included a total of 30 participants with 13 boys and 17 girls with a mean age of 10.3 years (SD=±1.39). MSSQ was successfully translated in Marathi version using forward-backward translation. It took 30 days to complete a culturally adapted version. At the end of the pilot study, results showed that the patients understood the meaning of all questions properly. After an exact translation process, the Marathi version MSSQ short form was found to exhibit face validity.

The reliability was tested by measuring internal consistency and test-retest method. The Cronbach's alpha for MSSQ = 0.94 with 95% confidence interval. Correlation between MSSQ-M on day 1 and day 15 were highly significant. The intraclass coefficient was 0.8 with 95% confidence interval.

Discussion

This is the first study to translate, culturally adapt, and validate the MSSQ for Marathi speaking patients with motion sickness. The translation and cross-cultural adaptation of the MSSQ-M was successfully carried out by the guidelines given by WHO. The pilot testing showed us that all the translated questions were properly understood without any difficulties. Hence, it was finalized without the need for any modifications.

MSSQ-M was further administered on 30 participants to assess the reliability of the questionnaire. A good internal consistency (0.94) was found for MSSQ-M which is consistent with other reports. Our findings are in line with the Thai (MSSQ-T 0.80). MSSQ-M demonstrated good test-retest reliability when the instrument was administered to participants 2 weeks apart. The ICC scores fell within the substantial reliability range of 0.75-0.90. Test-retest reliability was found to be (r=o.9) that indicates it is highly significant correlation between results of MSSQ obtained on day 1 and day 15.

The limitation of the study was that it being a cross-sectional study and no physical assessment tests were included.

Conclusion

This study showed that the MSSQ-M is cross-culturally adapted and is reliable questionnaire. This newly formulated questionnaire can be used to determine the motion sickness susceptibility in paediatric population. It is easy to administer and can be recommended for use in routine clinical practice in Marathi-speaking population.

Conflict of Interest : Nil

Source of Funding: Self

Ethical Clearance: Institutional Research Review Committee of Department of Physiotherapy , Tilak Maharashtra Vidyapeeth, Pune.

References

1. Asawavichienjinda T, Patarapak S. Reliability of the Thai Version of the Motion Sickness Susceptibility Questionnaire Short-Form. Aerospace medicine and human performance. 2019 Jan 1; 90(1):26-31.
2. Gianaros PJ, Muth ER, Mordkoff JT, Levine ME, Stern RM. A questionnaire for the assessment of the multiple dimensions of motion sickness. Aviation, space, and environmental medicine. 2001 Feb;72(2):115.
3. Paul Green. Motion Sickness and concerns for self-driving Vehicles: A literature Review. June 2016.
4. John F. Golding. Predicitng individual differences in motion sickness susceptibility by questionnaire. Personality and Individual differences.Volume 41, issue 2, July 2006.
5. Vrushali P. Panhale, Reshma S. Gurav, Kartiki Suradkar. Translation and Validation of Marathi version of fear-avoidance and belief questionnaire in patients with chronic low back pain. January 23, 2019.

Effectiveness of Mobilization with Movement in weight bearing position on pain, shoulder range of motion and function in patients with shoulder dysfunction

Reshma Subhash[1], Meena Makhija[2]

[1]Physiotherapist, Max hospital, Gurgaon, Haryana, India,
[2]Assistant Professor, ISIC Institute of Rehabilitation Sciences, New Delhi, India

Abstract

The purpose of the study was to investigate the effectiveness of mulligan mobilization with movement in weight bearing position on pain, shoulder range of motion and function in patients with shoulder dysfunction. The study was conducted on 32 patients of age between 18-50 years, who are diagnosed with shoulder dysfunction and follow the inclusion and exclusion criteria. Subjects were randomly allocated to two groups. The control group (n=16) received stretching, strengthening and shoulder active range of motion exercises with hot pack. The experimental group (n=16) received the same with an additional mulligan's mobilization with movement in weight bearing. Clinical outcome measures were pain intensity on numeric pain rating scale, pain free shoulder range of motion in flexion, abduction, internal rotation and external rotation as measured with a goniometer and disability of the shoulder with the help of shoulder pain and disability index. Data was collected at baseline and after 2 weeks of intervention in both groups. The results revealed that there was a statistically significant improvement in pain scores and flexion range of motion of shoulder in the experimental group when compared with control group, however no significant change was observed in disability and other ranges measured.

Key words: *Mobilization with movement, Shoulder dysfunction, Mulligan's mobilization, Shoulder pain*

Introduction

Shoulder dysfunction is the second most common health problem affecting approximately 16%-20% of the population [1]. It is characterized by restrictions in activities of daily living due to pain and limitation of range of motion (ROM) of the shoulder [2]. It includes various causes such as tendinopathy, bursitis, rotator cuff tears, adhesive capsulitis, shoulder impingement, glenohumeral osteoarthritis and trauma from injury.

Alterations in scapular position and motion occur in 68% to 100% of patients with shoulder injuries[3]. The scapular position have a mechanical effect on acromio and sternoclavicular joints[4]. The reductions in scapular upward rotation and posterior tilt during arm elevation could reduce the available sub acromial space, thus contributing to the development or progression of impingement[5]

Conservative treatment recommends physical therapy which includes electrotherapy, exercises and mobilization techniques. Amongst a well-known technique is mobilization with movement [MWM] developed by Brian Mulligan that is based on analysis and correction of minor positional faults at a joint. These faults are recorded in painful shoulder in various kinetic studies.[6–9].

There is a dearth in trials supporting or disapproving the use of mulligan's MWM in shoulder dysfunction. The MWM in weight bearing position of the shoulder girdle involving correction of scapulothoracic positional faults is a novel technique and its effectiveness is relatively unexplored in shoulder dysfunction patients. Weight bearing can have additional proprioceptive benefits

Corresponding author:
Meena Makhija
Indian Spinal Injuries Centre – Institute of Rehabilitation Sciences Vasant Kunj, New Delhi India, Phone: +91-9910011816
Email- makhijameena81@gmail.com

on clinical measures. Hence, the aim of the study is to evaluate the effectiveness of MWM in weight bearing position on shoulder pain, ROM, and function.

Material and Method

After approval from the research review committee and the institutional ethical committee of Indian Spinal Injury Centre, New Delhi, and a sample of 33 patients were screened for inclusion and exclusion criteria. Inclusion criteria for the study were Age: 18-50 years, Gender: Male & Female, Sub-acute shoulder pain (2-12 weeks), Patient diagnosed with shoulder dysfunction (shoulder impingement, AC joint lesion, Rotator cuff tendinopathy, sub acromial bursitis). Exclusion criteria involved subjects diagnosed with complete rotator cuff tears, adhesive capsulitis, shoulder pain of cervical origin[1], traumatic onset of shoulder pain, previous shoulder or cervical spine surgery, systemic illness[11], subjects contraindicated for Mulligan mobilization, patients unable to do weight bearing in all fours position.

GROUP A (Experimental group)

Patient is on all fours (lion position). The therapist stands on the painful side and places one hand beneath and over the clavicle, the thenar and hypothenar eminences lie along the lateral border of the scapula. A sponge may be used under the hand on the clavicle for patient comfort. Pull the scapula caudally, externally rotate it, move it medially towards thoracic spine and proximate the hands. Patient now rocks back slowly towards heels causing shoulder to flex. (Fig 1)[5]

The aim is to flex the arm with no pain. When movement without pain is achieved repetitions are done. Three sets of ten is the usual prescription. Patients were also given 10 minutes of hot pack and conventional physiotherapy treatment as described below.

GROUP B (Control group)

It included active assisted range of motion using a cane, pendulum exercises, corner push up and cross body adduction, Strengthening exercises consisting of internal and external rotation with 1 kg weight in side lying, active pain free range of motion in scaption, chair press, push-ups plus and upright rows[13].

Fig1

Mulligans MWM in weight bearing position

Statistical Analysis

The statistical package of social science (SPSS) of window version 20 was used for data analysis. Between group analysis was done by using independent t-test for outcome measures of pain (NPRS), range of motion and disability (SPADI). Within analysis was done by using paired t-test. The probability level of 0.05 was selected as the criteria for the level of significance in all test. Value of confidence interval was set at 95%.

Results

The mean Age±SD was 30.87± 9.373 years for group A and 32.37±9.743 for group B. On comparing the mean age of two groups, independent t-test revealed no significant difference (p=0.830) between the groups. Comparing the mean BMI of two groups, independent t-test revealed no significant difference (p=0.202) between the groups.More

The results revealed significant difference between the groups using independent t test for range of motion for flexion (p=0.045) and NPRS for pain (p=0.012) at 0.05 level (Table 1). Within group analysis revealed significant difference with all outcome variables except

external rotation (p=0.060) in group A and group B (p=0.158

Table 1 Baseline measurement between Group A and Group B

Outcome	Group A (Mean+ SD)	Group B (Mean+ SD)	t-value	Sig(P value)
NPRS	5.33± 0.724	5.69± 0.479	-1.617	0.117NS
Flexion	134.80±17.387	135.25± 14.540	-0.78	0.938 NS
Abduction	130.40±16.783	137.44±15.874	-1.200	0.240 NS
IR	74±11.570	73.63±10.905	0.093	0.927 NS
ER	82.40± 14.252	87.13±4.731	-1.256	0.219 NS
SPADI	41.27± 10.110	40.31±4.143	0.348	0.730 NS

Table 2 Between group analysis of outcome measures.

Outcome measure	Group A (Mean+ SD)	Group B (Mean+ SD)	t-value	Sig (P value)
NPRS	2.67±1.047	3.69±1.078	-2.677	0.012*
Flexion	156.40±11.153	147.75±11.857	2.093	0.045*
Abduction	152.27±13.562	146.81±13.318	1.129	0.268
Internal rotation	81.47±10.315	78.75±8.363	0.802	0.429
External rotation	84.07±12.719	88.25±3.624	-1.228	0.237
SPADI	26.27±10.074	27.50±6.272	-0.406	0.688

*Indicates significant difference at the 0.05 level

Discussion

The aim of the present study was to find out the effectiveness of mobilization with movement in weight bearing in conjunction with conventional physiotherapy treatment .It has been seen that for pain in between group analysis there was a significant difference between group A and group B.

Our result is supported by Kachingwe et al[14] whose result suggested that MWM group showed the highest percentage of change in decreasing pain and improving function from pre- to post-treatment. This may be attributed to the fact that the MWM technique is designed specifically for decreasing shoulder pain during active shoulder motion, and the amount of manual force applied is dependent on the ability of the technique to decrease pain with active movement. MWM has the additional benefit of being performed throughout AROM, which may engage additional proprioceptive tissues, such as the Golgi tendon organs activated by tendon stretch.

Satpute et al[11] suggested that MWM evokes a non-opioid descending pain inhibitory system(non–endorphin based) inducing mechanical hypoalgesia. The mechanical stimulus provided by MWM may

trigger central nervous system descending pain inhibitory system's causing hypoalgesia. Mobilization with movement also potentially modulates mechanical local hyperalgesia, which results from the sensitized peripheral nociceptors within the area of dysfunction. The improvement in pain in Group B can be attributed to hypoalgesic effect of exercise

For range of motion- statistically significant improvement in flexion shoulder range of motion when Group A and Group B were compared. The shoulder range of motion of flexion, abduction, increased by 22^0 and 22^0 respectively after MWM application in group A and 12^0 and 9^0 in group B.

The potential reason for more improvement in Group A as compared to Group 2 can be attributed to Mulligan Mobilization which was not given to Group 2. The improvement in mulligan group might be attributed to positional fault concept of mulligan. According to this concept, a minor positional fault of the joint may occur following any pathology, an injury or strain which ultimately leads to altered joint kinematics. Altered joint kinematics in shoulder dysfunction have been previously recorded by various studies.[3,5]

These positional faults affects the joint kinematics which contributes to reduced ROM. Mulligan mobilization aims to correct this minor positional fault and hence improves the range of motion.

Our result are in sync with Teys et al who found significant improvement in range of motion score after 3 sessions. However in our study we gave 6 sessions spread over 2 weeks time. Their study didn't take shoulder disability as an outcome measure which we assessed. The result of this study is similar to previous studies on effectiveness of Mulligan's MWM on various shoulder conditions in non weight bearing position.

For Function - No significant difference in disability can be due to shorter intervention time however within group analysis showed that there was significant improvement in disability of shoulder when pre and post intervention scores were compared. Reduction in pain, improved ROM, and changes in muscle function may be responsible for the improvement we found in shoulder pain and function which was measured with the SPADI questionnaire. This was supported by Satpute et al. who found improvement in shoulder pain and function measured with SPADI.

Improvements in pain, ROM, and disability over the intervention period in both groups may be explained to some degree due to natural resolution and/or,exercise/hot packs. One potential mechanism for this improvement may be that exercise improves joint function by improving muscle strength and control of the scapular and glenohumeral joint stabilizers as well as improving extensibility of shortened ligamentous and capsular tissues.

Our study had the following limitations of non-differentiation of primary and secondary impingement and shorter intervention on small sample size. Future studies can be done keeping in mind the above limitations.

These results provide evidence to support the clinical notion that when the positional faults are corrected shoulder pain, range of motion and function are improved.

Conclusion

MWM in weight bearing position is a useful manual therapy technique to be considered for subjects with shoulder dysfunction.

Acknowledgement: The author likes to thank the subjects for their consent and valuable contribution to this research.

Source of Funding- No outside funding or grants were received that assisted in this study.

Conflict of Interest - Nil

References

1. Brudvig TJ, Kulkarni H, Shah S. The Effect of Therapeutic Exercise and Mobilization on Patients With Shoulder Dysfunction: A Systematic Review With Meta-analysis. Journal of Orthopaedic & Sports Physical Therapy. 2011;41(10):734–48.
2. Lin JJ, Hanten WP, Olson SL, Roddey TS, Soto-quijano DA, Lim HK, Sherwood AM. Functional activity characteristics of individuals with shoulder dysfunctions. Journal of Electromyography and Kinesiology. 2005 Dec 1;15(6):576-86.
3. Surenkok O, Aytar A, Baltaci G. Acute Effects of Scapular Mobilization in Shoulder Dysfunction: A Double-Blind Randomized Placebo-Controlled Trial. Journal of Sport Rehabilitation. 2009;18(4):493–501.

4. Kibler W Ben, McMullen J. Scapular dyskinesis and its relation to shoulder pain. Vol. 11, The Journal of the American Academy of Orthopaedic Surgeons. 2003. p. 142–51.
5. Mulligan BR. Manual therapy ''NAGS'',''SNAGS'',''MWM'S'' etc,6th ed. Wellington: Plane View Services Ltd; 1999.
6. Ludewig PM, Reynolds JF. The Association of Scapular Kinematics and Glenohumeral Joint Pathologies. Journal of Orthopaedic & Sports Physical Therapy. 2009;39(2):90–104.
7. Romero CL, Lacomba MT, Montoro YC, Merino DP, Costa SPD, Marchante MJV, et al. Mobilization With Movement for Shoulder Dysfunction in Older Adults: A Pilot Trial. Journal of Chiropractic Medicine. 2015;14(4):249–58.
8. Pribicevic M, Pollard H, Bonello R, Luca KD. A Systematic Review of Manipulative Therapy for the Treatment of Shoulder Pain. Journal of Manipulative and Physiological Therapeutics. 2010;33(9):679–89.
9. Noten S, Meeus M, Stassijns G, Van Glabbeek F, Verborgt O, Struyf F. Efficacy of different types of mobilization techniques in patients with primary adhesive capsulitis of the shoulder: a systematic review. Archives of physical medicine and rehabilitation. 2016 May 1;97(5):815-25.
10. Djordjevic OC, Vukicevic D, Katunac L, Jovic S. Mobilization with movement and kinesiotaping compared with a supervised exercise program for painful shoulder: results of a clinical trial. Journal of manipulative and physiological therapeutics. 2012 Jul 1;35(6):454-63.
11. Satpute KH, Bhandari P, Hall T. Efficacy of hand behind back mobilization with movement for acute shoulder pain and movement impairment: a randomized controlled trial. Journal of manipulative and physiological therapeutics. 2015 Jun 1;38(5):324-34.
13. Kuhn JE. Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol. Journal of shoulder and elbow surgery. 2009 Jan 1;18(1):138-60.
14. Kachingwe AF, Phillips B, Sletten E, Plunkett SW. Comparison of manual therapy techniqueswith therapeutic exercise in the treatment of shoulder impingement: a randomized controlled pilot clinical trial. Journal of manual & manipulative therapy. 2008 Oct 1;16(4):238-47.

Effect of Stability Trainer Exercises with Mirror Feedback on Balance and Level of Physical Activity in Community Dwelling Elderly

Rima Musale[1], Ujwal Yeole[2], Ankit Shinde[3], Venkatesh Mane[3]

[1]Associate Professor, [2]Associate Professor and Principal, [3]Student, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune.

Abstract

Background: Balance is always dependent on feedforward and feedback mechanism which can be classified as intrinsic and extrinsic factors; with advancing age individuals will become more independent on external factors. Stability trainer with mirror feedback will give sensory as well as visual feedback to train balance in elderly. **Objectives:** To study the effect of stability trainer exercise with mirror feedback on Dynamic balance using (FRT) & (TUG), functional balance task using (BBS); and on level of physical activity using (PASE). **Method:** Our study was conducted amongst 60 subjects who were selected as per the inclusion and exclusion criteria. Subjects were divided into 2 groups namely experimental (Group A) and control (Group B) consisting of 30 individuals in each group. Demographic data including name, age, gender were noted. The participants of Group A and B were assessed before and after treatment. Dynamic balance was assessed using (FRT) & (TUG), functional balance task was assessed using (BBS); and on level of physical activity was assessed using (PASE). Data was collected & statistically analysed. **Results:** Data was statistically analyzed using Man-Whitney's test for among the groups. On comparing TUG mean values of group A=3.8secand group B=1.8sec with p value <0.0001 which is found to be significant. On comparing FRT mean values of group A=6.37and group B=2.47 with p value <0.0001 which is found to be significant. On comparing BBS mean scores of group A=31.93and group B=40.63 with p value <0.0001 which is found to be significant. On comparing PASE mean values of group A=39.43and group B=42.27 with p value=0.0014 which is found to be significant. **Conclusion:** The study concluded that stability trainer exercises with mirror feedback is extremely effective for balance training and improving level of physical activity in community dwelling elderly.

Keywords: *Balance, stability trainer, mirror feedback, TUG, BBS, FRT, PASE*

Introduction

Aging is referred as gradual dimination in physiological capacity of various systems with increasing age related balance issues have to be focused and treated mainly in community dwelling elderly in order to improve their level of physical activity to reduce fear of fall. Balance is always dependent on feedforward and feedback mechanism which can be classified as intrinsic and extrinsic factors with advancing age individuals will become more dependent on feedback from external environment than body because of declining function of the body.Stability trainer are nothing but foam pads which are oval shaped which provide sensory feedback that challenges proprioceptive system and mirror feedback will give sensory feedback which is important for balance training.[1]

A predictable, progressive, universal deterioration is found in various physiological systems, mental and physical, behavioural and biomedical system. In India, individuals above 60 years of age are called as aged/ elderly. [2]There has been a sharp increase in the number of elderly individuals between the year span of 1991 and

Corresponding Author:
Dr Rima Musale
Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Gultekdi, Pune 37 Mobile No. 9960842001, Email id: drrimamusale@gmail.com

2001 and it has been projected that by the year 2050, the number of elderly people would have risen upto 324 million. India has thus been acquired the label of "an ageing nation" with 7.7% of its population being more than 60 years of age. [2]

Balance is defined as the ability to maintain an upright posture during static and dynamic tasks which requires complex interactions between peripheral and central factors such as vision, somato-sensation, vestibular sensation, motor output, and musculature.[3] Balancing is an interplay and integration of contributions from vision, vestibular sense working in conjunction with the cerebellum, proprioception, muscle strength and reaction time.[4]

This proportion of the population faces numerous problems owing to the social and cultural changes that are taking place within the society. The health of the elderly with multiple medical and psychological problems is considered to be the major area of concern. Balance is referred to be one of the major problems in the elderly and are considered one of the "Geriatric Giants". Balance is an important cause of morbidity and mortality in the elderly and are a marker of poor physical and cognitive status. Following are the physiological changes according to the age. [5-8]

Dynamic balance indicates the ability to control posture during active motion; i.e., keeping the center of pressure (COP) of the body mass within the allowable area of the base of support. In controlling dynamic balance, anticipatory postural adjustments are required. Anticipatory adjustments of the posture prepare a person's balance prior to or parallel to postural disturbance induced by any subsequent voluntary motion which follows. Thus, it is important to note that dynamic balance depends on an anticipatory feed-forward adjustment of the posture.[9-11] When the COP deviates beyond the allowable area in standing balance, the postural response of the whole body is elicited to return the COP to within the controllable area of the base of support.[12,13] When this postural response does not function adequately, falling is inevitable. The postural response is therefore the final response acting to prevent falls.

Method

A experimental study was conducted on 60 elderly population with age group 65-84 years. The participants were selected according to the inclusion criteria exclusion criteria. Inclusion criteria were elders between age group of 65-84 years, both male and female population were included in the study, participants willing to participate. Exclusion criteria were Patients who had undergone any recent spine and lower limb surgeries, Patients having any neurological defect, Patients having cognitive dysfunction, Patients who are using assistive device. The participants are divided into 2 groups namely Group A (Experimental Group) and Group B (Control group) by randomised sampling each group having 30 elderly. The aim, objectives and method of study is explained to the participants. Consent is taken on the consent form.

Procedure

Permission was taken from the institutional ethical committee of Tilak Maharashtra Vidyapeeth, Department of Physiotherapy, Pune. Different centres were approached and permission will be obtained prior to the study. Explanation of the experiment was explained to the patient. Patients willing to give consent to participate in the study was included. A pilot study was conducted and the errors were resolved with approval of the guide. Subjects were interviewed for their demographic history and instructions were given to them. Pre-treatment dynamic balance was assessed by using (FRT) & (TUG) scale, functional balance task was assessed by using (BBS) scale; and level of physical activity was assessed by using (PASE).Group A was taken on stability trainer and following balance exercises were given for 20 min for a period of 4 weeks for 3 times per week:-

1) Stand on the stability trainer and raise both the heels and hold for 20 sec and release it repeating for 5 times.

2) One leg standing holding for 20 sec and release it, repeating it for 5 times. Same should be done with the other leg.

3) Single leg standing with the same sided upper limb giving reach out for 30 sec followed by other upper limb and repeating it twice.

4) March for 2 min

5) Stand on the stability trainer holding a stick performing side rotations for 2 min.

Group B (Control group) was given conventional balance exercises.

The treatment plan was given 3 times a week for

consecutive 4 weeks. Post-treatment dynamic balance was assessed by using (FRT) & (TUG) scale, balance task was assessed by using (BBS) scale and level of physical activity was checked by using PASE.

Data was collected and statistical analysis will be done.

Materials used in the procedure were demographic data sheet, consent form, stability trainer, inch tape, stopwatch, chair, pen and paper.

Statistics

The analysed data showed that it was not a normal distribution using Stability trainer exercises, hence Non parametric Man-Whitney's test was performed to analyse the data among the groups.

Results

The present study was done on 60 elderly population which were divided into 2 groups i.e Group A which was an Experimental group containing treatment by Stability trainer and Group B which was Control group containing conventional exercises.

Table no. 1: Comparison of FRT between Group A and Group B

FRT	Group A	Group B	P value
Mean	6.37	2.47	<0.0001

Interpretation: Above table shows a comparison of mean of FRT values of group A & group B; with (p value=<0.0001), extremely significant.

Table no. 2: Comparison of TUG between Group A and Group B

TUG	Group A	Group B	p value
Mean	3.8	1.87	<0.0001

Interpretation: Above table shows a comparison of mean of TUG values of group A & group B; with (p value=<0.0001), extremely significant.

Table no. 3: Comparison of BBS between Group A & Group B

BBS	Group A	Group B	P value
Mean	31.93	40.63	<0.0001

Interpretation: Above table shows a comparison of mean of BBS values of group A & group B; with (p value=<0.0001), extremely significant.

Table 4:- Comparison of PASE between Group A & Group B

PASE	Group A	Group B	P value
Mean	39.43	42.27	0.0014

Interpretation: Above table shows a comparison of mean of PASE values of group A & group B; with (p value=0.0014), extremely significant.

Discussion

The present study was done to find out the effects of stability trainer exercises with mirror feedback on balance and level of physical activity in community dwelling elderly of age group 65-84 years. Pre-treatment dynamic balance was assessed by using (FRT) & (TUG) scale, functional balance task was assessed by using (BBS) scale; and level of physical activity was assessed by using (PASE).

In this study the outcome measures used are TUG(validity=0.75; reliability=0.99), FRT(validity=0.71; reliability=0.89), BBS(validity=0.96; reliability=0.98) and PASE(validity=0.48; reliability=0.75). In the present study subjects were divided into 2 groups Group A & Group B. Group A was given stability trainer exercises as an intervention for 20 min for a period of 4 weeks for 3 times per week and Group B was given conventional exercises for a period of 4 weeks. Post-treatment dynamic balance was assessed by using (FRT) & (TUG) scale, functional balance task was assessed by using (BBS) scale; and level of physical activity was assessed by using (PASE). Data was collected and statistical analysis was done. Our study noted that patients who were been given treatment using stability trainer exercises with mirror feedback had a great improvement in their balance as compared to the ones treated conventionally.

There was a study done by Chavan U et.al (2017) on Effect of Stability Trainer Exercise Program on Balance in Geriatric Population to study the effect of stability trainer exercise program on Static balance, Dynamic balance, Static functional and Balance confidence concluded that Stability trainer exercise program (STEP) is extremely effective for balance training and improving the quality of life in the elderly.

In our study, there was a significant difference in the mean TUG before and after administration of stability trainer exercises indicated by p value (p value<0.0001) which is extremely significant.Inputs to the internal and external environment play an important role in reducing the response of the body to any stimulus. With the increasing age our body becomes more dependent on the feedback from external environment rather than internal environment which in deed results in reduction of body's internal functions. The exercises included in the stability trainer exercise program had a very good effect on the proprioception, lower limb muscle strength and vestibular system which helps our body to work on our internal functions. The feedback from internal environment starts redeveloping which increases body function because of which our body responses in a right way to any stimulus. This would help the elderly to balance themselves which could be seen as improvement in reducing the risk of fall in elderly assessed by Timed Up and Go scale.[14]

There was a significant difference in the mean FRT before and after administration of stability trainer exercises indicated by p value (p value<0.0001) which is extremely significant. As per the age our tensile structures i.e our muscles loose their flexibility. With the stability trainer exercises, the muscle strength increases and hence the flexibility of the muscle increases which could be possibly seen in the increased FRT ranges.[14,15]

There was a significant difference in the mean BBS before and after administration of stability trainer exercises indicated by p value (p value<0.0001) which is extremely significant.The stability trainer exercises helps in the development of the vestibular system. The vestibular system helps the body to recognize its position by the sensory feedback mechanism. The increasing sensory feedback would result in improved balance which is proved by the improvement in the Berg Balance Score.[14,15]

There was a significant difference in the mean PASE before and after administration of stability trainer exercises indicated by p value (p value=0.0014) which is extremely significant.With the increasing age response of our body towards any stimulus reduces. Due to which the body becomes incapable of any movements which in return reduces the activities. As the stability trainer exercises are given it works on balance and stability, the body becomes stable and could balance. Once our body's internal functions are improved and maintains his balance, the activities of their life improves. The effectiveness in performing in their activities increases which could be seen in the improvement of PASE score. [14]

The significant improvements in the exercise adherers indicate that the program was of an appropriate nature, the stimulus sufficiently intensive, and the program of adequate duration to produce considerable improvements in stability in the intervention group. The exercisers showed continued improvement in both stability tests throughout the study year, which indicates that long-term exercise trials (of the frequency and intensity of the present study) are necessary to assess the maximal beneficial effect exercise can have in improving dynamic stability and related measures in older people. Balance control is a complex process, with inputs and control is from a diverse array of sensory and motor systems.

Balance is always dependent on feedforward and feedback mechanism which can be classified as intrinsic and extrinsic factors; with advancing age individuals will become more independent on external factors. Stability trainer with mirror feedback will give sensory as well as visual feedback to train balance in elderly.

A study conducted by Sukwon Kim etal concluded that fear of falling and social activity levels are associated with each other. Improving physical activity can act as an effective measure to improve quality of life.

Conclusion

The study concluded that the stability trainer exercises with mirror feedback is extremely effective for balance training and improving level of physical activity.

Funding: Self

Conflict of Interest: Nil

References

1. Multani NK, Verma SK. Principles of geriatric physiotherapy. JAYPEE BROTHERS PUBLISHERS; 2008.
2. Rand D, Miller WC, Yiu J, Eng JJ. Interventions for addressing low balance confidence in older adults: a systematic review and meta-analysis. Age and ageing. 2011 May 1;40(3):297-306.
3. Khanna T, Singh S. Effect of Gaze Stability Exercises on Balance in Elderly. IOSR Journal of Dental and Mdical Sciences. 2014;12(9):41-8.
4. Sogebi OA, Ariba AJ, Otulana TO, Osalusi BS. Vestibular disorders in elderly patients: characteristics, causes and consequences. The Pan African Medical Journal. 2014;19.
5. Bishop MD, Patterson TS, Romero S, Light KE. Improved fall-related efficacy in older adults related to changes in dynamic gait ability. Physical therapy. 2010 Nov 1;90(11):1598-606.
6. Lindemann U, Rupp K, Muche R, Nikolaus T, Becker C. Improving balance by improving motor skills. Zeitschrift für Gerontologie und Geriatrie. 2004 Feb 1;37(1):20-6.
7. Beebe JA, Hines RW, McDaniel LT, Shelden BL. An isokinetic training program for reducing falls in a community-dwelling older adult: a case report. Journal of geriatric physical therapy. 2013 Jul 1;36(3):146-53.
8. Chou CH, Hwang CL, Wu YT. Effect of exercise on physical function, daily living activities, and quality of life in the frail older adults: a meta-analysis. Archives of physical medicine and rehabilitation. 2012 Feb 1;93(2):237-44.
9. Cordo PJ, Nashner LM. Properties of postural adjustments associated with rapid arm movements. Journal of neurophysiology. 1982 Feb 1;47(2):287-302.
10. Crenna P, Frigo C. A motor programme for the initiation of forward-oriented movements in humans. The Journal of physiology. 1991 Jun 1;437(1):635-53.
11. Bouisset S, Richardson J, Zattara M. Do anticipatory postural adjustments occurring in different segments of the postural chain follow the same organisational rule for different task movement velocities, independently of the inertial load value?. Experimental brain research. 2000 May 1;132(1):79-86.
12. Nashner L. The organization of rapid postural adjustments of standing humans: an experimental-conceptual model. Posture and movement. 1979:243-57.
13. Horak FB, Nashner LM. Central programming of postural movements: adaptation to altered support-surface configurations. Journal of neurophysiology. 1986 Jun 1;55(6):1369-81.
14. Chavan U, Sheikh A. Effect of Stability Trainer Exercise Program on Balance in Geriatric Population. J Community Med Health Educ. 2017;7(578):2.
15. Rogers ME, Rogers NL, Takeshima N, Islam MM. Methods to assess and improve the physical parameters associated with fall risk in older adults. Preventive medicine. 2003 Mar 1;36(3):255-64.

Effectivnesss of Physiotherapy Interventions on Stress Urinary Incontinence in Female Dancers

Rima Musale[1], Ujwal Yeole[2], Mansi Jain[3], Swarada Mahatre[3], Chinmoyee Panigrahy[4]

[1]Associate Professor, [2]Principal, [3]Student, [4]Assistant Professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune

Abstract

Background: Dancing involves high as well as moderate impact activities, interplay between aesthetic and physical demands which collectively increases intra-abdominal pressure responsible for stress urinary incontinence in female dancers. Practicing Kegel's and Behavioural Intervention therapy can minimize severity of problem. **Objectives:** To find out effectiveness of Kegel's exercises, Behavioural intervention therapy and combination of both on stress urinary incontinence in female dancers using IIQ and Pad test **Methodology:** Permission was taken from institutional ethical committee. 90 female dancers were assessed using QUID and dancers having stress urinary incontinence aged 18-25 years; practicing since 5 years were selected. Pre intervention evaluation was followed by Kegel's exercise for Group A, behavioral intervention therapy for Group B and combination of Kegel's exercise along with behavioral intervention therapy for Group C. Post intervention assessment was carried out. **Results:** Data was statistically analyzed using Wilcoxon test for within the groups and among the groups by using Kruskal-wallis test. IIQ for group A pre-intervention mean was 5.5± 1.45 and post intervention mean was 4.7±1.04 with $p < 0.00048$, For group B pre-intervention mean was 5.8 ± 1.27 and post 5.1± 1.27 with $p<0.003$ and For group C pre-intervention mean was 5.9±1.18 and post intervention mean was 4.4±0.85 with $p<0.0001$ which is very significant, while comparing group A B and C IIQ post values $p<0.08812$ which is not significant. Pad test for group A pre-intervention mean7.3±1.78 was and post intervention mean was 6.4±1.4 with $p<0.0001$, For group B pre-intervention mean was7.5±1.48 and post intervention mean was 6.7±1.44 with $p<0.0001$, For group C pre-intervention mean was7.8±1.47 and post intervention mean was 6.2±1.21with $p<0.0001$ which is significant while comparing group A B and C Pad test post values $p<0.08812$ which is not significant. **Conclusion:** Our study concludes the effectiveness of various Physiotherapy interventions within the groups and all interventions being equally effective.

Keywords: *(Stress urinary incontinence, Female dancers, Kegel's exercises, Behavioural Intervention therapy, IIQ, Pad test.*)

Introduction

Urinary incontinence is defined as an involuntary loss of urine which is objectively a demonstrable, social and hygienic problem. There are mainly three types of urinary incontinence stress, urge and mixed[1].

Stress Urinary incontinence is a condition in which there is involuntary loss of urine, when the pressure in the abdomen increases, as in coughing and jumping. Urinary incontinence is the complex coordination of bladder, urethra, Pelvic floor muscle exercise and supporting ligaments. With increased abdominal pressures, the Pelvic floor muscle exercise contraction causes a pull on the anterior vagina wall toward the pubic symphysis, leading to the occlusion of the urethra which prevent urine leakage. This mechanism is disturbed during physical exercises, when there is a variation in the intra-abdominal pressure[2].

Different Studies have shown a relationship between Stress Urinary incontinence symptoms and the performance of high-impact physical activities.

Corresponding Author
Dr Rima Musale
Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Gultekdi, Pune 37, Mob.: 9960842001
Email id: drrimamusale@gmail.com

There have been a large number of surveys done where questionnaires are the primary tool for evaluating the presence of incontinence[3].

Urinary stress incontinence is a serious medical condition that it can lead to urinary tract infections, pressure ulcers, perineal rash or any social problem creating embarrassment and negative self-perception. Urinary stress incontinence reduce both social interactions and physical activities and it is also associated with poor self-related problems[4].

It is important to have concern about Urinary incontinence in female dancers, as there are various dance forms like western (hip-hop, ballet, contemporary, etc.) as well as classical (Kathak, Bharatanatyam,) which involve moderate to high impact activities as well as steady postures required for long period of the time. To stabilize different postures while dancing it involves both the activation of abdominal pressure and pelvic floor muscles, which give rise to increase in intra-abdominal pressure and due to practicing dance over long time of period there might be increase in the flexibility of lower extremity which may be the another cause for urinary incontinence[2].

Dancers have to perform moderate as well as high impact activities in the form of dance. Strengthening of pelvic floor muscle can minimize the severity of stress urinary incontinence in high impact activities.

Kegel's exercises were first descried by Dr Arnold Kegel in 1948 to prevent urinary incontinence especially in postpartum female, and these exercises we can consider as one of the safest without any side effects and complications. The teaching of PFM contractions is the most difficult task because muscles aren't directly visible, requires a high level of skill particularly in communication. Visualization: A large diagram of the pelvis, pelvic organs, PFM. Throughout the teaching sessions the language and employing words must be chosen specifically i.e stopping of urine. Kegel's can be performed in any position, but the initial position is sitting on a hard chair leaning forward with support from the forearms on thighs, with the knees apart. This is the ideal position for teaching PFM contraction as it provides sensory stimulation feedback[5]. Kegel's exercises needs more of accuracy and understanding of muscles need to be contracted; avoiding unwanted contractions of gluteal muscles, lower abdominals. Pelvic floor muscle exercise is that a strong and fast contractions which clamp the urethra and increases the urethral pressure and the abdominal pressure[6].

Different behavioral interventions are mentioned to overcome from stress incontinence. Behavioral interventions are a group of treatments that improve urinary symptoms by altering bladder habits and teaching new skills. They have been used to improve incontinence and other lower urinary tract symptoms in women of all ages. Behavioural intervention therapy include patient education, bladder training, voiding schedules, fluid management etc. Patient education plays important role, includes an explanation of anatomy and physiology of continence and Pelvic floor muscles orientation Bladder training was originally developed for treatment of urgency incontinence. The reason behind giving bladder training is that frequent voiding can reduce bladder over activity which ultimately cause bladder overactivity[7]. The goal of bladder training is to reduce voiding frequency, increase bladder capacity. Changes in fluid intake with proper knowledge is beneficial for e.g. avoiding excess of consumption of fluid (>2100 ml/day), reducing fluid intake will help with sudden fullness of bladder[8]. Caffeine is also one of the bladder irritant for many women. Studies has shown that caffeine increases detrusor pressure and is a risk factor for detrusor overactivity[9].caffeine should be reduced gradually and caffeinated beverages should be replaced with decaffeinated one. Obesity is one of the risk factor for developing stress incontinence, weight control is must[10]. Behavioural intervention therapy contains group of treatments to improve stress urinary incontinence and very few studies are available.

In this study, we aimed to find out effect of Physiotherapy interventions (Kegel's exercise, behavioural intervention therapy and combination of both Kegel's and both behavioural intervention therapy) on stress urinary incontinence in female dancers.

Method

Ethical clearance was taken from institutional ethical committee. 90 female dancers practicing any dance form were selected from different dance institutes with convenient sampling method. Subjects were assessed using QUID to find out type of urinary incontinence[11], those who has only stress urinary incontinence, aged 18-25 years, nulliparous female dancers practicing since 5 years were assessed using IIQ[12] and Pad test[13] before giving physiotherapy interventions. Pre- intervention

evaluation was followed by implementation of exercise program in the term of Kegel's exercises for group A. Behavioural intervention therapy for group B and combination of Kegel's along with bit for group c for period of 6 weeks. Post intervention assessment was done

Exercise program:

Kegel's exercise (Pelvic floor contractions):

Starting position: sitting on a hard surface

Hold for 7 seconds, Relaxation for 1 second and repetitions 15-20

3 times a week for 6 weeks

Behavioural Intervention therapy:-

Stress Urinary incontinence education:

Going to the bathroom to urinate every 2 to 3 hours, daily fluid intakes, pelvic muscle exercises, and medications.

Bladder training:

Requires a fixed voiding schedule, whether or not you feel the urge to urinate. Empty your bladder as soon as you get up in the morning. Go the bathroom at the specific times. At night, go to the bathroom only if you awaken and find it necessary.

Lifestyle modification:

It includes fluid management, reducing caffeine, Bladder irritants, and weight control

Stress management:

Relaxation techniques, meditation, exercise regularly.

Kegel's exercises and Behavioural Intervention therapy: Combination of the treatments are given.

Statistics

The analysed data showed that it was not a normal distribution using Shapiro -Wilk test, hence Non parametric Wilcoxon signed-rank test was performed to analyse the data within the groups. Non parametric Kruskal-Wallis test was performed to analyse the data among the groups.

Results

Incontinence Impact Questionnaire

	Group A	**Group B**	**Group C**
Pre	5.5±1.45	5.8±1.27	5.9±1.18
Post	4.7±1.04	5.1±1.27	4.4±0.85
p Value	< 0.00048	<0.0003	< 0.00001
p Value	<0.08812 (comparison between the groups A, B and C)		

Interpretation: Table showing within the group comparisons and between the group comparisons within confidence interval of 95%, showing difference within the groups (group A p< 0.00048, group B p<0.0003 group C p< .00001) is significant and between the groups is not significant (p>0.08812)

Pad Test

	Group A	**Group B**	**Group C**
Pre	7.3±1.78	7.5±1.48	7.8±1.47
Post	6.4±1.4	6.7±1.44	6.2±1.21
p Value	< 0.00001	< 0.00001	< 0.00001
p Value	<0.49493(comparison between the groups A, B and C)		

Interpretation: Table showing within the group comparisons and between the group comparisons within confidence interval of 95%, showing difference within the groups (group A p<0.00001, group B p<0.00001 group C p<0.00001) is significant and between the groups is not significant (p<0.49493)

Discussion

The present study was conducted to find out effectiveness different physiotherapy interventions like effect of Kegel's exercises, effect of Behavioural intervention therapy and combined effect of Kegel's exercises and Behavioural intervention therapy on stress urinary incontinence in nulliparous female dancers; practicing since 5 years within the age group of 18-25 years.

Dance is an art where human movements are strictly selected in particular sequence, which is based on aesthetic and symbolic value. There are different types of dance forms in the world and established by different places and culture. In India according to states different dance forms are known like Bharatnatyam, Kathak, Kuchipudi, Manipuri and more and western dance forms are hip hop, locking and popping, salsa, ballet etc. health issues in dancers should be more focused as most dancers begin training at young age which will be giving more impact in future health, however there is increase in physical demands in dance which can lead to health issues[14]. Dance practice with specific training regimen can develop specific flexibility characteristics. Koutedakis et al. underwent study on the dancer as a performing athlete, suggested that dancers also have specific conditions like disordered eating, osteoporosis, amenorrhea and urinary incontinence[15].

In the present study, incidence of stress urinary incontinence is more in female dancers in between 5-12 years of dance training period which might be due to more years of practicing causes overuse of PFM while maintaining long standing postures; and practicing moderate to high impact activities for a prolonged period of time. The interplay of aesthetic demands and physical demands in dance; along with strict selection of dance practice and physical demands develops flexible characteristics compared with athletes. H H Thyssen underwent study on Urinary Incontinence in Elite female athletes and dancers, which demonstrated 50% elite athletes and professional ballet dancers have experienced urine loss.[16]

In this study, the outcome measures used are QUID (validity: 80%, reliability: ≥0.70%) IIQ (validity: 0.58 reliability0.84) Pad test (Sensitivity: 34-83%, Specificity: 65-89%). The Questionnaire for urinary incontinence diagnosis (QUID) is a self-administered 6- item scale which is designed to differentiate between Stress Urinary Incontinence and Urge Urinary Incontinence. Incontinence impact questionnaire (IIQ-7) is 7 – item scale to assess the impact of urinary incontinence on activities and emotions, which cover 4 domains: physical activity, social relationships, travel and emotional health. Pad test is a non-invasive method of detecting and quantifying severity of urine leakage, 1- hour pad test is used in this study. In present study subjects are divided into three groups; named Group A, Group B and Group C. This study examined the three forms of intervention in female dancers with stress urinary incontinence. Group A was given Kegel's exercise as an intervention for 6 weeks with specifications such as contraction for 6-7 seconds and relaxation 1 sec hold, 15-20 repetitions, 3 times a day for thrice a week for 20 to 30 minutes. Group B was given Behavioural intervention therapy which included urinary incontinence education proper counselling, bladder training, lifestyle modification, stress management and Group C was given both Kegel's

and Behavioural intervention therapy.

Kegel's exercises are nothing but pelvic floor muscle contractions; in which subject should contract her pelvic floor muscle without contracting gluteal region, abdominal muscles and back muscles. It treats stress urinary incontinence by strengthening PFM and improving elasticity. In our study group A Kegel's exercise intervention of variable IIQ ($p<0.00048$) and pad test ($p<0.00001$) shows there is significant difference between pre and post treatment. Theory behind Kegel's exercise is that a strong and fast contractions will help to clamp the urethra, which causes increase in urethral pressure during an abrupt increase in abdominal pressure. De-Lancey has suggested that; Pelvic floor muscle exercise contractions can cause urethra to get pressed against pubic symphysis, producing a mechanical pressure[6]. James R Balmforth et al. underwent study on A prospective observational trial of pelvic floor muscle training for female stress urinary incontinence suggested that PFM strengthening leads to hypertrophy of muscle fibres, an enhanced cortical awareness of muscle groups, strengthening of connective tissue in the muscles and more effective recruitment of active motor neurons[17].

In our study, group B Behavioural intervention therapy intervention of variable IIQ ($p<0.0003$) and pad test ($p< 0.00001$) shows there is significant difference between pre and post treatment. Behavioural intervention therapy are group of treatments that improve urinary incontinence by changing the patient's daily habits and helps to focus on improving bladder control by modifying voiding habits. Behavioural intervention therapy is group treatment which reduced overall mental stress and helped to improve quality of life. A study conducted by Diane Borello stated that Behavioural intervention therapy for Stress Urinary incontinence can help women beneficially[18].

Possible reasons behind effectiveness of combination therapy can be practice of Kegel's exercises i.e. strengthening of pelvic floor muscles but also behavioural intervention therapy working on behaviour, and faulty habits of the subjects. Group C combination of both interventions of variable IIQ ($p<0 .00001$) and pad test ($p<0 .00001$) shows there is significant difference between pre and post treatment. These both interventions are recommended as first line treatments for stress urinary incontinence. The combination of both the treatment shows that the treatment is effective in reducing incontinent episodes. Although the combination therapy group showed greater improvement after 6 weeks, no significant difference were observed between the groups.

While comparing all the groups with the variables of IIQ ($p<0.08812$) and Pad test ($p<0.49493$) which didn't show significant difference.

Our study shows that effect of physiotherapy interventions like effect of Kegel's exercises and Behavioural intervention therapy and combined effect of Kegel's exercises with Behavioural intervention therapy shows significant results within the groups. It is remarkable that each treatment is effective and beneficial but the study does not address which treatment is more effective.

Conclusion

Our study concludes the effectiveness of various Physiotherapy interventions within the groups and all interventions being equally effective.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Abrams P, Cardozo l, fall M, et al. Standardization Sub-committee of the International Continence Society: report from Sub-committee of the International Continence Society. Neurourol Urodyn, 2002, 21: 167-178
2. Arati Mahisale et al. Screening of urinary incontinence in female dancers- A cross sectional study, 2018; Vol 11(1): 31-35,
3. Victor W. Nitti et al. The prevalence of urinary incontinence, 2001, 3 (sup 1) : S2-S6
4. Wyman Jf, Harkins SW et al. Psychosocial impact of urinary incontinenece in the community dwelling population, 1990; 38:282-288
5. Jill Mantal, et al. physiotherapy in obstetrics and gynaecology second edition 2004, 11:369-370
6. De-Lancey et al. Anatomy and mechanics of structures around vesicle neck; how vesicle neck position height affects its closure, Neurourol Urody, 1988; 3:161-162.
7. Frewen WK. Role of bladder training in the treatment of unstable bladder in female. Urology Clin of N Am 1979; 6: 273-7.

8. Swithinbank L, Hahim H, Abrams P, et al. The effect of fluid intake on urinary symptoms in women. Journal of Urology 2005; 174:187-189.
9. Jura YH TM, Curhan GC, Resnick NM, Grodstein F et al. Caffeine intake and risk of stress, urgency and mixed urinary incontinence. Journal of Urology 2013; 185:1775-80.
10. Kathryn L.Burgio, Lifestyle and Behavioral therapies for Urinary incontinence. Global library of Womens medicine 2014
11. Catherrine S Bradley et al. A new Questionnaire for Urinary Incontinence Diagnosis in women : development and testing, 2004;192:66-73
12. Mariee Andree Harvey et al.The Incontinence Impact questionnaire and the Urogenital distress inventory: A revisit of their validity in women without a urodynamic diagnosis, Am J obstet Gynaecol 2001; 185:25-31
13. Jan krhut et al. Pad weight testing in the evaluation of urinary incontinence, 2014 ,33:507-510
14. Cesar A. Hincapie, Morton EJ,Cassidy JD, et al. Musculoskeletal injuries and pain in dancers: A systemic review 2008; 89: 1819-29
15. Koutedakis et al. underwent study on the dancer as a performing athlete, sports medicine, 2004; 34: 651-661
16. H H Thyssen, study on Urinary incontinence in elite female athletes and dancers, Vol 13, 15-17 2002
17. James R Balmforth, Jill Mantle, John Bdmead, et al. A prospective observational trial of pelvic floor muscle training for female stress urinary incontinence, 2006, B J U International; 98: 811-877.
18. Diane Borello-France, Kathryn L et al, Adherence to behavioural Interventions for stress incontinence - rates, barriers and predictors2013; 93: 757-773.

A Study on Students Performance Based On Their Learning Approaches in Cadaveric Dissection

Sangeetha Arumugam[1], Nandha Kumar Subbiah[2]

[1]Associate Professor, Department of Anatomy, Katuri Medical College and Hospital, Guntur, Andhra Pradesh, India, [2]Assistant Professor, Department of Anatomy, All India Institute of Medical, Sciences, Mangalagiri, Andhra Pradesh,India

Abstract

Introduction: Introduction of competency based integrated syllabus has led to decrease in dissection lab hours. This limitations has induced students to learn gross anatomy from alternative methods other than the traditional dissection. Any approach should yield good results to students. Aim of this survey is to compare the performance of medical students with their anatomy learning style in dissection lab hours.

Method: A cross sectional study was conducted among 120 students belonging to first professional year of Katuri Medical college and Hospital, India. After completion of limb region, theory and Practical test was conducted as part of assessment. Test scores of each student was noted.50% marks in each test was considered as pass. After the test, students were interviewed about their method of learning style which they followed in dissection lab. Responses were noted. Descriptive statistics such as percentages was used to summarise data.

Results: The study revealed that 75 students (62.5%) chose prosection, 20 (16.7) chose dissection,and the remaining 25(20.8%) students chose prosection followed by dissection approach. Pass percentage of Students who chose prosection was 86.7%, 80% by students who chose both approaches and least 50% by dissection approach.

Conclusion: Prosection approach has overall benefits in terms of gaining anatomical knowledge, stimulating self-directed learning, enhance group activity and finally better performance in examination.

Key words: *Gross anatomy education, cadaveric dissection, prosection, dissection laboratory, theory and practical examination*

Introduction

Anatomy is one of the basic science subjects and the corner stone of Medicine. It is a challenging subject due to its subdivisions and holds a major share among other subjects in the first professional year. Most often students have difficulty in learning anatomy due to its volume and usage of newer terminologies. The best method for learning anatomy is always a debatable topic till date [1,2,3]. In the year 2003, Brenner et al [2] categorized approaches to learn anatomy into (i) dissection by students, (ii) inspection of prosected specimens, (iii) didactic teaching, (iv)use of models, (v) computer-based learning (CBL) and (vi) teaching of living and radiological anatomy.

Anatomy teachers emphasize the importance of learning anatomy by dissection [4]. Alternatively, prosection based pedagogical approach is gaining popularity due to drastic reduction in cadaver-based anatomy teaching. This is supported by reports of Lockwood and Roberts[5] and Drake et al[6]. Implementation of any newer pedagogical approach should benefit the students in gaining knowledge and better results in examination. Various authors [6,7, 8] have done multiple studies regarding anatomy curriculum framework, type of pedagogical approaches to learn anatomy. Any newer approach should be considered based on the availability of cadavers, trained faculties and for the benefit of students in their examination.

With introduction of competency based integrated curriculum in Indian medical colleges, there is a significant decrease in the dissection contact hours. Every student gets to learn from cadaver specimens for only 6-8 hours per week in comparison to 10-12 hours earlier. We opine that the time spent in anatomy laboratory is extremely valuable and used wisely. With this scenario, the present study was conducted over a period of three months to obtain students feedback on the type of pedagogical approach they chose to learn anatomy in dissection laboratory and correlate the same with their performance in the exam.

Materials and Method

After obtaining Ethical clearance from the Institute Ethics Committee, a cross-sectional study was conducted among first year Medical students in the Department of Anatomy, KMCH, Andhra Pradesh, India. The study period extended from September 2019 to November 2019. A total of 120 students were included in the study. Written consents were obtained from the participants.

Gross Anatomy syllabus is divided into different regions of human body. To begin with upper limb and lower limb is taught followed by other regions of the body. Each region is taught first by large class room didactic lecture. This is followed by cadaveric dissection/ prosection sessions in the in laboratory. On an average, 6-8 hours per week is devoted for dissection practical. Following completion of each region, student learning is assessed by written theory and practical gross spotter examination. Theory examination comprises of modified essay, short notes and brief questions. Practical exam is conducted using cadaver specimens. The students are asked to spot the flagged structure and answer relevant questions regarding function /branches /or applied aspect of the same. For both theory and practical examination, 50% aggregate in each is considered as pass. Marks obtained by each student in both theory and practical examination is recorded.

Following completion of examination, 120 students were recruited for the present study. The purpose of the study was explained to them and were ensured that their names and responses would be kept confidential and used for research purposes only. They were asked to respond by choosing any one of the following learning styles which they adopted during the practical classes and include comments if any. Learning style 1-Dissection, Learning style 2-Prosection and Learning style 3-Both Dissection and Prosection. They were strictly told not to give multiple options. Their responses were calculated as percentage and their comments were taken into consideration for correlation. Descriptive analysis was made between the test scores and the response given by each student regarding their choice of learning.

Results

The responses given by each student was entered into Microsoft excel sheet and the percentage was calculated. Out of 120 students, 20 students (16.6%) opted for Dissection, 75 students (62.5%) for prosection and the remaining students 25(20.3) % for both as shown in Table 1, Figure 1. Responses of each student were compared with their theory and Practical marks. Among 20 students who opted for dissection, 40% (n=8) students scored ≥ 50% and the remaining 60% (n=12) students scored below 50 %. Out of 75 students who opted for prosection, 86.7% (n=65) scored ≥ 50% and the remaining 13.3% (10) scored < 50%. 80% (n=20) of students who chose both dissection and prosection scored ≥ 50% and the remaining 20% (5) students below 50% as shown in Table 2 and Figure 2.

Table 1: Percentage Distributions of Students' preferred Learning Method.

Learning Methods	Number of Students Responses(n=120)	Percentage (%)
Dissection only	20	16.6%
Prosection only	75	62.5%
Both Dissection and Prosection	25	20.8%

Table 2: Distribution of Students'Test scores according to their Preferred Learning Method

Learning Methods	**Number of Students Responses(n=120)**	**Students with Test score ≥ 50%**	**Students with Test score < 50%**
Dissection only	20	40% (8)	60% (12)
Prosection only	75	86.7% (65)	13.3%(10)
Both Dissection and Prosection	25	80% (20)	20%(5)

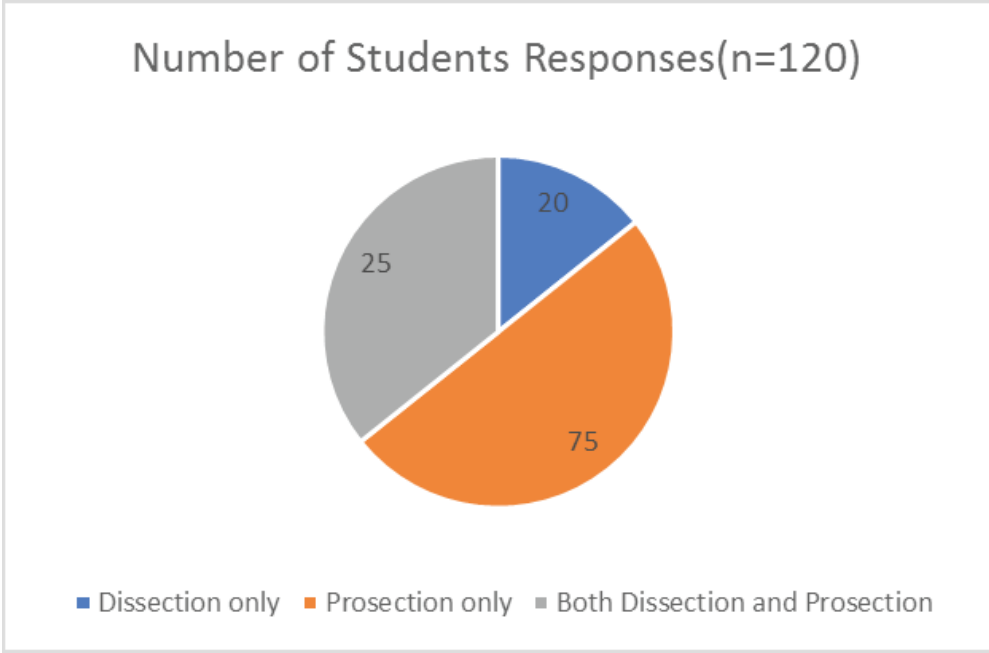


Figure 1: Showing number of students and their choice of learning Style/Approaches

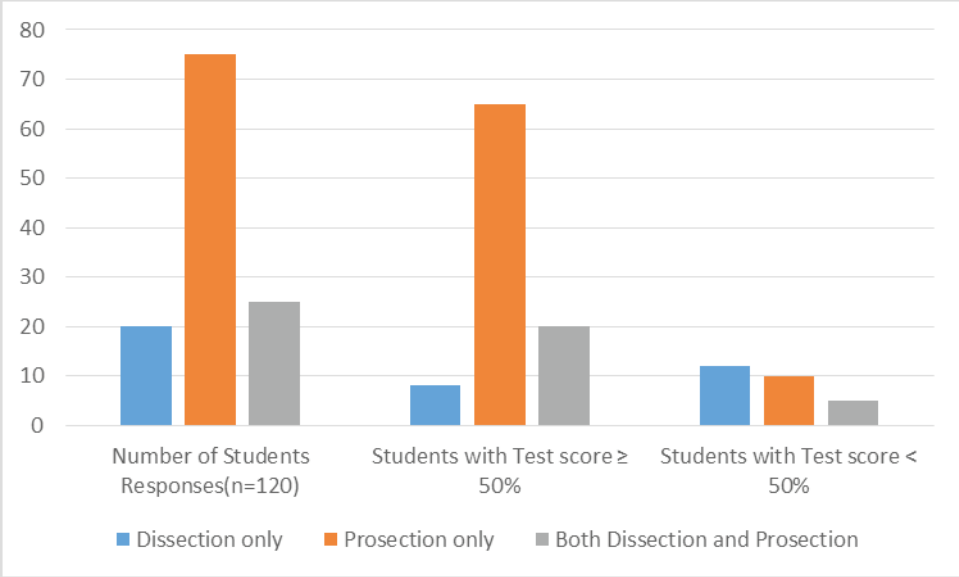


Figure 2: Showing comparison of test scores with learning styles/approaches

Discussion

Cadaveric dissection is considered to be the traditional and best method of learning gross anatomy in lab. Routine cadaveric dissection by students arouses their interest to explore and identify the structures, provide a feeling of surprise at the identification of anatomical variations [9,10]. It also facilitates them to acquire skills which is later useful for holding instruments necessary in clinical practice [11,12]. However, there are contrast opinions and views on whether cadaver dissection is still appropriate for today's undergraduate training. It has drawbacks with regard to availability of trained anatomy faculty, adequate number of cadavers to maintain an optimal student – cadaver ratio and decreased course duration compared to earlier gross anatomy courses. From the reports of the present study, only 20 students opted for dissection. Among them 10 students performed well in their test scores. They were interested in doing dissection due to their inclination to pursue surgical field in their later years (based on their comments). Other students felt cadaveric dissection is a laborious process which requires lot of time and skill to dissect the body meticulously. Also, there is lack of adequate time for learning and revision resulting in poor performance. Medical schools in UK, US, Australia and New zealand, follow integrated /system based medical curriculum. The practice of cadaveric dissection is no longer used as the principle method of teaching. Reports from these countries reveals that though adequate resources are available like cadavers and trained faculties, this method is not considered as the best method [13,14] .Alternatively, prosected specimen, plastinated specimen, models and other computer assisted learning (CAL) are implemented in these medical schools.

Though both dissection and prosection have the benefits of multisensory learning, there are various benefits of Prosection over Dissection. Prosection is learning anatomy from pre dissected cadavers and specimens. This method of learning anatomy started in the Middle Ages and early Renaissance [15,16]. In view of the current integrated curriculum, revising the methodology of learning anatomy is needed. Due to less contact hours, students are not able to complete the dissection in accordance to the theory lecture schedule. As a result, there is lack of coordination in carrying out dissection in a timely manner. Learning anatomy from prosected specimens of previous years or freshly prosected specimens by the faculties enhances quick review of all the structures in the given lab hours. From student's perspective, it removes the fear and stress of dissection. It largely enables them to identify the structures by themselves without the guidance of faculties. Constant support/ guidance of faculty is not necessary unlike dissection. It also gives them adequate time for repeated self - learning and an opportunity for peer -teaching. All the above characteristics are very essential for a medical graduate according to the new competency based curriculum. Reports of the present study shows that 75(62.5%) students chose prosection as their choice which is comparartively higher than other choices. Out of 75 students, 60 students scored above 50% and the remaining 15 scored below 50%. This clearly states that performance of students is higher among those who chose prosection over dissection as the method of learning anatomy. The results of the present study is similar to studies based on student feedback and assessments that showed that prosections are efficient learning approach [9,17,18] .McWhorter and Forester [7] in their study concluded that prosections is always better and should be applied for all simple dissections rather than complicated dissections alone .

Students who chose both choices commented that they would first learn from prosected specimens followed by cadaveric dissection. About 25 students chose this approach. Each student gets to completely view all the structures to be identified using prosected specimens within a short duration of time. Thereby, students have adequate time to conceptualise, discuss among peers and also self-learn with the aid of Atlas. After completion of learning from prosected specimens, students feel free of stress to carry out dissection. This enables them to easily dissect without damaging important anatomical structures. Prosection followed by Dissection largely helps them to acquire all the anatomical knowledge of a particular region in a time efficient way. Moreover, overall student's performance is enhanced by this approach. Test scores of Students who chose this approach was comparatively better compared to dissection alone with 20 out of 25 students scoring above 50%.

Conclusion

According to the new competency based integrated curriculum, a suitable method of teaching gross anatomy in practical laboratory is warranted. Hence, the reports of the present cross-sectional study conducted among 120 first year Medical students indicates that students have different learning approaches to Anatomy. Prosection

is favoured by the majority over other approaches. The study recommends adoption of cadaveric prosection as a primary approach to learn Anatomy rather than dissection. Learning anatomy thorough prosected specimen is time efficient, imparts same anatomical knowledge, develops self-directed learning attitude, enhances group activity and results in better performance. This method also ensures optimal utilization of available recourses in terms of cadavers, faculties and Cadaver-students ratio.

Ethical Clearance: Taken from Institutes Ethics Committee

Source of Funding: Self

Conflict of Interest: Nil

References

1. Bergman E, Van Der Vleuten C, Scherpbier A. Why don't they know enough about anatomy? A narrative review. Medical Teacher. 2011;33(5):403-409.
2. Brenner, Erich, Maurer, H, Moriggl, Bernhard & Pomaroli, A. General educational objectives matched by the educational method of a dissection lab. Annals of Anatomy.2003;185 (173):229–230.
3. Alexander J. Dissection versus prosection in the teaching of anatomy. Academic Medicine. 1970;45(8):600-6.
4. Moore NA. To dissect or not to dissect? The Anatomical Record.1998; 253:8–9.
5. Lockwood A, Roberts A. The anatomy demonstrator of the future: An examination of the role of the medically-qualified anatomy demonstrator in the context of tomorrow's doctors and modernizing medical careers. Clinical Anatomy. 2007;20(4):455-459.
6. Drake R, McBride J, Pawlina W. An update on the status of anatomical sciences education in United States medical schools. Anatomical Sciences Education. 2014;7(4):321-325.
7. McWhorter D, Forester J. Effects of an alternate dissection schedule on gross anatomy laboratory practical performance. Clinical Anatomy. 2004;17(2):144-148.
8. Wisco J, Young S, Rabedeaux P, Lerner S, Wimmers P, Byus C et al. Student Perceived Value of Anatomy Pedagogy, Part I: Prosection or Dissection?. Journal of Medical Education and Curricular Development. 2015;(2):15-20.
9. Topp K. Prosection vs. dissection, the debate continues: Rebuttal to Granger. The Anatomical Record. 2004;281B(1):12-14.
10. Korf H, Wicht H, Snipes R, Timmermans J, Paulsen F, Rune G et al. The dissection course – necessary and indispensable for teaching anatomy to medical students. Annals of Anatomy - Anatomischer Anzeiger. 2008;190(1):16-22.
11. L. M. Newell R. Follow the royal road: The case for dissection. Clinical Anatomy. 1995;8(2):124-127.
12. Ellis H. Medico-legal Litigation and its Links with Surgical Anatomy. Surgery (Oxford). 2002;20(8):i-ii.
13. Craig S, Tait N, Boers D, McAndrew D. Review of anatomy education in Australian and New Zealand medical schools. ANZ Journal of Surgery. 2010;80(4):212-216.
14. Sugand K, Abrahams P, Khurana A. The anatomy of anatomy: A review for its modernization. Anatomical Sciences Education. 2010;3(2):83–93.
15. Enke U. Historische Anmerkungen zu Anatomie und anatomischem Unterricht an den hessischen Universitatten von 16. Bis zum 18. Jahrhundert. Hess. Arztebl. 2005; 122: 819-824.
16. Estai M, Bunt S. Best teaching practices in anatomy education: A critical review. Annals of Anatomy - Anatomischer Anzeiger. 2016;208:151-157.
17. Dinsmore C, Daugherty S, Zeitz H. Teaching and learning gross anatomy: Dissection, prosection, or ?both of the above??. Clinical Anatomy. 1999;12(2):110-114.
18. Newble D, Entwistles N. Learning styles and approaches: implications for medical education. Medical Education. 1986;20(3):162-175.

Original Article

Stress of the Family Members of Alcoholics admitted in a De-Addiction Centre in Mangalore

Shreekanth S. K,[1] Ramulamma K[1], Dhanya Yacob[1], Rosalynda. M. Khongwet[1], Clena Faria[1], Shiji P.J

[1]Post B.Sc Nursing Students, Father Muller college of Nursing, Kankanady, Mangaluru, [2]Associate Professor and HOD, Department of Community Health Nursing, Father Muller College of Nursing, PhD Scholar NITTE Deemed to be University, Mangaluru

Abstract

Background: Stress is the emotional and physical strain caused by the response to pressure from the outside world. The problem of stress among the family members of alcoholics is currently a major concern in the health policy. Family burden due to alcoholism might be social, financial, emotional and physical but it disrupts the life of a whole family. **Objective:** To assess the stress of the family members of alcoholics. **Materials and Method:** Descriptive research design was adopted in the study. Subjects of 100 family members of alcoholics admitted in de-addiction centre were recruited by non-probability convenience sampling technique. The data was gathered by using stress rating scale and informed consent was obtained from the subjects. **Results:** shows that most (54%) of the family members of alcoholics had moderate stress whereas (42%) of them had severe stress and only (4%) of them were having mild stress. There is no significant association between the level of stress of the family members of alcoholics and selected demographic variables. **Conclusion:** The study findings revealed that most of all family members of alcoholics are having one or another stress which make them suffer in their life. Hence need to adopt effective measures to reduce stress and improve their wellbeing which promotes health of family members

Keywords: *Stress; Family members; Alcoholics; Descriptive study.*

Introduction

Alcoholism is a chronic, progressive health problem which affects not only the individual but also his entire family members. Today, many families in the world are disturbed due to substance abuse, of which the most widely abused substance is Alcohol. Even though dependents are the victims of the Alcohol, but the major consequences are faced by the family members of the Alcoholics.[1]

Family members of alcoholics can experience stress, anxiety, depression and shame related to their loved ones addiction[2]. Family members may also be the victims of emotional or physical outbursts.

Family burden due to alcoholism might cause physiological problems such as hand tremor and blackout as well psychological problems such as obsessive desire to drink, behavioural problems that disrupt social or work life [3]. Alcoholism can be of any age background, income level, social or ethnic group.

It was estimated according to the national survey about alcohol consumption standards. About 25% of people life irritated with his drunkenness behaviour when they drink. 12% said they had started an argument or fight with the partner while drinking which points out the importance of working with these peoples family [4].

Stress is the body‘s reaction to change that requires a physical, mental or emotional adjustment or response. Stress can come from any situation or thought that makes you frustrated angry, nervous or anxious. Stress is the body and minds response to any pressure that disrupts in

Corresponding Author
Mrs. Shiji P.J
Associate Professor and HOD, Department of Community Health Nursing,Father Muller College of Nursing, PhD Scholar NITTE Deemed to be University, Mangaluru, Contact number-09986041840
E- mail: shijishivaji@gmail.com

normal balance. It occurs when our perception of events doesn't meet our expectations and we are unable to manage our reaction. When body is unable to resist the stress and strain the physiological and the psychological equilibrium is disturbed, that in turn can lead to numerous health hazards[5].

Alcoholism also has negative effects on the spouse of an alcoholic. The spouse may have feelings of hatred, exhaustion and become physically or mentally ill. Very often the spouse has to perform the roles of both parents. As a result, the non –alcoholic parent may be inconsistent, demanding and often neglect the children [6].

Common stress reactions include change in activity levels difficulty in communicating, in ability to rest, relax, irritability, outburst of anger ,sleep disturbance, periods of crying, gallows humour, headache ,tunnel vision, sweating or chills, increase heart rate, stomach upset, intolerance, withdrawal, isolating from people. Family members involves in this study were exposed to tension of which may negatively impact their physical and mental health.

From all the above statistics it is evident that there is a stress among family members of alcoholics, which leads unhappy life with multiple health problems.

Materials and Method

A quantitative approach with descriptive research design was adapted in this study to assess the stress of family members of alcoholics. The study was conducted in a de-addiction centre, a unit Father Muller Medical College Hospital, Mangalore. Total of 100 family members of alcoholics who were admitted in de-addiction centre were recruited through non-probability convenience sampling technique. Family members of alcoholics are the women related to alcoholic by marriage, children by him, his parents, sisters and brothers who are common living with him at the time of the study were selected as subjects. Ethical clearance: obtained from Institutional Ethics committee of Father Muller Medical College, Mangalore.

Inclusion Criteria: The study includes family members of alcoholics

- who are willing to participate in the study
- who are available during the time of data collection
- who never consumed alcohol and without any kind of major medical or psychiatric illness

Exclusion Criteria: The study excludes family members of Alcoholics

- who are not co-operative
- who are unable to communicate due to any other reasons like hearing impairment, mental disorders, below 18 years or chronic illness
- who are not available at the time of data collection

The permission to conduct study was obtained from Director, Father Muller Medical College Hospital, Mangalore. Informed consent was obtained from the study subjects. The need and purpose of the study was explained to the participants in their local language and confidentiality was assured. The stress among family members of alcoholics was assessed by using self prepared stress rating scale in the areas such as Physical, Psychological, Social and Financial with a total of 20 items..The data gathered were analyzed by using descriptive and inferential statistics.

Results

Section –1: Description of Sample characteristics

This section deals with the description of the baseline characteristics of 100 subjects presented in frequency and percentage.. The demographic characteristics of the family members are age, education, income; types of family, number of children duration of drinking and relationship with the patient with alcoholics are depicted in the table.

Table 1: Frequency and percentage distribution of family members of alcoholics

n=100

Sl. No	Variables	Frequency (F)	Percentage (%)
1	**Age (in years)**		
	a. 20-40	39	39
	b. 41-60	48	48
	c. 61-80	13	13
2	Education		
	a. Illiteracy	8	8
	b. Primary	27	27
	c. High School	35	35
	d. PUC	18	18
	e. Graduate & Above	12	12
3	**Income**		
	a. 5000	17	17
	b. 5001-10000	49	49
	c. 10001-15000	25	25
	d. 15001above	9	9
4	**Types of family**		
	a. Nuclear family	61	61
	b. Joint family	35	35
	c. Other	4	4
5	**Number of children**		
	a. No children	22	22
	b. 1 child	40	40
	c. 2 children	25	25
	d. 3 and above	13	13
6	**Drinking**		
	a. 1 year	8	8
	b. 1-5 years	32	32
	c. 6-10 years	33	33
	d. Morethan10years	27	27
7	**Relationship with patient**		
	a. Wife	32	32
	b. Parents	19	19
	c. Son and daughter	32	32
	d. Siblings	14	14
	e. Others	3	3

The data presented in table 1 shows that Majority (48 %) of the subjects belongs to the age group of 41-60 years. Highest percentage (35%) had high school education. Family income (49%) had income of Rs.5001 to 10,000 per month. About (61 %) of them belongs to nuclear family. Most (40%) of the family members had one child. About (33%) of them had duration of drinking about 6-10 years. Majority (32%) of each had relationship of wife, son and daughter with alcoholics.

Section II: Stress level of the family members of alcoholics

Table 2: frequency and percentage distribution of subject according to the stress score of the family members of alcoholics. n= 100

Sl.No	Score	Grades	Frequency (F)	Percentage (%)
1	0-20	Mild	4	4
2	21-40	Moderate	54	54
3	41-60	Severe	42	42

The data presented in table 2 shows that majority (54%) of family members had moderate stress due to alcoholics, about (42%) of them had severe stress and only (4%) had mild stress because of an alcoholics in the family.

TABEL 3: Mean, standard deviation (SD) and mean percentage according to their stress score of the family members of alcoholics. n= 100

Family members of alcoholics	Minimum score	Maximum score	Mean + SD	Mean %
Overall stress score	10.00	53.00	36.9500+ 9.73526	69.71%

The data in the table 3 shows that maximum score is (53.00) and minimum score is (10.0). The mean $\pm$ standard deviation of stress score of the family members of alcoholics are 36.9500 $\pm$9.73526 and mean percentage of stress score is (36.95%) respectively.

Section IV. Association of stress level of subjects with selected demographic variables

Chi square test was computed to determine the association between the stress level and selected demographic variables. The following null hypothesis was stated:

H_{01}: There is no significant association of level of stress among family members of alcoholic with selected demographic variables

There is no significant association between stress level of the subjects and the selected variables since the calculated chi square value is less than the tabled value .Hence the null hypothesis is accepted and research hypothesis is rejected.

Discussion

Alcohol abuse has the potential to destroy families. Research shows that families affected by alcoholism are more likely to have low levels of emotional bonding, expressiveness and independence[7].

The present study aimed at to assess the stress of the family members of alcoholics and the findings revealed that majority about (42%) of them had severe stress, due to various factors. A cross-sectional study was carried out to evaluate quality of life and presence of stress in caregivers of drug-addicted people. Results revealed that, 55.9% were mothers with a mean age of 47.66 years; 23.8% had depressive symptoms. The SF36 scores most compromised were emotional aspects, vitality, pain and mental health. Mean stress among caregivers was 2.24. A significant correlation in quality of life, depression and stress of caregivers was seen[8]. The present study also showed that there is no significant association between stress level of the subjects and the selected variables since the calculated chi square value is less than the tabled value .Hence the research hypothesis

is rejected and null hypothesis is accepted

CONCLUSION

Alcoholism is a family disease. Due alcoholic member in the family there are various consequences are faced by the family members. The present study envisaged to assess the stress of the family members of alcoholics. The findings of the present study revealed that majority of the family members had severe stress due to various factors. So the researcher felt the need to further to undertake some essential interventions to the family members to train them how to cope up with situations.

Source of Funding: RGUHS Granted Project

Ethical Clearance: obtained from Institutional Ethics committee of Father Muller Medical College, Mangalore.

Conflict of Interest: There are no conflicts of interests

References

1. Parsons T. Alcoholism and its effects on family. Allpsychjournal.2003.Available in https://allpsych.com/journal/alcoholism/
2. Nisha Naik M N. Stress level among Wives of Alcoholics. Hindu, June 2014; 86:86.
3. Silverstein H. Alcoholism and its effects on family. New York Franklin Watts. 1990.
4. Laranjeira R, Pinsky I, Zaleski M, Caetano R. Alcohol use patterns among Brazilian adults. Secetaria nacional Antidrogas; 2007.
5. Schneiderman, N., Ironson, G., & Siegel, S. D. Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology*, (2005). 1, 607-628. https://doi.org/10.1146/annurev.clinpsy.1.102803.144141
6. Berger G. Alcoholism and the family, New York. 1993.
7. ChrisElkins,MA.Effects of alcoholism on families. https://www.drugrehab.com/addiction/alcohol/effects-of-alcoholism-on-families/.
8. Samira Reschetti Marcon1, Elizete Aparecida Rubira. Quality of life and stress in caregivers of drug-addicted people. Acta Paul Enferm. 2012; 25(Special Issue 2):7-12.

Effect of Functional Task Exercises on Hand Function and Grip Strength in Patients with Lateral epicondylitis

Shreya Deshak[1], Ujwal Yeole[2], Saikrupa Moralwar[3]

[1]Assistant Professor, [2]Principal, Associate Professor, [3]Intern, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth Pune, India

Abstract

Background: Tennis Elbow is the most common overuse syndrome in the elbow. It is a tendinopathy injury involving the extensor muscles of the forearm. The lateral epicondylitis is characterized by pain and tenderness at the lateral epicondyle of the humerus as there is non-specific inflammation at the origin of the extensor muscles of forearm. As there is pain and inflammation, the grip strength in decreased and hand function is affected. But there are few research done on intervention regarding same. Hence a comparative study was carried on 60 patient, 30 subjects were grouped in Group A which were given functional task exercises and Group B was given Conventional therapy. The stastical analysis showed that out of 30 subjects, mean age of group A patients was 25±6.23 and mean age of group B patients was 27.2±4.8. Grip strength in between Group A (63.5± 14.2) and Group B (60.4± 12.9) with p value 0.04, Patient rated tennis elbow evaluation scale in between Group A (44.1± 6.8) and Group B (43.8±10.6) with p value 0.002 and Michigan hand outcome measures in between Group A (62.5±14.4) and Group B (54.3±14.7) with p value 0.0005. Hence the study concluded that there is significant effect of Functional Task Exercises on Grip strength and Hand function in lateral epicondylitis.

Key words: *sphygmamometer, tennis elbow evaluation scale, Michigan hand outcome questionnaire , hand function grip strength.*

Introduction

The lateral epicondylitis is characterized by pain and tenderness at the lateral epicondyle of the humerus as there is non-specific inflammation at the origin of the extensor muscles of forearm.It is sometimes seen in tennis player , other activities such as squeezing clothes, carrying a suitcase etc are frequent responsible.[1]

The lateral epicondylitis is a chronic symptomatic degeneration of the tendons that are attached extensor muscles of the lateral epicondyle of the humerus. It is also most common cause of chronic musculoskeletal conditions affecting the elbow. The results of lateral epicondylitis is pain, disability, and leads to loss of productivity.[2]

There are some neurological symptoms, namely cervical spine diseases with radiculopathy and posterior interosseos nerve involvement and also bursitis is also associated with lateral epicondylitis .In lateral epicondylitis the pain thresholds are at lateral epicondyle with pain on palpation and with positive Millis test. The results of the resisted wrist extension reflects decreased strength.[3]The patients has pain and there is decrease in function which affects basic activities in daily life.[4]

It is also termed as tendinosis that specifically involves the origin of extensor Carpi radials brevis muscle. It is mostly work related or sport related pain syndrome of the arm. The quick and repetitive movements of the wrist and forearm can rupture the proximal attachment of the long extensor muscles also causes inflammation and pain.[5]

Corresponding Author:
Dr Shreya Deshak
Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Gultekdi, Pune-37,
Mobile No. 9730825470,
Email id: shreyad.2010@gmail.com

There is pain on palpation of lateral epicondyle of humerus and weakness during gripping activities. The grip strength is mostly affected due the damage caused to the muscles which work in gripping activities. The grip is affected due to the repetitive activities performed in same manner for long duration. The repetitive activities such as driving for long hours, tying ,using rolling pin for making rotis, etc. Due to this repetitive activities the hand function is also affected. The hand function like turning a knod, lifting a heavy weight bag, driving a bike, etc.[6]

There has been research done that due to pain, there has been affection of grip strength and hand function. Functional task exercise is more effective in improving functional performance, and that Functional task exercise is the first exercise programme with sustainable effects. But there is little research done on effects of functional task exercises on grip strength and hand function in lateral epicondylitis, hence need of this study.

- **Methods:**

- **Study Design**: Experimental

- **Selection of subjects**: Total 75 patients were approached for the study out of which 60 patients were selected according to inclusion and exclusion criteria. The patient included were patients diagnosed with lateral epicondylitis more than 6 weeks and patient excluded were patient with bilateral involvement and with cervical radiculopathy. The patient were divided into 2 groups by convenient sampling each having 30 patients. The aim, objectives and method of study was explained to the participants. Consent was taken on the consent form.

Materials: Demographic data sheet, Consent form, scale, sphygmomanometer, paper, plastic bottle, cards, door knob, clay, cloth.

Procedure:

Ethical clearance was taken from the Institutional Ethical Committee, Tilak Maharashtra Vidyapeeth, Department of Physiotherapy, Pune. Participations were selected according to inclusion and exclusion criteria. The aim, objectives and method of study was explained to the participants. Consent was taken on the consent form. The assessment of patient was done as below.

Patient rated tennis elbow evaluation scale: In the patient rated tennis elbow evaluation scale there are three sections Pain, functional disability and usual activities. All the questions are numbered between 0-10 and the patient is asked to select on basis of the how much pain is present and affected activities.

Sphygmamometer: Grip assessment was done by the sphygmomanometer: The sphygmomanometer is rolled to cylinder and the cuff is inflated to 20 mmhg and patient is asked to press the cylinder 3 times . The highest reading among the 3 is considered and if the increments 2mmhg then the grip is affected [18].

Michigan hand outcome questionnaire: The scale contains 6 scales: (1) overall hand function (2) Activities of daily living (3) work performance (4) pain (5) anestheics (6) satisfaction with hand function. The scale score for each of 6 scales is the sum of the reading of each scales. The score is converted to a score range from 0 to 100.

Treatment protocol: Pre-training: The grip strength will be checked by sphygmamometer. The hand function can be checked by Michigan hand outcome questionnaire. The physical function,pain and disability will be checked by using patient rated tennis elbow evaluation scale.

The treatment will be divided into 2 groups : [A] Functional Task exercises

[B] Conventional therapy

45 minutes session 10 repetitions for 4 weeks.

Functional task exercises: 45 minutes session 10 repetitions for 4 weeks

Functional task exercises was given additional along with the conventional treatment.

Functional task exercises were transfer of sandbag from one hand to other hand, gripping the door knob, carrying the water bottle from one hand to other hand, turn the cards over, do typing movements, wringing the wet clothes, crumble the paper and try to spread back paper.

Post-training: The physical function , pain and disability will be checked by using patient rated tennis elbow evaluation scale. The grip strength will be checked by sphygmomanometer. The hand function can be checked by Michigan hand outcome questionnaire.

Data will be collected and statistical analysis will be

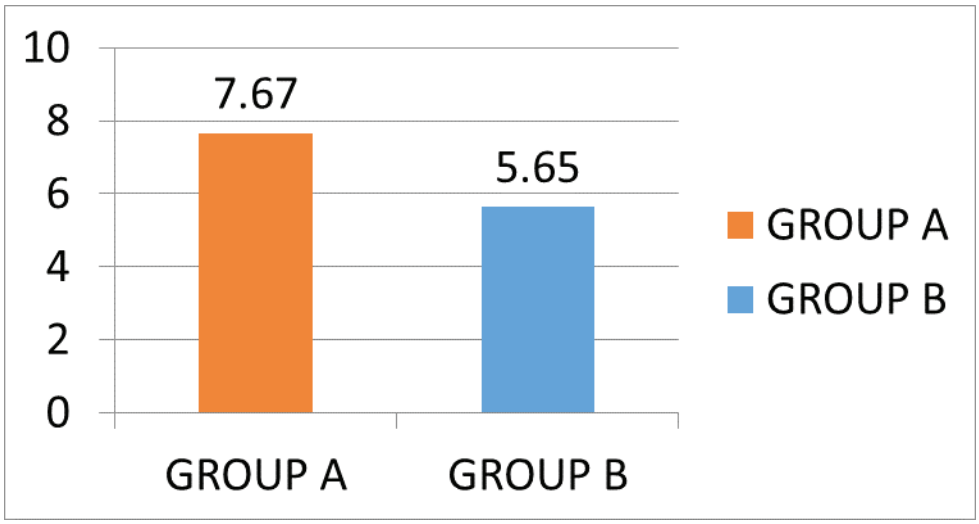
done.

Stastistical Technique: Wilcoxon's test was used for within the groups not passing the normality and mann witney u test was used for between the groups not passing the normality.

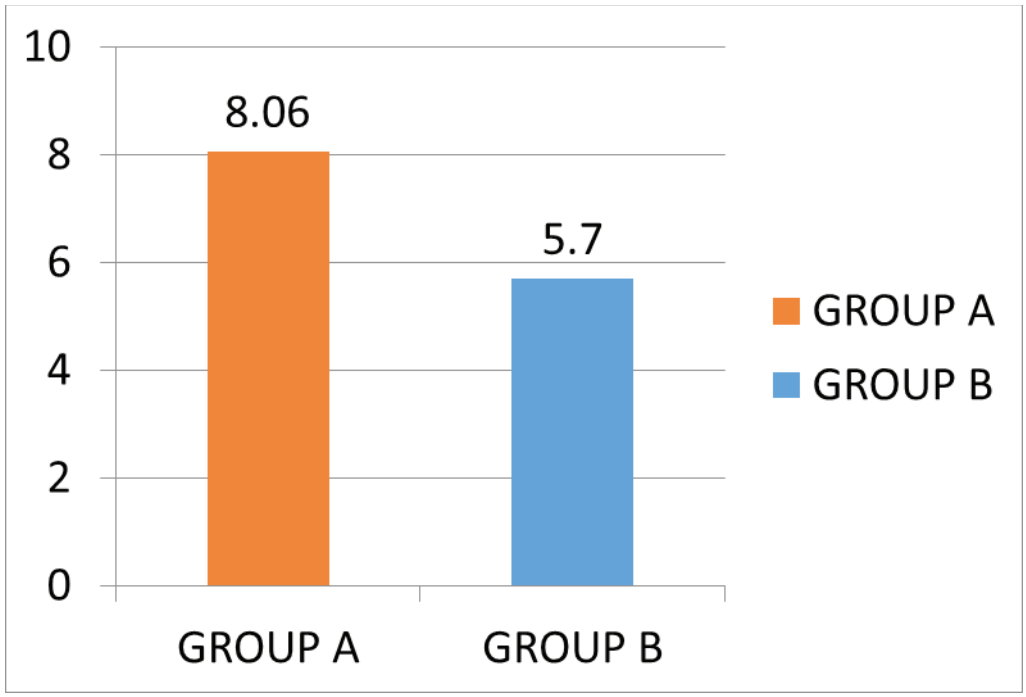
Results

Table 1 Showing Demographic Data and Comparison Between Group A (Functional Task Exercises) and Group B (Control Group) on Grip Strength, Hand Function and Physical disability.

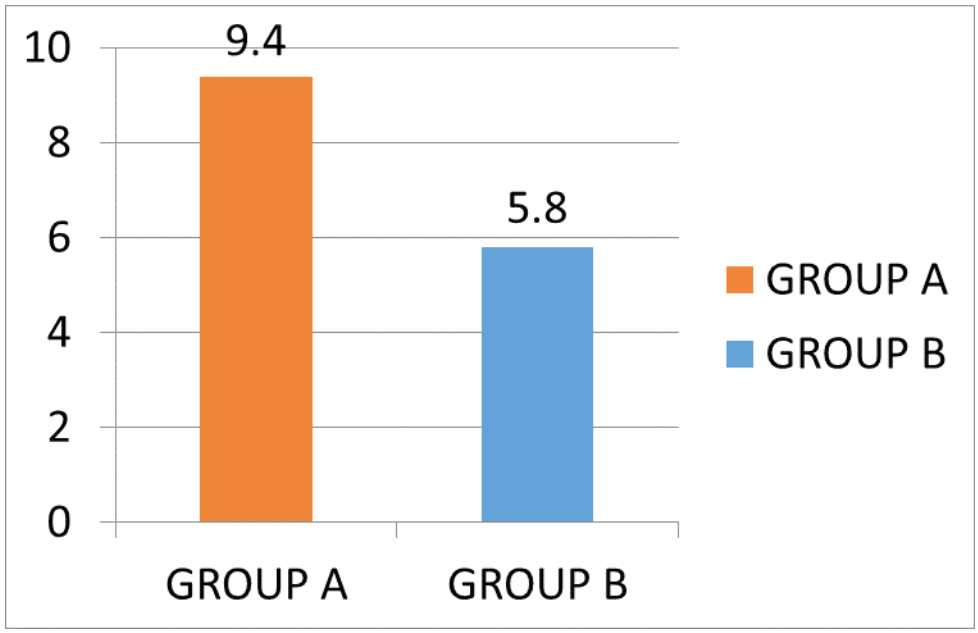
Outcome measure	Group A	Group B	P value
Age (years)	25±6.23	27.26±4.89	
Grip strength(mmHg)			
Pre	54.67± 13.5	53.7±12.82	0.04
Post	63.5±14.2	60.4±12.94	
p value	0.0001	0.0001	
PRTEE			
Pre	52.1±16.9	49.08±9.48	0.002
Post	44.1± 16.8	43.8±10.63	
p value	0.0001	0.0001	
MHOM			
Pre	71.7±14.7	63.8±14.01	
Post	62.5±14.4	54.3±14.7	0.0005
p value	0.0001	0.0001	



Graph 1 : It shows in comparison, the group A (functional task exercises) which is significantly improved than Group B (control group) in grip strength in patients with lateral epicondylitis with p value (0.04).



Graph 2 : It shows in comparison, the group A(functional task exercises) which is significantly improved than Group B (control Group) in patient rated tennis evaluation scale in patients with lateral epicondylitis with p value (0.002).



Graph 3: This graph shows in comparison, group A (functional task exercises) which is significantly improved than group B of Michigan hand outcome questionnaire in patients with lateral epicondylitis with p value (0.005).

Discussion

In this study of the effect of functional task exercise vs conventional therapy on grip strength and hand function in patients with lateral epicondylitis. The patients are evaluated pre and post treatment for grip strength and hand function by sphygmomanometer, patient rated tennis elbow evaluation scale and Michigan hand outcome questionnaire.

The functional task exercise are related to the daily life activities and it can performed easily and things required for that are also easily available in environment. This exercise allows to patient to perform daily activities which are related daily living also declines chances of

decrease of grip strength and hand function due to lateral epicondylitis.[10]

Functional task exercises showed more beneficial because these components are practised in relevant functional positions only. Functional task exercises attempts to adapt or develop the training which allows individuals to perform activities of daily life more easily and without injuries.

The performance of functional task exercise includes the teamwork of cognitive, perceptual, and motor functional and it is also related to the individual's active environment. The functional task exercise trains the patient to perform daily life task easily by increasing the grip strength and hand function. It makes the patient functionally independent to perform daily life grips and hand function which required to perform in individual's daily life. (15)

Functional task exercises increase the upper body strength and balance and coordination. The strength of the muscles is also increased which contributes to grip strength, Thus showing positive effect on grip strength and hand function in patients with lateral epicondylitis. (15)

In functional task exercises there were wider range of exercises and performed in optimal manner. Exercises are performed in structured manner.(16) Functional Task exercises increase blood flow, prevent injury to damaged area and cause neovascularization.(16)

Literatures suggest that strengthening and stretching both are main components of exercise programme, because tendons must be flexible along with strong. Positive effects of exercise programme for tendon injuries may be attributable to lengthening of muscle tendon unit by stretching and strengthening exercise which could achieve loading effect within muscle tendon unit along with hypertrophy and increased tensile strength of the tendon.[21]

Tipton et al (1987) say that "prescribed exercises which increase the forces being transmitted to ligaments, tendons and bones will maintain and generally increase the strength and functional capacity of these structures". The same principle seems to be valid in the treatment of chronic tennis elbow syndrome. [21]

Conclusion

Hence the study concluded that there is significant improvement in hand function and grip strength with the functional task exercises in comparison with the control group.

Acknowledgment: All the authors and participants contributed equally to the conception and design of the study. We are grateful to clinics for the support of this study.

Source of Funding: Self

Conflict of Interest: Nil

References

[1] Bisset L, Beller E, Jull G, Brooks P, Darnell R, Vicenzino B. Mobilisation with movement and exercise, corticosteroid injection, or wait and see for tennis elbow: randomised trial. Bmj. 2006 Nov 2;333(7575):939

[2] Genc H, Nacir B, Duyur Cakit B, Saracoglu M, Erdem HR. The effects of coexisting fibromyalgia syndrome on pain intensity, disability, and treatment outcome in patients with chronic lateral epicondylitis. Pain Medicine. 2012 Feb 1;13(2):270-80.

[3] Weber C, Thai V, Neuheuser K, Groover K, Christ O. Efficacy of physical therapy for the treatment of lateral epicondylitis: a meta-analysis. BMC musculoskeletal disorders. 2015 Dec;16(1):223.

[4] Kotnis NA, Chiavaras MM, Harish S. Lateral epicondylitis and beyond: imaging of lateral elbow pain with clinical-radiologic correlation. Skeletal radiology. 2012 Apr 1;41(4):369-86.

[5] Hoogvliet P, Randsdorp MS, Dingemanse R, Koes BW, Huisstede BM. Does effectiveness of exercise therapy and mobilisation techniques offer guidance for the treatment of lateral and medial epicondylitis A systematic review. Br J Sports Med. 2013 Nov 1;47(17):1112-9.

[6] Jafarian FS, Demneh ES, Tyson SF. The immediate effect of orthotic management on grip strength of patients with lateral epicondylosis. journal of orthopaedic & sports physical therapy. 2009 Jun;39(6):484-9.

[7] Shreya D, Ujwal Y, Saikrupa M, Rasika P. Assessment of Pain, Physical Function and Disability in patients with lateral Epicondylitis. International Journal of Research and Analytical Reviews. 2019 March;6(1): 607- 610

[8] Dundar U, Turkmen U, Toktas H, Ulasli AM, Solak O. Effectiveness of high-intensity laser therapy and splinting in lateral epicondylitis; a prospective, randomized, controlled study. Lasers in medical science. 2015 Apr 1;30(3):1097-107.

[9] Shiri R, Viikari-Juntura E, Varonen H, Heliövaara M. Prevalence and determinants of lateral and medial epicondylitis: a population study. American journal of epidemiology. 2006 Dec 1;164(11):1065-74.

[10] Ajimsha MS, Chithra S, Thulasyammal RP. Effectiveness of myofascial release in the management of lateral epicondylitis in computer professionals. Archives of physical medicine and rehabilitation. 2012 Apr 1;93(4):604-9.

[11] Lee DG. "Tennis elbow": a manual therapist's perspective. Journal of Orthopaedic & Sports Physical Therapy. 1986 Sep;8(3):134-42.

[12] Tarhan Serdar & Unlu Zeliha 2009 value of ultrasonogrphy on diagnosis and assessment of pain and grip strength in patients with lateral epicondylitis. Turk J Rheumatol 2009 :24:123-30

[13] Pienimäki TT, Siira PT, Vanharanta H. Chronic medial and lateral epicondylitis: a comparison of pain, disability, and function. Archives of physical medicine and rehabilitation. 2002 Mar 1;83(3):317-21.

[14] Alizadehkhaiyat O , Pain Clin J .2007 Pain, functional disability and psychological status in tennis elbow.The clicical journal of pain 23(6):482-487.

[15] JK, Tsang RC, Leung H. 2014 Lateral epicondylalgia: midlife crisis of a tendon. Hong Kong Med J2014;20:145-151.

[16] Savnik A, Jensen B, Nørregaard J, 2004 Magnetic resonance imaging in the evaluation of treatment response of lateral epicondylitis of the elbow. Eur Radiol 2004;14:964-969.

[17] Vincent Joshua ,. MacDiarmid Joy C 2014 Patient-Rated Tennis Elbow Evaluation Questionnaire Journal of Physiotherapy volume 60 issue 240.

[18] Martins Julia , Aguiar Larissa ,2014 Assessment of grip strength with the modified sphygmonometer test: association between upper limb global strength and motor function. Brazillian journal of physical therapy.

[19] Coel M, Yamada CY, Ko J. MR 1993 imaging of patients with lateral epicondylitis of the elbow (tennis elbow): importance of increased signal of the anconeus muscle. AJR Am J Roentgenol ;161:1019-1021.

[20] Kotnis NA, Chiavaras MM, Harish S. 2012 Lateral epicondylitis and beyond: imaging of lateral elbow pain with clinical-radiologic correlation. Skeletal Radiol ;41:369-386.

[21] Upadhyay S, Shukla Y, Patel KK. Effects of progressive strengthening exercises in chronic lateral epicondylitis. Int J Health Sci Res. 2017; 7(4):244-257.

[22] Samagh P, Sudhakar K, Jindal R. The Impact Of Lateral Epicondylitis On Quality Of Life. International Journal Of Physiotherapy. 2015 Aug 1;2(4):627-32.

Endovascular Treatment (Stenting) of Total IVC Obstruction with Collaterals in Young Adult with Crohn's Disease Maharishi Markandeshwar (Deemed to Be University)

Sivaji Patibandla[1], Abhinav Rastogi[1], Sajaad Manjoor[2], Vishal Singh[3], Himanshu Tanwar[1]

[1]DM Cardiology Resident, [2]Director Interventional Cardiology, [3]Assistant Proffessor Department of Cardiology)

Abstract

We present a case of clinically extensive bilateral DVTs associated with chronic total inferior vena cava thrombosis with underlying crohn's disease and who is on steroid therapy. Young patients presenting with symptoms of DVT should be investigated not only to establish any thrombophilic pre-disposition but to ascertain the proximal extent of thrombus which may itself influence treatment. Treatment options in the case of IVC thrombus without anatomical variance include anticoagulation, mechanical thrombectomy, systemic thrombolytic therapy, transcatheter regional thrombolysis, and angioplasty

Keywords: *Deep vein thrombosis, inferior vena cava thrombus, IVC stenting, Chronic total IVC occlusion, chron's disease*

Introduction

Inferior vena cava (IVC) thrombosis is an entity which is given less importance that is associated with significant morbidity and mortality [1]

About 2.6% to 4.0% of patients will have DVT [2]

The incidence of unprovoked DVT in young patients is rare, especially below 30 years of age.

There is a paucity of data and societal guidelines with regards to the diagnosis and management of IVC thrombosis

The clinical presentation of IVC thrombosis is often ambiguous and varies significantly according to the acuity, the level, and the extent of thrombosis.

Similar to those with lower extremity DVT, patients with IVC thrombosis commonly complain of leg heaviness, pain, swelling, and cramping.

Even the total occlusion of IVC can remain silent or else can present with acute symptoms

Hypercoagulability which is related to neoplastic or hematological abnormalities, venous stasis secondary to extraluminal pressure from tumors or inflammatory processes and vessel injury due to trauma have all been implicated as primary mechanisms in the pathophysiology of IVC thrombosis [3]

Endovascular interventions play a major role in treatment of venous obstructive diseases.

Catheter-directed thrombolysis (CDT) has become a pivotal adjunctive therapy in the management of both acute and chronic thromboembolic venous disease.

This therapy is most successful in acute thrombus(<14 days) and less effective in chronic clot(>4 weeks)[9]

Percutaneous mechanical thrombectomy has evolved in treating complex veno-occlusive diseases.

These devices work by simple thrombo aspiraton(venturi effect) .

Endovascular therapy offers less morbidity and

Corresponding Author :
Dr Abhinav Rastogi
DM Cardiology Resident
Email:sivajipatibandla@gmail.com
Address: flat no 191, I block, MM University, Mullana, Ambala.Pincode:133207

mortality when compared to surgery. In one of largest reported series of endovascular therapy for IVC occlusion, 82% of the lesions in 120 patients were infrarenal, with suprarenal involvement in 18% of cases[10]

Underlying lesions are identified and should undergo high-pressure angioplasty and stenting. The advantage of self-expanding venous stents include the ability to oversize them so as to allow proper fixation and reduce the risk of stent migration in these highly compliant vessels

Case History

22 years male patient presented with complaints of bilateral lower limb pain associated with swelling of limbs for 15 days. H/O shortness of breath for 15 days. H/O anorexia, decreased appetite, nausea for 15 days. He was diagnosed as CHRON'S disease for 6 months and was on steroid therapy. There was no history of trauma, surgery, long-distance travel, prolonged immobilization.

On examination, his BP was 120/70 mmHg and has tachycardia of HR: 126/min

Bilateral lower limbs swelling symmetrically with pitting edema is present

Cardio-respiratory was unremarkable and his abdomen was soft

All routine Lab investigations (hematological, coagulation, and biochemical) were normal.

ECG suggestive of sinus tachycardia

2DECHO suggestive of RA an RV dilated, moderate TR, moderate to severe PAH.

USG COLOUR DOPPLER bilateral lower limbs found to have DVT extending up to infra hepatic inferior vena cava.

CT pulmonary angiography was done suggestive of pulmonary embolism

IVC venogram via the right femoral vein demonstrated total occlusion of the IVC with high-grade multiple collaterals (Figure 1)

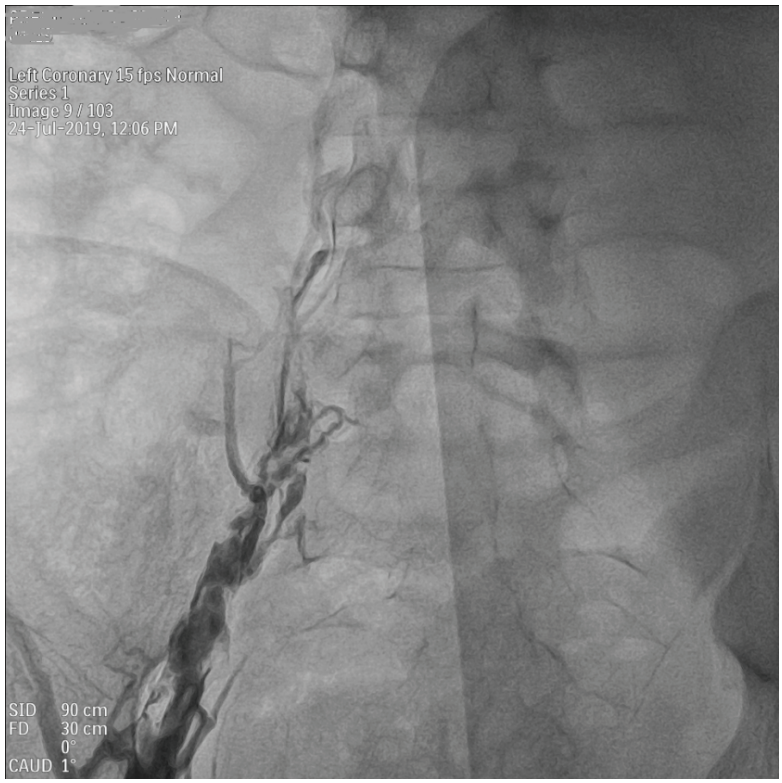


Figure 1 : Venogram showig total occlusion of IVC

IVC filter(Cook Celect Platinum vena caval filter) was placed in view of pulmonary embolism (Figure 2)

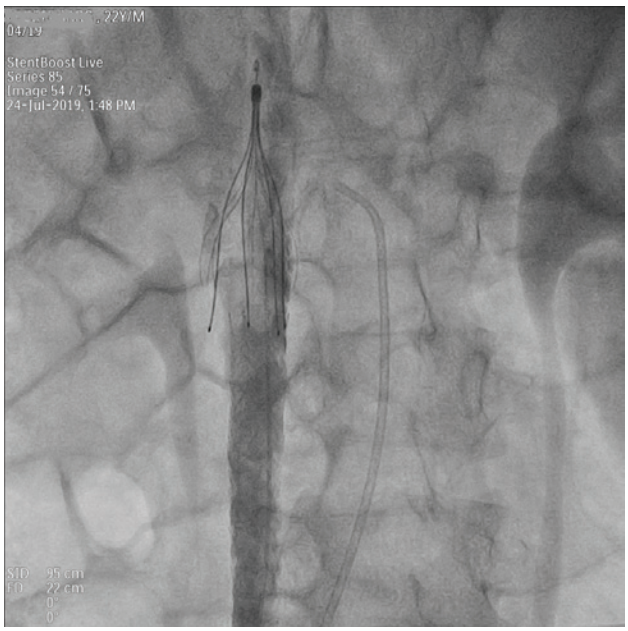


Figure 2 : IVC filter placed

Balloon angioplasty of IVC was done along with mechanical thrombectomy resulting recanalization of IVC.

A self-expandable stent (Abbott Vascular –Absolute Pro) (10×100 mm,135 cms) was placed in IVC. (Figure 3)

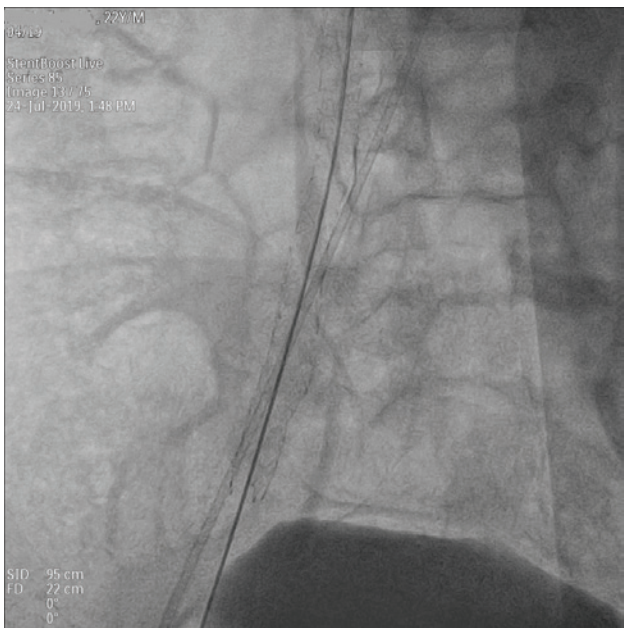


Figure 3 : Stent was placed

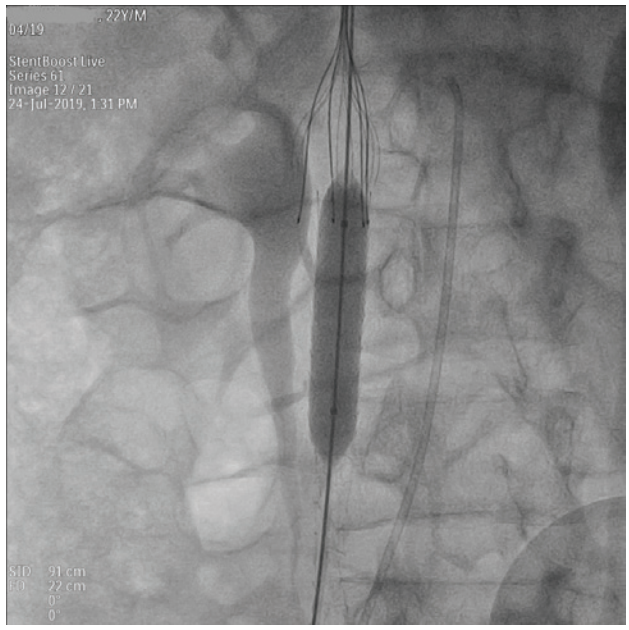


Figure 4: dilatation of stent

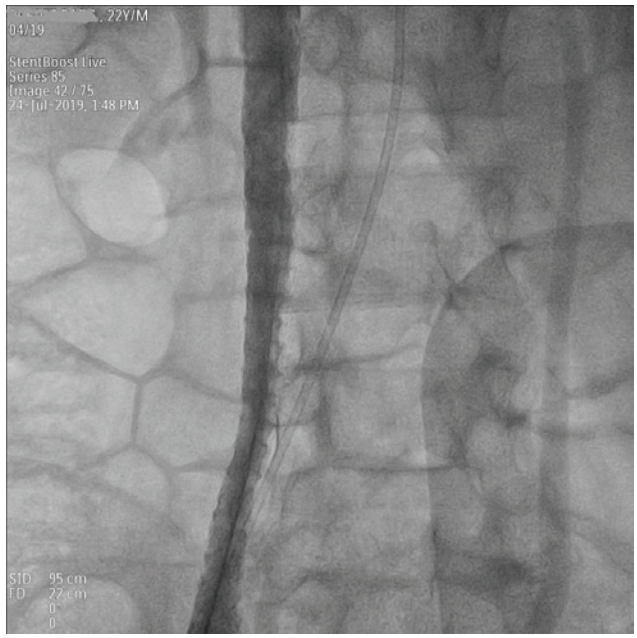


Figure 5 : final result after stent placement and post dilation of stent

The patient was started on anticoagulation with intravenous injection heparin bridging with oral anticoagulants.

The patient was started on oral anticoagulants-warfarin 3 mg OD and advised to maintain INR between 2-3

Discussion

It is a known fact that Virchow's triad (stasis, endothelial injury, hypercoagulability) most common pathophysiology for predisposing to DVT. But

unprovoked DVT, especially in young patients, needs thorough workup.

Recent advances in the utilization of ultrasound, CT and as well as endovascular procedures have resulted in an increase in detection rates of IVC thrombosis.

About 12% of patients with a diagnosis of IVC thrombus may present with pulmonary embolism. So, CT pulmonary angiogram is needed to evaluate for pulmonary embolism

Treatment options in the case of IVC thrombus without anatomical variance include anticoagulation, mechanical thrombectomy, systemic thrombolytic therapy, transcatheter regional thrombolysis, and angioplasty [4]

There is no specific literature describing the ideal duration of anticoagulation in these instances, however, case evidence identifies a trend toward treatment for a minimum of one year with maintaining the target INR

Endovascular stent placement in combination with angioplasty is recommended in the cases of residual stenosis and chronic IVC occlusion [5]

Learning Points

 Deep venous thrombosis (DVT) of the inferior vena cava (IVC), iliac veins and femoral veins in young adults is rare, but it is associated with significant morbidity.

 Understanding the embryological IVC development and pathophysiology of thrombus formation is critical to suspecting congenital anomalies of the IVC, especially with bilateral DVT.

 The initial diagnostic procedure should be an ultrasound of the lower extremities. Further investigation modalities are mandatory with the detection of iliofemoral thrombosis. CT or MRI is required to identify the extension of the thrombus and IVC anatomy. For the complete evaluation, thrombophilia workup should be performed[6,8]

 Treatment options include anticoagulation, thrombolytic therapy, and mechanical thrombectomy. In a case of IVC development abnormalities, the location and type of the defect determine the surgical approach. Even with extensive therapeutic modalities, long-term or even life-long anticoagulation is often required [6,7]

Source of Funding- NIL

Conflict of Interest-NIL

Ethical Clearance -Institutional ethics Committee-Maharishi Markandeshwar (deemed to be university), Mullana-Ambala

References

1. McAree BJ, O'Donnell ME, Fitzmaurice GJ, Reid JA, Spence RA, Lee B. Inferior vena cava thrombosis: a review of current practice. Vasc Med 2013;18:32–43.
2 Agnelli G, Verso M, Ageno W, et al. The MASTER registry on venous thromboembolism: description of the study cohort. Thromb Res 2008;121:605–10.
3. Giordano P, Weber K, Davis M, Carter E. Acute thrombus of the inferior vena cava. *Am J Emerg Med* 2006; 24(5):640-6.
4 Yamada N, Ishikura K, Ota S, Tsuji A, Nakamura M, Ito M, Isaka N, Nakano T. Pulse-spray pharmacomechanical thrombolysis for proximal deep vein thrombosis. *Eur J Vasc Endovasc Surg* 2006;**31(2)**:204-11
5 Robbins MR, Assi Z, Comerota AJ. Endovascular stenting to treat chronic long-segment inferior vena cava occlusion. *J Vasc Surg* 2005;41(1):136-40.
6 Yun SS, Kim JI, Kim KH, et al. Deep venous thrombosis caused by congenital absence of inferior cava, combined with hyperhomocysteinemia. Ann Vasc Surg 2004;18:124–9
7 McAree BJ, O'Donnell ME, Boyd C, et al. Inferior vena cava thrombosis in young adults—a review of two cases. Ulster Med J 2009;78:129–33.
8 Obernosterer A, Aschauer M, Schnedl W, et al. Anomalies of the inferior vena cava in patients with iliac venous thrombosis. Ann Intern Med 2002;136:37–41
9. Theiss W, Wirtzfeld A, Fink U, Maubach P. The success rate of fibrinolytic therapy in fresh and old thrombosis of the iliac and femoral veins. Angiology. 1983; 34:61–69
10. Meissner AJ, Huszcza S. Surgical strategy for management of deep venous thrombosis of the lower extremities.World J Surg. 1996; 20:1149–1155.

Neuroendocrine Tumors of the Oral Cavity: A Summarized Overview

Sona Baburathinam[1], Devi.M[2], Therraddi Muthu R.M[3], Chitra N[4]

[1]Senior Lecturer, [2] Head of the Department,[3] Reader, [4]Senior Lecturer, Department of Oral Pathology and Microbiology, Asan Memorial Dental College and Hospital

Abstract

The neuroendocrine system is made up of neuroendocrine cells that are distributed throughout several organs, including digestive system and lungs. The neuroendocrine cells have characteristics of both nerve and endocrine cells. The neuroendocrine cells are locally aggregated constituting certain endocrine organs, such as adrenal medulla or are scattered throughout all organs with an epithelial lining (disseminated/diffuse neuroendocrine system- DNES). This article provides an overview of the neuroendocrine tumors that arise in the oral cavity.

Keywords: *Malignant Peripheral Nerve Sheath Tumor, Olfactory Neuroblastoma, Paraganglioma, Schwannoma*

Introduction

The neuroendocrine system is made up of neuroendocrine cells that are distributed throughout several organs, including digestive system and lungs. The neuroendocrine cells have characteristics of both nerve and endocrine cells. The neuroendocrine cells are locally aggregated constituting certain endocrine organs, such as adrenal medulla or are scattered throughout all organs with an epithelial lining (disseminated/diffuse neuroendocrine system- DNES). Tumors that arise from DNES, commonly involve the gastrointestinal tract, followed by the lung[1] . In the head and neck region, most tumors involve the larynx followed by salivary glands [2] .

Neuroendocrine cells of the oral mucosa:

Merkel cell, which is a member of the DNES, is the neuroendocrine cell of the oral mucosa. They are distributed in the basal layer of keratinized mucosa of gingiva and hard palate. They appear as scattered clear cells, occurring singly or in clusters[3] . They are not readily identifiable at light microscopic level. Immunohistochemically, they are positive for cytokeratins (CK 8, 18,19, 20)[3], villin, chromogranin A, synaptophysin, neuron specific enolase, vasoactive intestinal polypeptide, pancreastatin, substance P, epithelial and neural cell adhesion molecules and S-100 [4]. Dual expression of both epithelial antigens and neurosecretory substances are characteristic of both normal and neoplastic Merkel cells. But they show variability in expression of the various markers[5] . Merkel cells function as mechanoreceptors and mediate the sense of touch [6]. Ultrastuctural studies reveal the presence of a nuclear rodlet [7] .

Classification of neuroendocrine tumors:

Neuroendocrine tumors at any anatomic site, are classified into two groups [8] :

Group I: Tumors showing epithelial differentiation

Group II: Tumors showing neural features.

Group I

Well-differentiated neuroendocrine carcinoma (carcinoid tumor)

Moderately differentiated neuroendocrine carcinoma (atypical

Corresponding author:
Dr. Sona Baburathinam
Department of Oral Pathology and Microbiology,
Asan Memorial Dental College and Hospital
Chengalpatu, Tamil Nadu, India

carcinoid tumor)

Poorly differentiated neuroendocrine carcinoma, small cell type

Poorly differentiated neuroendocrine carcinoma, large cell type

Pituitary adenoma/carcinoma

Group II

Granular cell tumor

Heterotopic glial tissue

MPNST - Malignant peripheral nerve sheath tumor

Malignant melanoma

Neurofibroma

Olfactory neuroblastoma

Paraganglioma

PNET/Ewing's sarcoma

Schwannoma

(PNET- peripheral neuroectodermal tumor.)

Group I neoplasms:

Majority of lesions in the head and neck region arise from the larynx, while the second most common site is the salivary gland. Majority of lesions in the larynx are moderately differentiated, but those arising in the salivary gland are of poorly differentiated, small cell type. The well-differentiated neuroendocrine carcinoma or the "typical carcinoid tumor" grows in nests and cords, composed of uniform cells having 'salt and pepper' chromatin distribution [9] .

The moderately differentiated neuroendocrine carcinoma or the "atypical carcinoid tumor" grow in nests and cords with peripheral palisading of nuclei. There is mild-moderate nuclear pleomorphism seen [10].

The poorly differentiated neuroendocrine carcinoma, small cell type that occurs in the salivary glands is composed of sheets of spindled to oval cells with little cytoplasm and high mitotic rate. Areas of necrosis are common. Foci of glandular differentiation may be seen[11]. Poorly differentiated neuroendocrine carcinoma, large cell type is composed of intermediate to large cells. The sino-nasal undifferentiated carcinoma is a classic example [12]. The pituitary adenoma may arise in the nasopharynx as an ectopic mass[13].

Group II neoplasms:

Granular cell tumor:

It is a rare, benign, soft tissue tumor that arises from Schwann cells[14]. The lesion could be benign or malignant. Abrikosoff, in 1926 described a tumor of the tongue that was composed of granular cells. The granular cells are large, polygonal, oval or bipolar cells with abundant fine or coarsely granular cytoplasm and an eccentrically located vesicular, pale staining nucleus. The cells occur in ribbons separated by fibrous septa. Pseudoepitheliomatous hyperplasia is characteristic. Of the head and neck lesions, 70% occur intaorally in the tongue, buccal mucosa and hard palate[14]. Granular cells are positive for S 100, neuron specific enolase, laminin and myelin basic protein, confirming their neural origin[15].

Malignant peripheral nerve sheath tumor:

They are rare, highly aggressive soft tissue sarcomas of ectomesenchymal origin that may arise de novo or from a pre-existing neurofibroma. There is a higher incidence in patients with neurofibromatosis I and in those with radiation exposure[16]. Most tumors have spindle cells arranged in fascicles and resemble fibrosarcoma. Mitotic activity is high. Few tumors exhibit variable differentiation. A MPNST with rhabdomyoblastic differentiation exhibits both skeletal muscle and neural differentiation. Other tumors with differentiation include glandular malignant Schwannoma, epithelioid malignant Schwannoma and superficial epithelioid variant[17].

Malignant melanoma:

It is aggressive neoplasm composed of small round cells resembling small cell carcinoma or lymphoma. They may be composed of epithelioid cells, rhabdoid cells or spindle cells[18]. They thus mimick a variety of sarcomas. They exhibit diffuse positive staining for S 100 protein, HMB-45 and anti-tyrosinase [2].

Olfactory neuroblastoma:

Rare tumor that is found in the nasal cavity and nasopharynx. They may also arise from the maxillary sinus or invade it. Microscopically, they are composed

of densely packed masses of small darkly staining cells, with poorly defined eosinophilic cytoplasm and round, vesicular nucleus. Rosette formation with non-ciliated columnar cells and eosinophilic neurofibrils is commonly found. Stroma has a fibrillar neuroid pattern. Few mitotic figures are seen[19].

Paraganglioma:

The tumor is characterized by presence of round or polygonal epithelioid cells that are organized into nests or zellballen. The nests are composed of chief cells, with centrally located vesicular nucleus and a granular, eosinophilic cytoplasm. The tumor is vascular and is surrounded by a thin fibrous capsule [20].

Melanotic neuroectodermal tumor of infancy:

This tumor has a striking predilection for head and neck, frequently involving anterior maxilla. They have a biphasic population of small and large cells forming alveolar or tubular patterns. The small cells resemble neurofibroblasts, while the large cell shave prominent cytoplasmic melanin pigment. The larger cells are positive for cytokeratin, vimentin and HMB-45. Both cell types are positive for neuron specific enolase and may also exhibit positivity for Leu-7 or muscle markers. They may also stain for synaptophysin and GFAP[21].

Conclusion

The basis of classification of neuroendocrine tumors is largely determined by their histologic differentiation. Though they reveal biologic heterogeneity, there should be an awareness of the occurrence of such lesions in the oral cavity to enable them to be detected and treated early.

Ethical Clearance: Not required

Source of Funding: Self

Conflicts of Interest : Nil .

References

1. Rosai J. An evolutionary view of neuroendocrine cells and their tumors. Int J Surg Pathol 2001; 9: 87–92.
2. Mills SE. Neuroectodermal neoplasms of the head and neck with emphasis on neuroendocrine carcinomas. Mod Pathol 2002; 15: 264–78.
3. Barrett AW, Cort EM, Patel P, Berkovitz BK. An immunohistological study of cytokeratin 20 in human and mammalian oral epithelium. Arch Oral Biol 2000; 45: 879–87.
4. Garcia-Caballero T, Pintos E, Gallego R, et al. MOC- 31⁄Ep-CAM immunoreactivity in Merkel cells and Merkel cell carcinomas. Histopathology 2003; 43: 480–4.
5. Shah IA, Netto D, Schlageter MO, Muth C, Fox I, Manne RK. Neurofilament immunoreactivity in Merkel-cell tumors: a differentiating feature from small-cell carcinoma. Mod Pathol 1993; 6: 3–9.
6. Toyoshima K, Seta Y, Takeda S, Harada H. Identification of Merkel cells by an antibody to villin. J Histochem Cytochem 1998; 46: 1329–34.
7. Fortman GJ, Winkelmann RK. The Merkel cell in oral human mucosa. J Dent Res 1977; 56: 1303–12.
8. Mills ES, Fechner ER. Neuroectodermal neoplasms of the head and neck with emphasis on neuroendocrine carcinomas. Mod Pathol 2002; 15(3): 264-78.
9. El-Naggar AK, Batsakis JG. Carcinoid tumor of the larynx. A critical review of the literature. ORL J Otorhinolaryngol Relat Spec 1991; 53: 188–93.
10. Woodruff JM, Senie RT. Atypical carcinoid tumor of the larynx. A critical review of the literature. ORL J Otorhinolaryngol Relat Spec 1991; 53: 194–209.
11. Gnepp DR, Corio RL, Brannon RB. Small cell carcinoma of the major salivary glands. Cancer 1986; 60: 1583–8.
12. Levine PA, Frierson HF Jr, Stewart FM, Mills SE, Fechner RE, Cantrell RW. Sinonasal undifferentiated carcinoma: a distinctive and highly aggressive neoplasm. Laryngoscope 1987; 97: 905–8.
13. Lloyd RV, Chandler WF, Kovacs K, Ryan N. Ectopic pituitary adenomas with normal anterior pituitary glands. Am J Surg Pathol 1986; 10(8): 546–52.
14. Dive A, Dhobley A, Fande PZ, Dixit S. Granular cell tumor: Report of a case. J Oral MAxillofac Pathol 2013; 17(1): 148-52.
15. Enzinger FM, Weiss SW. 4th ed. St Louis: Mosby; 2001. Soft Tissue Tumors; pp. 1178–87
16. Minovi A, Basten O, Hunter B, Draf W, Bockmühl U. Malignant peripheral nerve sheath tumors of the head and neck: management of 10 cases and

literature review. Head Neck. 2007; 29: 439–45.

17. Shyama PS, Gangothri S, Reddy KS, Basu D, Ramkumar A. Malignant peripheral nerve sheath tumor of the mandible: A case report and review of literature. J Neurol Res. 2011; 1: 219–22.
18. Franquemont DW, Mills SE. Sinonasal malignant melanoma. A clinicopathologic and immunohistochemical study of 14 cases. Am J Clin Pathol 1991; 96: 689–97.
19. Shafer, Hine and Levy. Shafer's Text book of Oral Pathology, 6th Ed. New Delhi, India; Reed Elsevier India Private Limited: 2009. P. 183.
20. Brad W. Neville, Doughlas D. Damm, Carl M. Allen, Jerry E. Bouquot. Oral and Maxillofacial pathology, 3rd Edition, Gurgaon, India; Reed Elsevier India Private Limited: 2013. P. 535.
21. Kapadia SB, Frisman DM, Hitchcock CL, Ellis GL, Popek EJ. Melanotic neuroectodermal tumor of infancy. Clinicopathologic, immunohistochemical, and flow cytometric study. Am J Surg Pathol 1993; 17: 566–73.

Does Oral Health Have an Impact on Self Perceptions, Parental Ratings and Photographic Assessments of a Child's Smile?

Suganya.P[1], Prabu. D[2], Sunayana Manipal[3], Rajmohan[3], Bharathwaj[3], Bharathwaj[4,] M.R.Prashanthy[1]

[1](1st Year Post Graduate) [2] (Head Of The Department,[3].Reader, [4]Lecturer, Department Of Public Health Dentistry, SRM Dental College, Ramapuram

Abstract

AIM: To determine whether there is a relationship between the oral health of a child and evaluation of the child's smile by self-perception, their parents perception and through measurements by photographic assessment.

MATERIALS AND METHODS: A Cross sectional study was conducted among 100 children to determine their oral health status. The children and parents were given a questionnaire to assess the child's self-perception of their smile, the parents also responded to questions directed at evaluating the smile of their children. Then the photographs of children were taken at 2 occasions one when they were at rest position and the other photograph was taken when the child was smiling.

RESULTS: The child's self-evaluation correlated significantly with the photographic assessment of the smile and the number of positive responses by the parents. There were significant relationships between oral health indicators and the overall smile evaluation scores. The children with less decayed teeth showed more teeth while smiling and received more positive responses by the parents than children with decay.

CONCLUSIONS: Poor oral health is related to the child's smiling patterns and the way others perceive their smile. Poor oral health may significantly impair a child's smile and may impact the child's social interactions, confidence level and the way they feel about themselves

Key Words-*Oral health, child's smile, photographic assessment*

Introduction

Dental caries though preventable is very common in young children. Especially children from low socioeconomic background are highly vulnerable to dental caries, the dental need is the greatest in this group. Poor oral health in children manifests in various ways later in the course of their life .Dental caries in the primary dentition is an indicator that the individual is highly susceptible to caries in future[1.]

Corresponding Author:
Suganya.P (1st Year Post Graduate) Department Of Public Health Dentistry
SRM Dental College, Ramapuram
Mail Id: Suganyavvk92@Gmail.Com

Dental caries has also been seen as the major reason for emergency dental visits .Toothache was documented as the most frequent complaint at 49% [2]

It is seen that there is a significant relationship between poor oral health and general health status of a chid as well as their height and weight[3]. Caries and its treatment affect children's oral health related quality of life in a significant way there is a social and psychological impact as well[4, 5]

Studies done show that there is a social and psychological impact on the child caused by impaired oral health. A child's smile is very innocent and has certain significance in social interactions .Their own self perceptions are a major indicator of self-confidence and self-esteem. A relaxed natural smile is also an indicative of the comfort level of the child. The smile is the best

way to express our confidence and will power Studies shows that smile plays a great importance to child's social life and their own mood.[6] 'A smile is a curve that sets everything straight' it is a form of greeting and it is very delightful to see a wide beautiful smile. The previous study conducted by Anu Babu et al has showed about the importance of smile[7].

It may even affect the judgement and attractiveness of a person .It shows the welcoming behaviour of a person.[8] Research has shown that children with missing, decayed or stained teeth are very conscious and less confident about smiling.[5]

The objective of this study is to investigate how the oral health of a child is related to their smiling patterns .Taking into account a child's self perception of their smile ,parents proxy evaluation of their child's smile as well as a photographic assessment.

Materials and Method

A cross sectional study was conducted among 100 children of aged 4-12 years in the Department of Public Health and Community Dentistry and Pedodontics ,SRM dental college, Ramapuram, Chennai. The convenience sampling method was used to select the samples.

Inclusion criteria: Children with physical and mental well-being

The parents ranged from age 25 years to 40 years

Exclusion criteria: Children with any systemic diseases

Those who are not willing to participate

Those who didn't fulfil the questionnaire are excluded

Data were obtained from 100 child patients and their parents who consented to participate in the survey. Parents were approached and after receiving their consent the child was examined and asked questions about their smile. Required photographs were taken.

Data consists of three parts

- child's survey

- parents assessment of their child's smile

- photographic assessment of the child's smile

The child survey consists of five easy questions about child's smile which could be answered by the diverse age group from a four year old child to a 12 year old .Questions concerned with the child's smile focussed on their teeth and smiling patterns. Questions included were "Do you like your teeth?", "Are you happy with your teeth and smile?", "do your teeth look nice?", "do you have a nice smile?" and "do you show your teeth when you smile?"

Answers were dichotomous with a simple "yes" or "no"

The total score was the sum of "yes" answers. A higher score indicated that the child was more positive about their smile.

Five parent indices were calculated based on a questionnaire

Index 1 was used as the proxy score which was calculated by averaging scores of two questions. The 5 point Likert scale (1= "disagree strongly" and 5= "agree strongly") was used to answer the questions.

Index 2 was the impact score evaluated by the average response of two questions,(" How much do you think the condition of your child's teeth affects the way your child feels about him/herself?", "How much do you think that the health of your child's teeth affects the way your child smiles?").These responses were based on a 5 point Likert scale ranges from 1= "not at all" and 5= "very much".

Index 3 comprised of the tooth ache score .This score was calculated based on the parent's answer to the question "A tooth ache keeps my child from smiling". The answer was given on a five point scale 1= "Disagree strongly" and 5= "Agree strongly"

Indices 4 and 5 consists of the total number of positive and negative adjectives obtained from the 9 adjectives namely "hides teeth" , "hesitant" , "shy" , "happy", "reserved", "wide smile" ,"shows teeth", "open mouth"," closed mouth" . The positive items number was calculated by adding one point of the adjectives - wide smile, happy, open mouth and shows teeth. The rest were counted as the negative items.

Photographic Assessment

The photographs of the child were taken by a single examiner two photographs were taken for each child one

with the mouth closed indicating when the child's mouth is at the baseline level. The other photograph was taken when the child is smiling. Based on the two photographs three indicators were calculated namely- width of the child's mouth, opening of child's mouth and no. of teeth shown. These indicators were selected based on the assessment of facial expressions.

Child Clinical Examination

The child was clinically examined and the no. of decayed, missing and filled teeth was determined and other details were noted like the number of missing teeth naturally, teeth missing due to caries, the number of restored teeth and the number of extracted teeth.

Results

Children's self-report, the parents proxy assessment and photographic assessment of the children's smile (Table 1)

The children's self-assessment of their smile as measured with number of teeth shown (r=0.736,P=0.05) and mouth width (r=0.436,P=0.05) correlated significantly

Children who were more positive about their smile showed more teeth and had wider smiles.

It also correlated significantly with the parent's assessment of the child's smile proxy score (r=-0.522,P=0.05) and the impact score (r=-0.490,P=0.05)

The most significant variable was the number of positive (r=0.693,P=0.05) and negative(r=-0.712,P=0.05) adjectives chosen.

The more the child liked his smile the parents corresponded with choosing more number of positive and negative adjectives.

TABLE 1 Correlations between the children's self report, the parent proxy and own assessments, and photographic smile assessment

Correlations between the children's self report, the parent proxy and own assessments, and photographic smile assessment									
	Child_ assessment	**Proxy_ score**	**Impact_ score**	**Tooth_ache**	**No_ positive_ adj**	**No_ neg_adj**	**width**	**mm_ open**	**No _teeth**
Child_ assessment	1	-.522**	-.490**	-0.127	.693**	-.712**	.436**	.403**	.736**
Proxy_score	-.522**	1	.913**	0.14	-.472**	.507**	-.327**	-.487**	-.504**
Impact_score	-.490**	.913**	1	0.117	-.407**	.436**	-.314**	-.460**	-.463**
Tooth_ache	-0.127	0.14	0.117	1	-.222*	.201*	-.174*	0.038	-0.097
No_positive_ adj	.693**	-.472**	-.407**	-.222*	1	-.898**	.424**	.374**	.751**
No_neg_adj	-.712**	.507**	.436**	.201*	-.898**	1	-.401**	-.429**	-.701**
Width	.436**	-.327**	-.314**	-.174*	.424**	-.401**	1	.417**	.411**
mm_open	.403**	-.487**	-.460**	0.038	.374**	-.429**	.417**	1	.516**
No_teeth	.736**	-.504**	-.463**	-0.097	.751**	-.701**	.411**	.516**	1

The single star (*) represents the 0.01 level of significance and double stars (**) represents the 0.05 level of significance.

Children's self-report, the parents proxy assessment and photographic assessment of the children's smile (Table 1)

The children's self-assessment of their smile as measured with number of teeth shown (r=0.736,P=0.05) and mouth width (r=0.436,P=0.05) correlated significantly

Children who were more positive about their smile showed more teeth and had wider smiles.

It also correlated significantly with the parent's assessment of the child's smile proxy score (r=-0.522,P=0.05) and the impact score (r=-0.490,P=0.05)

The most significant variable was the number of positive (r=0.693,P=0.05) and negative(r=-0.712,P=0.05) adjectives chosen.

The more the child liked his smile the parents corresponded with choosing more number of positive and negative adjectives.

TABLE 2 Correlation between objective oral health indicators and child self-evaluations, parents proxy and own evaluations, and photographic assessment of the children's smile

Correlation between objective oral health indicators and child self-evaluations, parents proxy and own evaluations, and photographic assessment of the children's smile									
	Child assessment	**Proxy score**	**Impact score**	**Tooth_ ache**	**No_ positive_ adj**	**No_neg_ adj**	**width**	**mm_ open**	**No_ teeth**
DMFT	-.711**	.801**	.771**	.199*	-.615**	.616**	-.480**	-.483**	-.639**
Missing (natural)	-.497**	.457**	.394**	0.111	-.468**	.446**	-.201*	-.269**	-.475**
Caries	-.432**	.467**	.667**	.167*	-.216*	.245**	-.229*	-.325**	-.233**
RESTORED	-.454**	.900**	.644**	0.138	-.450**	.486**	-.278**	-.422**	-.451**
EXTRACTED	-.354**	.626**	.890**	0.066	-.250**	.266**	-.235**	-.334**	-.321**

The single star (*) represents the 0.01 level of significance and double stars (**) represents the 0.05 level of significance.

Correlation between objective oral health indicators and child's self-evaluations, parents proxy and own evaluation and photographic assessment of the child's smile (Table 2)

The child's self-assessment correlated significantly with the DMFT (r=-0.711,P=0.05) and number of naturally missing teeth (r=-4.97,P=0.05)

In addition it also correlated with number of decayed teeth (r=-0.432,P=0.05)

Children who felt less positive about their smiles had a higher DMFT index and more number of naturally missing teeth. Their smiling was affected by the change from deciduous to permanent dentition

Table 3: Average child self reports, parent proxy and own assessments, and photographic assessment of smiles of children without versus with decay:

		No Decay (n = 42)	Decay (n = 58)
Children Assessment	Child_assessment	5	2.24
Parent's Assessment	Proxy_score	0	0.59
	Impact_score	0	0.48
	Tooth_ache	3.71	3.98
	No_positive_adj	1.90	0.69
	No_neg_adj	0.19	1.29
Photographic Assessment	Width	0.85	0.40
	mm_open	0.80	0.47
	No_teeth	5.67	2.98

Average child self-reports, parent proxy and own assessments, and photographic assessment of smiles of children without versus with decay(Table 3)

The group comparisons were conducted between the group of children with no decayed, missing, and filled primary teeth due to caries (group 1; n = 42) and the group of children (group 2; n = 58) who had at least one decayed, missing or filled primary tooth due to caries. Children in group 1 (children with no decay) agreed on average with 5 of the five positive statements describing their smiles, while the children in group 2 (with decay) agreed only with 2.24 of the five statements.

The parent's assessments of the smiles of the children in the "no decay" group also differed significantly from the assessments of the smiles in the "decay" group in several ways.

There was a tendency for the children in the "no decay" group to show more teeth than the children in the "decay" group. On average, healthy children showed 5.67 teeth when they smiled, while children with decay showed only 2.98 teeth.

Disscussion

There has been extensive research to assess the implications that poor oral health can have on the quality of life[4,9] and general health there has not been research to indicate whether a child's oral health is reflected on their smiling patterns ,their own perceptions of their smile and the parents perception of the child's smile. Although orthodontists are the ones that primarily deal with perfect smiles[10] but this research shows how poor oral health can also affect the smiling patterns of a child.

Smiling is very essential for communication and elicits a confidence in a child ,smiling faces were evaluated as being more sincere, more sociable and more competent than non smiling faces[7] and were evaluated more positively, Moreover, a smiling person was perceived to be more intelligent and could create in the perceiver a warm feeling more so than a nonsmiling person[11]

This research showed that children were aware about how good their smile was. The children's self-evaluation

correlated significantly with the ratings of their photographed smiles as well as their parents evaluations of how positive the child's smile was. Studies have shown that by using appropriate questionnaire techniques, valid and reliable information can be obtained from children concerning their oral health[12].The research also showed significant similarities between the child's and the parents evaluation of the child's smile indicating that the parents were well aware of their child's smile. Research done on parental ratings of a child's smile shows that parents can be a reliable source of information on a child's smile[12]

Smiling is of great importance in social interaction, communication and confidence hence it is imperative to explore the aspects that affect a child's smile .Poor oral health significantly affected the smiling patterns of a child as shown by the photographic assessments, the child's own perceptions and the parental ratings. Most of these measures are calculated based on questionnaires which are affected by a number of factors like the parents knowledge of their child's smile, their personal style of responding to any survey and the child's knowledge and understanding of the questions. However the results were significant which supported the hypothesis that a child's smiling pattern and their oral health was related.

The results of this study also showed that children with good oral health were more likely to describe their smile more positively, showed more teeth when they smiled and had more positive evaluations by their parents.

These findings stresses even more on the importance of a good oral health care in Children since it has a great impact on the overall development and quality of life of a child.

Limitations

A possible limitation of this study was that the children who participated in this survey had come for a dental check up and it is possible that they would have expressed more positive emotions if this had been done in some other setting. In addition to this the photographs were rated manually and not by complex computer software to measure the smiles.

Conclusions

A child's self evaluations of their smile provide valid information about how they feel about themselves. They significantly correlated with the photographic assessment as well as the parent's description of their children's smile.

There is a clear relationship between a child's oral health status and the evaluations of their smile done by photographic assessment, by the children themselves and their parents. Children with Dental caries as measured with the dmft were less positive about their smile this also correlated with the parent's assessment and the photographic assessment; poor oral health affected the child's quality of life and had an impact on their confidence, social interactions and self-perceptions.

Ethical Clearance: The Ethical approval was obtained from the department of Public Health Dentistry, SRM Dental College, Ramapuram.

Conflict of Interest: NIL

Source of Funding: NIL

References

1. Johnsen DC, Gerstenmaier JH, DiSantis TA, Berkowitz RJ. Susceptibility of nursing-caries children to future approximal molar decay. Pediatr Dent. 1986 Jun;8(3):168-70.
2. Fleming P, Gregg TA, Saunders ID. Analysis of an emergency dental service provided at a children's hospital. International journal of paediatric dentistry. 1991 Apr;1(1):25-30.
3. Nicolau B, Marcenes W, Allison P, Sheiham A. The life course approach: explaining the association between height and dental caries in Brazilian adolescents. Community dentistry and oral epidemiology. 2005 Apr;33(2):93-8.
4. Filstrup SL, Briskie D, Da Fonseca M, Lawrence L, Wandera A, Inglehart MR. Early childhood caries and quality of life: child and parent perspectives. Pediatric dentistry. 2003 Sep;25(5):431-40.
5. Low W, Tan S, Schwartz S. The effect of severe caries on the quality of life in young children. Pediatric dentistry. 1999;21(6):325-6.
6. Källestål C, Dahlgren L, Stenlund H. Oral health behaviour and self-esteem in Swedish children. Social science & medicine. 2000 Dec 15;51(12):1841-9.
7. Anu Babu, Suganya P, Prabu D, Sunayana, Rajmohan, Bharathwaj. Evaluation of refashioned dental exquisites- A comparative study between

dental professionals and lay persons in India. International Journal of Innovative Science and Research Technology.2019 Sep;4(9):20-24.

8. Reis HT, Wilson IM, Monestere C, Bernstein S, Clark K, Seidl E, Franco M, Gioioso E, Freeman L, Radoane K. What is smiling is beautiful and good. European Journal of Social Psychology. 1990 May;20(3):259-67.
9. Chen MS, Hunter P. Oral health and quality of life in New Zealand: a social perspective. Social science & medicine. 1996 Oct 1;43(8):1213-22.
10. Mackley RJ. An evaluation of smiles before and after orthodontic treatment. The Angle Orthodontist. 1993 Sep;63(3):183-9.
11. Lau S. The effect of smiling on person perception. The Journal of Social Psychology. 1982 Jun 1;117(1):63-7.
12. Barbosa TS, Gavião MB. Oral health-related quality of life in children: part I,II. Int J Dent Hyg. 2008 May;6(2):93-107.

Top Most Cited Articles Related to Dental Caries- A Bibliometric Analysis

Suganya.P[1], Prabu. D[2], Sunayana Manipal[3], Rajmohan[3], Bharathwaj[4], M.R.Prashanthy[1]

[1]1st Year Post Graduate ,[2]Head of the Department, [3]Reader,[4]Lecturer, Department Of Public Health Dentistry, SRM Dental College, Ramapuram

Abstract

BACKGROUND: The bibliometric analysis of articles provides more useful information and scientific knowledge about the field of research. This also helps to encourage the scientists to be updated in the research work.

AIM: The aim of this study is to evaluate the bibliometric analysis of top 30 cited dental caries articles from the year 2000- 2019.

MATERIALS AND METHODS: The top 30 cited articles from the year 2000-2019 were hand searched for bibliometric analysis. The Google Scholar and Scopus databases were used to assess the top 30 cited articles. The parameters such as number of citations, geographical distribution, type of articles and patterns of authorship were assessed.

RESULTS: The top 30 cited articles were ranged from 2165- 418. Most of the articles are review articles and are conducted in the United States of America with maximum number of joint authorship patterns.

CONCLUSION: The bibliometric assessment of dental caries articles helps to enlighten the knowledge as well as provides additional information to design a proper treatment protocol.

***Keywords**: Citations, bibliometric analysis, dental caries, research.*

Introduction

Dental caries is most prevalent multi-factorial disease that exists globally which affects the overall health of the individual. The socio- behavioural, environmental and biological factors are the major risk for the occurrence of dental caries [1]. Based on the etiological factors, the dental caries causes rapid destruction of dental structures which produces complications locally and generally and is most common in developing countries especially among children [2].

Dental caries is the most prevalent non-communicable disease and it affects the permanent dentition in the 1st place whereas it ranks 12th place for the deciduous dentition as per the Global Burden of Disease Study in the year 2015 [3].

Bibliometrics deals with the analysis of academic literature quantitatively which includes various parameters such as number of publications, citations, name of the journal, impact factor of the journal, geographical distribution and institutional affliations. The citation is the reference which was used by a researcher during publication of the article. The bibliometric analysis provides most useful information about the articles and journal which provide easy assess to the population [4].

The scientific journal plays a major role in providing knowledge about the research. This also provides more interaction and participation of the authors to develop their skills in research especially in developing countries. The topic of journals related to health provides more

Corresponding Author:
Suganya.P
(1st Year Post Graduate) Department Of Public Health Dentistry, Srm Dental College, Ramapuram
Mail Id: Suganyavvk92@Gmail.Com

knowledge and awareness in order to maintain health and prevent diseases

This present study aims to evaluate the bibliometric analysis of the top most cited articles related to dental caries.

Materials and Method

The dental caries related articles published from the year 2000-2018 were hand searched using Google scholar and Scopus database. The top most 30 cited articles were ranked based on the citation number provided in the Google Scholar and assessed for bibliometric analysis which includes the no. of citations, journal name, no. of authors, geographical distribution and type of articles.

The inclusion criteria are only the articles published from the year 2000-2018 were selected and those articles published in English language are included. Only the articles with full text are included. The exclusion criteria are the articles published before the year 2000 and the articles published other than the English language are excluded from the study.

Results

Table 1: Ranking of top 30 cited dental caries articles from the year 2000-2018

RANK	ARTICLES	NO. OF CITATIONS
	Selwitz et al, 2007 5	2165
1	Featherstone, 2000 6	1195
2	Ismail et al, 2007 7	997
3	Marinho et al, 2003 8	961
4	Marthaler, 2004 9	899
5	Fejerskov, 2004 10	882
6	Marinho et al, 2013 11	873
7	Harris et al, 2004 12	831
8	Bagramian et al, 2009 13	768
9	Beltran- anguliar et al, 2005 14	751
10	Takahashi et al, 2011 15	712
11	Aas et al, 2008 16	686
12	Nase et al, 2001 17	631
13	Kidd et al, 200 18	620
14	Featherstone, 2004 19	619
15	Walsh et al, 2010 20	613
16	Kassebaum et al, 2015 21	600
17	Tanzer et al, 2001 22	577
18	Touger decker et al, 2003 3	574
19	Sheiham, 2006 23	538
20	Peterson et al, 2004 24	536
21	Peterson, 2005 25	505
22	Featherstone, 2008 26	486
23	Takahashi et al, 2008 27	481
24	Lukacs et al, 2006 28	460
25	Marshall, 2003 29	447
26	Kleinberg, 2002 30	436
27	Berkowitz et al, 2003 31	433
28	Burt et al, 2001 32	429
29	Aahola et al, 2002 33	418
30		

In the table 1, top 30 cited articles related to the dental caries were ranked from the year 2000- 2018. The number of citations ranged from 2165- 418.

Table 2: Rank wise arrangement of journal name with geographical distribution

RANK	COUNTRY	JOURNAL NAME
1	USA	The Lancet
2	USA	The Journal of the American Dental Association
3	USA	Community Dentistry and Oral Epidemiology
4	Brazil	Cochrane database of systematic reviews
5	Switzerland	Caries research
6	Denmark	Caries research
7	UK	Cochrane database of systematic reviews
8	UK	Community dental health
9	USA	American journal of dentistry
10	USA	MMWR surveillance summaries
11	Japan	Journal of dental research
12	Norway	Journal of clinical microbiology
13	Finland	Caries research
14	Denmark	Journal of dental research
15	USA	Journal of dental research
16	UK	Cochrane database of systematic reviews
17	USA	Journal of dental research
18	USA	Journal of dental education
19	USA	Journal of clinical nutrition
20	London	British dental journal
21	Switzerland	Community dentistry and oral epidemiology
22	Switzerland	Community dentistry and oral epidemiology
23	USA	Australian dental journal
24	Japan	Caries research
25	Oregon	The official journal of the human biology association
26	IOWA	Paediatrics
27	USA	Critical reviews in oral biology and medicine
28	USA	Journal- Canadian dental association
29	USA	Journal of dental education
30	Finland	Archives of oral biology

In table 2, the geographical distribution and the name of the journal in which the dental caries articles were published were listed. The journal of dental research and caries research were the most published journal. The USA was the most common place where the study was done.

Table 3: Type of articles

Type of article	No. of articles
Original articles	4
Review articles	25

In table 3, the type of the dental caries articles were discussed. The total of original articles was 4 whereas the review articles were 25

Table 4: Geographical distribution of authors

Geographical distribution	No. of articles
Asia	2
Africa	0
Europe	12
America	16
Australia	0
Antartica	0

The table 4 shows about the geographical distribution of the authors of the dental caries articles

Table 5: Patterns of authorship

Authorship pattern	No. of articles
Single authors	9
Joint authors	21

The table 5 shows about the authorship pattern of the dental caries related articles. Out of 25 articles, 21 articles were joint authors whereas 9 articles were joint authors.

Discussion

In this study the top 30 cited dental caries related articles were ranked and their bibliometrics were assessed. This provides more useful information about the articles by providing more details of the number of citation of articles, study design, geographical distribution of authors and the patterns of authorship for easy assessment to the scientists as well to the public.

Selwitz et al, 2007 was the leading article with highest number of citations 2165. It is a review article and the study was conducted in USA. This gives more information about the dental caries which was published in the year 2007 [5].

The second most cited article by Featherstone which was published in the year 2000 in USA and obtained 1195 citations. This article discussed about the prevention and control of dental caries and it was published in the Journal of American Dental Association [6]. The third most cited article was given by Ismail et al which was published in the year 2007 in USA and obtained 997 citations. This article discussed about the International Caries Detection and Assessment System (ICDAS) method of examining dental caries and it was published in the Community Dentistry and Oral Epidemiology [7].

Table 2 shows about the rank wise arrangement of geographical distribution and journal name of the published articles. The maximum number of studies conducted in USA. This shows that authors from the American continent shows more interest in the field of research.

Table 3 shows that among the top 30 cited dental caries articles most of them are review articles and only 4 of them are original articles. These articles provide more information about dental caries such as prevention, diagnostic approach and various treatment modalities.

Featherstone had published more number of articles when compared to others and all of them were review articles. Among these top 30 cited articles most of the articles were published in the Journal of dental research, Caries Research and Community dentistry and oral epidemiology. The table 4 shows that geographical distribution of the authors of top 30 cited dental caries articles of that all the authors were foreigners of that two authors were from Asian continent, 16 authors are from American continent whereas 13 authors were from Europe continent. The table 5, shows about the authorship patterns of top 30 cited dental caries articles among these 9 of them were single authors whereas 21 of them are joint authors. Most of the articles were done in the country of USA.

Limitations:

The limitations of this study are only articles were hand-searched from Google scholar and Scopus database. The inclusion of other databases such as web of science, science direct and Pubmed will provide more additional information.

Conclusion

This study concludes that the bibliometric analysis of highly cited articles provide most interesting and useful information about the dental caries. The citation of the articles ranged from 2165-418. Most of these articles are review articles and these researches were conducted in the American continent followed by Europe continent.

Ethical Clearance: Since it is a review article, the ethical permission taken from the department of public

health dentistry, SRM dental college, Ramapuram.

Conflict of Interest: Nil

Sourceof Funding: Nil

References

1. Elamin A, Garemo M, Gardner A. Dental caries and their association with socioeconomic characteristics, oral hygiene practices and eating habits among preschool children in Abu Dhabi, United Arab Emirates—the NOPLAS project. BMC oral health. 2018 Dec;18(1):104.
2. Sicca C, Bobbio E, Quartuccio N, Nicolò G, Cistaro A. Prevention of dental caries: A review of effective treatments. Journal of clinical and experimental dentistry. 2016 Dec;8(5):e604.
3. Touger-Decker R, Van Loveren C. Sugars and dental caries. The American journal of clinical nutrition. 2003 Oct 1;78(4):881S-92S.
4. Ullah R, Zafar MS, Riaz I, Hasan SJ. TOP CITED PUBLICATIONS ON FLUORIDE IN RELATION TO ORAL HEALTH: A BIBLIOMETRIC ANALYSIS. Fluoride. 2019 Jul 1;52(3).
5. Selwitz RH, Ismail AI, Pitts NB. Dental caries. The Lancet. 2007 Jan 6;369(9555):51-9.
6. Featherstone JD. The science and practice of caries prevention. The Journal of the American dental association. 2000 Jul 1;131(7):887-99.
7. Ismail AI, Sohn W, Tellez M, Amaya A, Sen A, Hasson H, Pitts NB. The International Caries Detection and Assessment System (ICDAS): an integrated system for measuring dental caries. Community dentistry and oral epidemiology. 2007 Jun;35(3):170-8.
8. Marinho VC, Higgins J, Logan S, Sheiham A. Fluoride toothpastes for preventing dental caries in children and adolescents. Cochrane database of systematic reviews. 2003(1).
9. Marthaler TM. Changes in dental caries 1953–2003. Caries research. 2004;38(3):173-81.
10. Fejerskov O. Changing paradigms in concepts on dental caries: consequences for oral health care. Caries research. 2004;38(3):182-91.
11. Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database of Systematic Reviews. 2013(7).
12. Harris R, Nicoll AD, Adair PM, Pine CM. Risk factors for dental caries in young children: a systematic review of the literature. Community dental health. 2004 Mar;21(1):71-85.
13. Bagramian RA, Garcia-Godoy F, Volpe AR. The global increase in dental caries. A pending public health crisis. Am J dent. 2009 Feb 1;22(1):3-8.
14. Beltrán-Aguilar ED, Barker LK, Canto MT, Dye BA, Gooch BF, Griffin SO, Hyman J, Jaramillo F, Kingman A, Nowjack-Raymer R, Selwitz RH. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis; United States, 1988-1994 and 1999-2002.
15. Takahashi N, Nyvad B. The role of bacteria in the caries process: ecological perspectives. Journal of dental research. 2011 Mar;90(3):294-303.
16. Aas JA, Griffen AL, Dardis SR, Lee AM, Olsen I, Dewhirst FE, Leys EJ, Paster BJ. Bacteria of dental caries in primary and permanent teeth in children and young adults. Journal of clinical microbiology. 2008 Apr 1;46(4):1407-17.
17. Näse L, Hatakka K, Savilahti E, Saxelin M, Pönkä A, Poussa T, Korpela R, Meurman JH. Effect of long–term consumption of a probiotic bacterium, Lactobacillus rhamnosus GG, in milk on dental caries and caries risk in children. Caries research. 2001;35(6):412-20.
18. Kidd EA, Fejerskov O. What constitutes dental caries? Histopathology of carious enamel and dentin related to the action of cariogenic biofilms. Journal of dental research. 2004 Jul;83(1_suppl):35-8.
19. Featherstone JD. The continuum of dental caries—evidence for a dynamic disease process. Journal of dental research. 2004 Jul;83(1_suppl):39-42.
20. Walsh T, Worthington HV, Glenny AM, Appelbe P, Marinho VC, Shi X. Fluoride toothpastes of different concentrations for preventing dental caries in children and adolescents. Cochrane database of systematic reviews. 2010(1).
21. Kassebaum NJ, Bernabé E, Dahiya M, Bhandari B, Murray CJ, Marcenes W. Global burden of untreated caries: a systematic review and metaregression. Journal of dental research. 2015 May;94(5):650-8.
22. Tanzer JM, Livingston J, Thompson AM. The microbiology of primary dental caries in humans. Journal of dental education. 2001 Oct 1;65(10):1028-37.

23. Sheiham A. Dental caries affects body weight, growth and quality of life in pre-school children. British dental journal. 2006 Nov 25;201(10):625.
24. Petersen PE, Lennon MA. Effective use of fluorides for the prevention of dental caries in the 21st century: the WHO approach. Community dentistry and oral epidemiology. 2004 Oct;32(5):319-21.
25. Petersen PE. Sociobehavioural risk factors in dental caries–international perspectives. Community dentistry and oral epidemiology. 2005 Aug;33(4):274-9.
26. Featherstone JD. Dental caries: a dynamic disease process. Australian dental journal. 2008 Sep;53(3):286-91.
27. Takahashi N, Nyvad B. Caries ecology revisited: microbial dynamics and the caries process. Caries research. 2008;42(6):409-18.
28. Lukacs JR, Largaespada LL. Explaining sex differences in dental caries prevalence: saliva, hormones, and "life-history" etiologies. American Journal of Human Biology: The Official Journal of the Human Biology Association. 2006 Jul;18(4):540-55.
29. Marshall TA, Levy SM, Broffitt B, Warren JJ, Eichenberger-Gilmore JM, Burns TL, Stumbo PJ. Dental caries and beverage consumption in young children. Pediatrics. 2003 Sep 1;112(3):e184-91.
30. Kleinberg I. A mixed-bacteria ecological approach to understanding the role of the oral bacteria in dental caries causation: an alternative to Streptococcus mutans and the specific-plaque hypothesis. Critical Reviews in Oral Biology & Medicine. 2002 Mar;13(2):108-25.
31. Berkowitz RJ. Causes, treatment and prevention of early childhood caries: a microbiologic perspective. Journal-Canadian Dental Association. 2003 May;69(5):304-7.
32. Burt BA, Pai S. Sugar consumption and caries risk: a systematic review. Journal of dental education. 2001 Oct 1;65(10):1017-23.
33. Ahola AJ, Yli-Knuuttila H, Suomalainen T, Poussa T, Ahlström A, Meurman JH, Korpela R. Short-term consumption of probiotic-containing cheese and its effect on dental caries risk factors. Archives of oral biology. 2002 Nov 1;47(11):799-804.

A Prospective Study of Intestinal Stomas

Sukhnein Singh[1] , P. K. Bhatia[2] , Kapil Sindhu[3.] , Ashutosh Bawa[1], Nischal Shivaprakash[1], Shabool Nafees[1], Jatin Bedi[1]

[1]Junior Resident, [2]Professor, [3]Assistant Professor, Dept. of Surgery, MMIMSR, Mullana Ambala

Abstract

Background and Objectives: Intestinal stomas are commonly constructed in an emergency as well as elective setting for a variety of indications. Historically associated with a high morbidity, evolution of skills on the part of the surgeon has lead to better understanding of the indications, complications and management of a stoma. This study aims to evaluate the above mentioned parameters and hence improve the outcome of patients undergoing a stoma. **Method** 50 patients admitted in MMIMSR, Mullana (Ambala) and later operated and managed with a stoma were closely followed up from the date of admission to the date of discharge and the various parameters were studied. **Results** The indications, technique, complications and its management were studied in detail by following patients in person or through phone and the results were analyzed in detail. **Interpretation and Conclusion** Construction and management of stoma was associated with a few complications. Most patients however tolerated the procedure well and the overall compliance was satisfactory. Loop ileostomy was the commonly constructed stoma and the one associated with most complications. Transverse loop colostomy was associated with no complications and was extremely well tolerated.

Key Words: *Intestinal stoma, complications, end colostomy, loop ileostomy, loop colostomy, Parastomal hernia, stomal prolapse, loop-end ileostomy.*

Introduction

Stoma was introduced in surgical practice more than 200 years ago as a simple and safe procedure[1]. Littre of Paris, made the first colostomy in baby with imperforate anus, in 1710. The mortality rate of 60% with primary repair of colonic injuries, in World War I, dropped down to 30%, with introduction of colostomy in World War II. Though ileostomy was first performed in 1912, it was widely accepted only after Brooke's modification in 1952. Stomas can be made on a temporary or a permanent basis and can be constructed surgically on an emergency or elective basis. The various surgically constructed forms of stomas include gastrostomy, ileostomy and a colostomy. The procedures like ileostomy or colostomy is necessitated in many patients attending tertiary care hospital.

Materials and Method

The present study entitled "A Prospective Study Of Intestinal Stomas" carried out in the Department of Surgery at Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala from December 2017 to July 2019. After submission and clearance of the synopsis from the Institutional Ethical Committee, MMIMSR, MMU, Mullana, a total of 50 patients admitted in department of surgery, MMIMSR, Mullana, Ambala, who underwent surgical procedure and had resultant stoma (ileostomy/colostomy) were carefully selected by applying specific inclusion and exclusion criteria.

Inclusion criteria

All patients 18 years and above in whom ileostomy/ colostomy has been made, whether in emergency or elective surgery.

Exclusion criteria

- Patients less than 18 years of age.
- Patient not fit for surgery
- Patient with bleeding disorders
- Patient with pregnancy

· Patient with immunocompromised state

The demographic profile of each selected patient as per prescribed Performa.

Clinical assessment of each selected patient was carefully done as per the prescribed Performa

Investigations

All selected patients were then subjected to baseline hematological, biochemical and radiological evaluation at the time of admission.

Preoperative evaluation and anesthesia

All selected patients were then explained regarding the need for surgery and a fully explained, well informed, written consent was taken from them, regarding the procedure.

All patients received preoperative antimicrobial prophylaxis before surgery. The antibiotic given was injection ceftriaxone 1000 mg, injection amikacin 500 mg, injection metronidazole 500 mg.

All operations were performed in supine position under general anesthesia.

Procedure and intra operative assessment

For hollow viscus perforations, laparotomy was done, perforation was closed, through wash was given with normal saline and loop ileostomy was constructed.

Post-operative assessment

Post-operative management consisted of standard nursing care and analgesia.

Dressing was removed in the morning. From day 7 to day 10 notes was made of any wound infection, wound dehiscence and burst abdomen.

Compliance was graded as good, average and poor based on patient's acceptance of the procedure.

Results

Table 1 :Nature of presentation among patients undergoing stoma formation

Nature of presentation	Frequency	Percentage	X^2	P Value
Emergency	29	58%	1.28	**0.25**
Elective	21	42%		
Total	**50**	**100%**		

Table 2: Anatomical type of stoma among patients undergoing procedure

Type of stoma	Frequency	Percentage	X2	P value
Loop Ileostomy	28	56.0	60.8	0.0001
Transverse Loop Colostomy	10	20.0		
End Ileostomy	6	12.0		
End Colostomy	4	8.0		
Loop Colostomy (Sigmoid)	2	4.0		
Total	50	100.0		

Table 3: Nature of stoma among patients undergoing stoma formation

Nature of stoma	Frequency	Percentage	X2	P value
Temporary	46	92%	15.48	0.0001
Permanent	4	8%		
Total	50	100%		

Table 4: Complications among patients undergoing stoma formation

Complications	Frequency	Percentage	X^2	P value
Nil	38	76	128.80	**0.0001**
Local sepsis	5	10		
Necrosis	3	6		
Hernia	2	4		
Prolapse	1	2		
Retraction	1	2		
Total	**50**	**100**		

Table 5 :Complications of stoma with respect to nature of stoma

Complication	Elective	Emergency	X2	P value
Nil	6(12%)	32(64%)	15.7	0.008
Hernia	2(4%)	0		
Local sepsis	0	5(10%)		
Necrosis	0	3(6%)		
Prolapse	1(2%)	0		
Retraction	0	1(2%)		
Total	9(18%)	41(82%)		

Table 6: Type of stoma versus compliance

Patient compliance	Good	Average	poor	X^2	P value
End Colostomy	3(6%)	1 (2%)	0	5.270	0.728
End Ileostomy	2(4%)	2 (4%)	1 (2%)		
Loop Colostomy(Sigmoid)	2(4%)	0	0		
Loop Ileostomy	20(40%)	4(8%)	4 (8%		
Transverse Loop Colostomy	10 (20%)	0	0		

Discussion

The findings can be discussed as follows :

I: Indications for surgery In the present study, 17 patients (34%) had stoma constructed for hollow viscus perforation (jejunum, ileum, colon). 8 patients (16%) undergoing stoma formation had intestinal obstruction for malignant conditions while 7 patients (14%). 2 patients (4%) each had blunt abdominal trauma, diverticular disease, inflammatory bowel disease, peri-anal sepsis, and acute mesenteric ischemia as cause for stoma formation.(X^2 = 41.200, p value = 0.0001).

Ahmad Z et al[46], in his study of 85 patients, in 2009, found that 38% patients requiring stoma formation had enteric perforation, which is comparable to the present study. **Chaudhary P et al[60]**, in his study of 630 patients, in 2013 reported a further higher incidence of enteric perforation requiring stoma formation in the range of 63.8%. However, **Ahmad Z et al[46]** and **HussainS et al[61],** in his study of 100 patients and 106 patients respectively, in 2009 and 2013 respectively, reported a lower incidence of enteric perforation in the range of 12.9% and 25.4% respectively.

2 : Nature of the disease

	Benign	**Malignant**
Keerthana DD et al (2019)	24.1%	75.90%
Roshini AP et al (2017)	67.5%	32.5%
Gujar N et al (2016)	43.4%	46.6%
Sumathi P et al (2015)	52.0%	48.0%
Engida A et al (2014)	89.0%	21.0%
Ahmad Z et al (2012)	83.0%	13.0%
ReRedha AG et al (2002)	62.5%	37.5%
Present Study	78.0%	22.0%

In the present study,39 patients (78%) had benign cause where as 11 patients (22%) had malignant cause. In all malignant conditions colostomy was performed i.e 11 patients (22%). Among benign conditions, 31 patients (62%) had ileostomy and 7 patients (14%) had colostomy. The ratio of benign to malignant cause among patients undergoing stoma formation was 3.54:1

1:Nature of stoma

	Temporary	**Permanent**
MessangaA et al. (2017)	94.0%	6.0%
Roshini AP et al. (2017)	57.5%	42.5%
Hussain S et al. (2013)	66.0%	34.0%
Present Study	92.0%	8.0%

In the present study, 46 patients (92%) underwent a stoma construction for temporary period which was closed accordingly, in the range of 3-6 months. Only 4 patients (8%) underwent permanent stoma construction. (x2 =15.48, p value = 0.0001)

3 : Complications of stoma

	Local sepsis	**Necrosis**	**Hernia**	**Stomal prolapse**	**Stoma lretration**
Messanga A et al. (2017)	16%	2%	2%	42%	7%
Gujar N et al. (2016)	25%	4%	1.6%	7%	4%
Sumathi P et al. (2015)	22%	2%	2%	10%	8%
Kurpad V et al (2015)	25%	5%	2.5%	2.5%	10%
Engida A et al. (2014)	23.3%	4.6%	1.4%	2.7%	5.9%
Pipariya PR et al. (2014)	22%	6%	6%	14%	4%
Present study	10%	6%	4%	2%	2%

In the present study, a total number of 12 patients (24%) had stoma related complications while 38 patients (76%) had no stoma related complications throughout their course of treatment. Maximum number of patients i.e. 5 patients (10%) had local sepsis and excoriation around stoma site, while 3 patients (6%) had stoma necrosis. Two patients (4%)

had parastomal herniation while 1 patient (2%) each had stomal prolapse and stomal retraction.(x^2=128.80, p value =0.0001).

Conclusion

Though stoma formation is life saving, it carries significant number of complications, is associated with decreased quality of life and increased economic health burden.

The common complications associated with stoma formation include local sepsis with excoriation, stomal necrosis, herniation, prolapse and retraction. Stomal necrosis, herniation, prolapse andretraction require stomal revision, while local excoriation demands prevention and conservative management.

Patient's compliance may vary with the nature of complications suffered, its duration and intensity. Patients with no complication may rate the procedure good, even if it is cosmetically unfair, while patients with complication may rate a procedure worse, even if it is lifesaving.

Source of Funding: Self

Conflict of Intrest: Nil

References

1. Taylor P. An introduction to stomas: reasons for their formation. Nurs Times 2005;101:63-4.
2. Ahmad Q A, Saeed M K,Muneera M J,Ahmad M S, Khalid K. Indications and complications of intestinal stomas- A tertiary care hospital experience, Biomedica2010;26:144-7.
3. Warsi AA, Basnyat PS, Stock A.Impact of subspecialization on rectal cancer management. Br J Surg 1999;869Suppl.10:83-115.
4. Khalid AM, Irshad W. Surgical history of intestinal obstruction. Specialist 1991; 8(1):55-60.
5. R. B. Tumbell Jr. and F. L. Weakley, Ileostomy technics and indications for surgery. Review of Surgery 1996; 23: 310-314.
6. Dinnick T. The origins and evolution of colostomy. Br J Surg 1934;22: 142–153.
7. Paul FT. A method of performing inguinal colostomy, with cases. Br Med J1891; 2:118.
8. Bass EM, Pino AD, Tan A et al. Does preoperative stoma marking and education by the enterostomal therapist affect outcome?.Dis Colon Rectum 1997;40:440-442.
9. Kock NG. Continent ileostomy. ProgrSurg 1973;12:180–201.

10. Eugene D. Gierson MD, Storm F. Blow hole cecostomy, an analysis Arch Surg.1975;110(4):444-445.
11. Clark DD and C Hube tube cecostomy, an analysis of 161 cases. Ann Surg.1972January; 175(1):55–61.
12. Steele SR, Lee P, Martin MJ et al.Is parastomal hernia repair with polypropylene mesh safe?.AmJ Surg2003; 185:436.
13. Allen-MershTG,Thomson JP. Surgical treatment of colostomy complications. BrJ Surg1988;75:416.
14. Makela JT, Turku PH, Laitinem ST. Analysis of late stomal complications following ostomy surgery. Ann ChirGynaecol 1997;86:305.
15. Prian GW, Sawyer RB,SawyerKC. Repair of peristomal colostomy hernias. Am J Surg1975;130:694.
16. Amin SN, Armitage NC, Abercrombie JF, Scholefield JH. Lateral repair of parastomalhernia. AnnRCollSurgEngl2001;83:206.
17. SugarbakerPH.Peritoneal approach to prosthetic mesh repair of paraostomy hernias. AnnSurg1985; 201:344.
18. LeenenLPH,Kuypers JH, Some factors influencing the outcome of stomasurgery. Dis ColonRectum1989;32:500.
19. Park JJ, Del PinoA, Orsay CP et al. Stoma complications: The Cook CountyHospitalexperience. Dis ColonRectum1999; 42:1575.
20. Duchesne JC, Wang YZ, Weintraub SL etal. Stoma complications: A multivariateanalysis. AnnSurg2002; 68:961.
21. Pearl RK, Prasad ML, Orsay CP, Abcarian H, Tan AB, Melze MT. Early local locations from intestinal stomas. Asch Surg 1985; 120(10):1145-47.
22. Tang CL, YunosA, LeongAPet al.Ileostomy output in the early postoperativeperiod. BrJSurg1995;82:607.
23. SzilagyiA, ShrierI Systematic review. The use of somatostatin or octreotide in refractory diarrhea. Aliment PharmacolTher2003;15:1889.
24. Saghir JH, McKenzie FD, Leckie DM. Factors that predict complications after construction of a stoma: A retrospective study. EurJSurg2001; 167:531-534.
25. Makela JT, Turku PH, Laitinen ST. Analysis of late stomal complications following ostomy surgery. AnnChirGynaecol1997; 86:305.
26. Mylonakis E, Scarpa M, Barolla M et al. Life table analysis of hernia following end colostomy construction. Colorect Dis 2001;3:334.
27. Christie PM, Knight GS, Hill GL. Comparison of relative risks of urinary stone formation after surgery for ulcerative colitis: Conventional ileostomy vs. J-pouch- a comparative study. DisColonRectum1996; 39:50.
28. Christie PM, Knight GS, Hill GL. Metabolism of body water and electrolytes after surgery for ulcerative colitis: Conventional ileostomy versus J-pouch. Br J Surg1990;77:149.
29. Voitk A. Simple technique for laparoscopic paracolostomy hernia repair. DisColonRectum2000;43:1451.
30. Price AL, Rubio PA. Laparoscopic colorectal surgery: a challenge for ET nurses. J Wound Ostomy Continence Nurs1994;21:179-18

Effect of Hand Rehabilitation on Hand Grip Strength and Manual Dexterity in Patients with Diabetic Hand Syndrome

Rasika Panse[1], Ujwal Yeole[2], Nikeeta Aher[3]

[1]Assistant Professor, [2]Principal and Associate Professor, [3]Intern, BPT, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra, India

Abstract

Background- In patients with diabetes upper extremity impairments are common. Diabetes patient are more prone to diabetic hand. **Aim-** To study the effect of hand exercises on hand grip strength and manual dexterity in patients with Diabetic hand .**Objectives-** To study the effect of hand exercises on hand grip strength in patients with Diabetic hand using Modified sphygmomanometer test. To study the effect of hand exercises dexterity in patients with Diabetic hand using grip ability scale. To study the effect of hand function in patients with Diabetic hand using Michigan hand outcomes questionnaire (MHQ) and Duruoz Hand Index. **Setting and design** – In this study 15 individual participated having diabetic hand which was selected randomly. Modified sphygmomanometer test was performed on patient to check grip strength. Grip ability scale was performed on patient to check manual dexterity. Hand function was check using Michigan hand outcomes questionnaire (MHQ) and Duruoz Hand Index. The effect of hand exercise on hand grip strength and manual dexterity in patients with diabetic hand was analysied. **Result-** Total 15 individual participated with age mean 58±13.519 and duration of diabetes with mean 11±6.448. Modified sphygmomanometer test result improved from 28.13±3.044 to 32.47±2.875(p=0.001). Grip ability test result improved from 23.13±3.523 to 18.67±1.345(p=0.001). Michigan hand outcome questionnaire result improved from 53.29±10.19 to 71.34±5.036(p=0.001). Duruoz Hand Index result improved from 31.67±11.2 to13.47±4.596(0.001).**Conclusion-** There is significant effect of hand exercises on hand grip strength and manual dexterity in patient with diabetic hand.

Keywords*-Diabetic hand, Hand grip strength, dexterity, Duruoz Hand Index, Michigan hand outcomes questionnaire*

Introduction

Diabetes mellitus is a autoimmune systemic disorder in which there is increase in sugar level due to insulin deficiency. In type 1 and type 2 diabetes hyperglycemia that is poor sugar level causes micro- and macrovascular complications primary to pathophysiological and structural changes in musculoskeletal structures causing diabetic hand.(1) Diabetes mellitus is related with musculoskeletal disorders affecting hand, commonly called to as diabetic hand syndrome. These include limited joint mobility (LJM) (also known as diabetic cheiroarthropathy), Dupuytren's contracture, stenosing tenosynovitis (trigger finger), carpal tunnel syndrome (CTS), Charcot neuroarthropathy, reflex sympathetic dystrophy and a variety of hand infections.(2)

Dexterity means ability to use hand skilfully that is during a specific task fine, voluntary movement used to manipulate small objects. Dexterity can be categorized into manual dexterity that is the skill to handle objects with the hand. Grip strength means the measurable ability to apply pressure on objects or force applied by the hand and fingers.(3). Due to hyperglycemia there is adverse effect on connective and nervous tissue which affects hand functions in conditions of dexterity, grip and pinch strength, hand manipulation skills that can be impaired in patients with types 1 and type 2 diabetes. Due to structural changes in connective tissues, in approximately 50% of individuals with diabetes,

Corresponding Author:
Dr Rasika Panse
Assistant Professor Department of Physiotherapy Tilak Maharashtra Vidyapeeth Pune
Phone numbers: 9689362993
E-mail address : panserasika09@gmail.com

musculoskeletal impairments in hand like limited range of motion, tenosynovitis, Dupuytren's contracture, and altered nerve function are noted which affect hand function in terms of strength, dexterity, fine motor skills, and hand performance.(1)

In diabetes, limited joint mobility is considered to be caused by non-inflammatory thickening and increased stiffness in the peri-articular structures. Limited joint mobility may lead severe upper extremity impairments related with pain and disability. The incidence of limited joint mobility and associated impairments at the shoulder and hand can have a important impact on upper extremity function in diabetic patient.(4) Dupuytren's contracture is also called as palmar fibromatosis is thickening of tissue in palmar skin most commonly involving the middle and ring fingers in diabetes.(2) **Carpal tunnel syndrome is a neuropathy that occurs frequently, when the median nerve that passes through the carpal tunnels of the flexor tendons is contracted by the transverse carpal ligament and carpal bones. Diabetes mellitus is the most common metabolic disease that causes Carpal tunnel syndrome.(4)**

Materials and Method

Ethical clearance was taken from institutional ethical committee of Tilak Maharashtra Vidyapeeth, department of physiotherapy. Permission Different centers was approached and permission was obtained prior to study. Explanation of the experiment was given to the patient. A Pre and Post Experimental study was conducted at various diabetic Clinics. Total 15 individual which were medically diagnosed cases of diabetic hand syndrome were selected. Modified sphygmomanometer test, Grip ability scale, Duruoz Hand Index, Michigan hand outcomes questionnaire (MHQ) was used pre and post intervention. Patient with diabetes mellitus both type I and type II, both male and female, patient willing to participate were included in study whereas patient with osteoarthritis, rheumatoid arthritis and fracture of hand were excluded from the study. Intervention protocol was given for 3 weeks 30 minutes 5 min flexor tendon gliding and blocking exercises, 5 min extension gliding exercises, 5 min rest, 10 min strengthening, 5 min rest. Intervention protocol include –Flexor Tendon Gliding Exercises, Flexor Tendon blocking exercises, Extension tendon Gliding exercise, Stretching technique for Intrinsic and multijoint muscles, Technique to strengthen muscles of wrist and hand.

Result

Study showed that out of 15 individual 6 were male and 9 were female (Table 1). Age with mean 58±13.519 and duration of diabetes with mean 11±6.448(Table 2). Modified sphygmomanometer test result improved from 28.13±3.044 to 32.47±2.875 with p value = 0.001(Table 3). Grip ability test result improved from 23.13±3.523 to 18.67±1.34 with p value = 0.001(Table 3). Michigan hand outcome questionnaire result improved from 53.29±10.19 to 71.34±5.036 with p value = 0.001(Table 3). Duruoz Hand Index result improved from 31.67±11.2 to13.47±4.596 with p value = 0.001(Table 3).

Table 1- Pre and post intervention

Outcome measues	Pre Mean±SD	Post Mean±SD	p value
Modified sphygmomanometer test	28.13±3.044	32.47±2.875	0.001
Grip ability test	23.13±3.523	18.67±1.345	0.001
Michigan hand outcome questionnaire	53.29±10.19	71.34±5.036	0.001
Duruoz Hand Index	31.67±11.2	13.47±4.596	0.001

Discussion

Study showed that out of 15 individual 6 were male and 9 were female. For age Mean= 58 SD=13.51 and median=53. For duration of diabetes Mean=11 SD=6.448 and median=10. Pre and post intervention performed noted that for Modified sphygmomanometer test p value= 0.001, Grip ability test p value= 0.001, Michigan hand outcome questionnaire p value= 0.001, Duruoz Hand Index p value= 0.001.

Diabetic hand syndrome is a common but less discussed. Pathologies that were examined in diabetic hand syndrome occur in general population as well. Moreover they are more common in patients with diabetes. These may differ in their Clinical presentation, course and response of treatment in diabetics compared to normal population. This condition has also been called to as diabetic pseudoscleroderma and the term shoulder-hand syndrome is often used when combined with adhesive capsulitis of the glenohumeral joint,.

Research conducted by De Carvalho e Silva et al. on the hand strength and functions in type 2 DM patients, found that hand functions and grip strength impairment are present in patient with type 2 DM . Similarly, Savas et al. And Cetinus et al. found that in patients with type 2 DM grip strength values were reduced than normal individuals. Lewko et al. investigated hand functions and dexirity in patients with DM and found out that poor hand functions are seen in patients with diabetes that leads to reduced quality of life as result of impaired hand function. Hence, it is important to assess hand function and treat it [6]

Muscle weakness is prominently seen in patients with diabetes and is mostly affected in Insulin resistance (Sayer et al, 2005) and, as a result patient exhibit reduce grip strength. researchers conducted by Rantanen et al (1999) an Leveille et al (2004) have reported that patients with type 2 diabetes mellitus showed that there is decreased handgrip strength.[7]

Strength training which employs principles of working at the level of motor neurons can benefit the hand dysfunction. Strength training improves glycemic control and improves grip strength and endurance and it leads to improvement in hand function in patient with diabetic neuropathy. Grip strength training exercises improved hand function in patient with diabetic neuropathy.[7]

Duruöz Hand Index (DHI) is a functional disability scale that can be used to assess the functional disability of hand. The hands are oftenly involved in diabetic patients. The DHI is a practical scale that is efficient in accurate assessment of hand dysfunction in diabetic patients.[8]

The recent study was done to study the effect of strength training on hand function in patient with diabetic neuropathy on 30 patients diagnosed with neuropathy .The patients were assessed and strengthening exercise were given. In Grip strength comparisons of post test values in group A are mean 34.80 and SD 12.23. Group B Mean 35.33 and SD 11.64. These values suggest they are statistically significant. These values suggest they are statistically significant. The study concluded that there was significant effect in giving strength training on hand function in patient with diabetic neuropathy.[9]

Active muscle contraction and specific motions of the digits are used to maintain or develop mobility between the multiple joint musculo-tendinous units and other connective tissue structures of hand. Tendon-gliding exercises and tendon-blocking exercises are used to develop or maintain mobility. These exercises used to develop neuromuscular control of hand musculature. The flexor tendon blocking exercises and extensor tendon-gliding exercise are used to strengthen the musculature by adding resistance manually or mechanically. [10]

Hand-specific exercises have also been emphasised as an efficient way of increasing handgrip

strength and functionality of RA individuals. Hand specific exercise improves hand grip strength and functionality of hand .Muscle strengthening exercises of hand improves functional performance, Quality of Life and muscle force gain. Strength training exercise improves lost function .During Hand movements, Balance between intrinsic and extrinsic muscle is quintessential for correct stabilization of joints in hand. [11]

Hence hand exercises like flexor tendon blocking exercises and extensor tendon-gliding exercise , intrinsic muscle strengthening exercise plays vital role in improving hand grip strength andmanual dexterity in patient with diabetic hand

Conclusion

There is significant effect of hand rehabilitation

exercise, flexor tendon blocking exercises and extensor tendon-gliding exercise , intrinsic muscle strengthening exercise on hand grip strength and manual dexterity in patient with diabetic hand. Hence rehabilitation plays an important role in management of hand dysfunction in patients with Diabetes

Acknowledgement: Thanks to all patients for participating and co-operating in the study. Special thanks to Prof. Tuncay Duruöz who permitted the use of scale Duruoz hand index. Also thanks to all teaching and non- teaching staff of Department of physiotherapy, Pune for giving support, encouragement during research project work.

Conflict of Interest : Nil

Source of Funding : Self

References

1. Wani SK, Mullerpatan RP. Hand function in people with type 1 and type 2 diabetes. International Journal of Diabetes in Developing Countries. 2019 Jul 1;39(3):523-7.
2. Goyal A, Tiwari V, Gupta Y. Diabetic Hand: A Neglected Complication of Diabetes Mellitus. Cureus. 2018 Jun;10(6).
3. Langer D, Maeir A, Michailevich M, Luria S. Evaluating hand function in clients with trigger finger. Occupational therapy international. 2017.
4. Sözen T, Başaran NÇ, Tınazlı M, Özışık L. Musculoskeletal problems in diabetes mellitus. European journal of rheumatology. 2018 Dec;5(4):258.
5. Kisner C, Colby LA, Borstad J. Therapeutic exercise: Foundations and techniques. Fa Davis; 2017 Oct 18.pg no 631-638.
6. Akpinar[1] P, Icagasioglu A, Selimoglu E, Mesci B. Hand functions in type 1 and type 2 diabetes mellitus. Srp Arh Celok Lek. 2017 Nov;145(11-12):584-8..
7. Thorat KD, Ganvir S. Effectiveness of strength training on hand function in patients with Diabetic neuropathy. Indian Journal of Basic and Applied Medical Research. 2015 Sep;4:429-37.
8. Turan Y, Duruöz MT, Aksakalli E, Gürgan A. Validation of Duruöz Hand Index for diabetic hand dysfunction. Journal of Investigative Medicine. 2009 Dec 1;57(8):887-91.
9. Brijwasi S. A Study to Evaluate the Effect of Strength Training on Hand Functions in Diabetic Neuropathy Patients. Indian Journal of Physiotherapy & Occupational Therapy. 2017 Jul 1;11(3).
10. Kisner C, Colby LA. Therapeutic exercise. Foundations and techniques. 2002;4.
11. Cima SR, Barone A, Porto JM, de Abreu DC. Strengthening exercises to improve hand strength and functionality in rheumatoid arthritis with hand deformities: a randomized, controlled trial. Rheumatology international. 2013 Mar 1;33(3):725-32.

Association of Severity of Autism Spectrum Disorder with Cardiac Autonomic Indices in Children

Remya Bharath[1], Shailaja S. Moodithaya[2], Ashwini Kishan[3], Shrinivasa Bhat U[4], Suchetha Kumari N[5], C. H. Krishna Bhat[6]

[1]Research Scholar, [2]Additional Professor, [3]Associate Professor, *Department of Physiology, [4]Professor, Department of Psychiatry, [5]Professor, Department of Biochemistry,* [6]Professor, *Department of Biostatistics, K. S. Hegde Medical Academy, Nitte (Deemed to be University), Deralakatte, Mangalore, Karnataka*

Abstract

Background & Objectives: Autism Spectrum Disorder (ASD) being a complex neuro-developmental disorder is found to be associated with Autonomic Nervous System (ANS) dysfunction. The sympatho-vagal continual dynamic excitatory- inhibitory interactions leads to Heart Rate Variability (HRV) which is an index of cardiac autonomic regulation**.** Aim of the study was to evaluate cardiac autonomic regulation in children with ASD at rest using short-term HRV analysis and to correlate it with severity of autism.

Methods: A total of 30 subjects were evaluated in the study comprising of 15 ASD children and 15 healthy controls. A five minutes recording of resting ECG was carried out from which R-R intervals were procured and HRV indices were analysed. Frequency domain analysis of HRV was carried out and the following parameters were evaluated: Spectral powers in low frequency (LF) bands, High frequency (HF) bands, total power (TP), LF/HF ratio and average heart rate (HR) were evaluated. HRV indices between the groups were compared using Student's t test. Severity of autism was correlated with the evaluated HRV indices using Pearson correlation test.

Results: Cardiac sympathetic activity as assessed by low frequency power spectrum ('p' value 0.034) and total power ('p' value 0.023) of the HRV spectrum was significantly higher in autistic children compared to that of normal controls. However, the association between severity of ASDs and HRV indices were not statistically significant.

Conclusion: Study concludes that here was no significant association between HRV indices and severity of autism.

Keywords- *Autonomic nervous system, Autism spectrum disorders, Heart rate variability, High frequency, Low frequency.*

Introduction

Autonomic nervous system (ANS) incorporates two opposing branches, the sympathetic and parasympathetic systems that maintain body homeostasis.[1] Functionally, the sympathetic system is activated during "fight-or- flight" situations and is associated with catabolic processes while the parasympathetic system is concerned with the vegetative functions of routine living and mediates anabolic processes of the body.[2] The parasympathetic division usually opposes or balances the actions of sympathetic division. ANS plays an important role in a wide range of visceral-somatic and mental diseases.

A network of brain areas like prefrontal cortex, amygdala and hypothalamus controls the ANS as

Corresponding Author:
Dr. Shailaja S. Moodithaya, Additional Professor,
Department of Physiology, K. S. Hegde Medical Academy, Nitte (Deemed to be University), Deralakatte, Mangalore, Karnataka- 575018.
Email id: shailaja.moodithaya@nitte.edu.in,
Mobile number: 9845516116

well as socio-emotional and cognitive processes. The central autonomic network has tonic, reflexive and adaptive control over autonomic functions and monitors cognitive, emotional and behavioural responses and its dysregulation is noted in various neuro-psychological ailments.[1] Rising evidence portrays the association of Autism spectrum disorders (ASDs) with the dysfunction of ANS.

ASD is a complex neurological and developmental disorder categorized by impaired social communication, limiting interests, and conventional repetitive behaviors.[1] Differences in development in 3 main areas: communication (verbal and non-verbal), social interactions and imagination. This is stated to as the triad of impairments. It is known as a 'spectrum disorder' because the severity of symptoms may range from a mild learning and social disability, to more complex needs with multiple complications and often very unusual behaviour. The Diagnostic and statistical manual for mental disorders -V (DSM-V) in May 2013 established the use of unique term 'Autism Spectrum Disorders (ASDs)'.[3] At least one comorbid mental disorder is associated with about 70% of ASDs and 40% may have two or more comorbid mental disorders.[4] The incidence of Autism has revealed a swift increase over the last few years. Current international studies show that about 1 in 68 people have autism and its incidence is believed to be steady around the world.[3] Males are more often affected with autism than females, at a ratio of 4:1 (males: females).[5] The onset of symptoms of ASDs are gradual for most children; although they develop before the age of 3 years.

Autonomic imbalance, in which one branch of the ANS dominates over the other, is related to a lack of active flexibility and fitness. Clinical symptoms of these disorders are often non-characteristic and so to identify them it is vital to know the procedures of assessment of ANS function.[6] Autonomic activity dysfunctions may be related to social functioning in individuals with ASD. The mutual regions of the brain that are associated with both autonomic dysfunction and socio-emotional deregulations, make autonomic status a good biomarker for ASD.

Heart rate is complexly modified by the coordination of autonomic, respiratory, circulatory, endocrine and mechanical influences over time. It is an important parameter for the assessment of autonomic function and reflects the autonomic activity of sinoatrial node.[1] The sympatho-vagal continual dynamic excitatory-inhibitory interactions leads to heat rate instantaneous oscillations called Heart rate variability (HRV) which is assessed by computing R-R intervals.[3] HRV pattern variations provide an advanced indicator of health involvements. Higher HRV is a signal of good adaptation and symbolizes a healthy person with well-organized autonomic mechanisms, while lower HRV is frequently an indicator of abnormal and inadequate adaptation of the ANS. HRV is a useful non-invasive tool to study central processes involved in autonomic regulation, thereby emphasizing its relevance in various psychiatric conditions. As per literature, fluctuations in HRV reflects both the sympathetic and parasympathetic responses and the sympathovagal balance can also be assessed.[7] Various HRV indices are widely recognized as useful and powerful indicators of physiological and psychological interaction.[8]

As suggested by literature, the link between ASD symptoms and ANS dysfunction can be related to parasympathetic underactivity, sympathetic over-arousal, or an atypical interaction between these systems.[9-11] Some studies have reported no significant differences in resting autonomic activity in children with ASD compared to controls.[12,13] Both sympathetic and parasympathetic lower resting activity were revealed in studies done by Bujnakova et al. in 2016, indicating autonomic under arousal in ASD children.[14] Studies assessing orthostatic stress in ASD children have shown higher parasympathetic responses with the same sympathetic modulation, suggesting parasympathetic dominance in this population.[15] Thus, the inconsistencies in the existing literature on autonomic function in ASD propose a large heterogeneity in this population.

Many paediatric autonomic disorders occur as a result of developmental abnormalities caused by specific genetic mutations and others as a result of generalized central dysfunction. In addition to traditional neurodevelopmental symptoms, autism also produce symptoms attributable to other organ systems that suggest underlying autonomic dysfunction. Aim of the present study was to evaluate cardiac autonomic regulation in autistic children using HRV as an assessment tool and compare HRV indices between normal and autistic children. The study also correlated the severity of autism with the obtained HRV indices.

Materials and Method

Study population: The study was conducted on Children diagnosed with ASDs and age and gender matched controls. 40 children were recruited for the study including 24 autistic children and 16 controls. Excluding dropouts during ECG recording and HRV analysis reliable statistical data could be obtained only for 15 autistic and 15 normal children. Out of the autistic children 9 were boys and rest 6 were girls whereas normal group comprised of 8 boys and 7 girls. Children aged between 3 and 14 years were recruited for the study.

Selection Method: Children with ASDs were diagnosed by a Psychiatrist or clinical Psychologist using DSM-V criteria (APA, 2013).

Exclusion criteria: Children with diagnosis of disruptive behaviour disorders, severe and profound Intellectual disability, and with autonomic dysfunction were excluded as all these conditions affected HRV parameters evaluated in the study.

Study setting: Study was conducted in the research lab of Department of Physiology of K. S. Hegde Medical Academy, Mangalore. Subjects were recruited from Psychiatric, Paediatric & Speech language pathology departments of K.S Hegde Charitable Hospital.

Ethical clearance: Institutional and Central ethics committee approval was obtained from Nitte University for the study. Study procedure was explained in detail to the parents' of children recruited and written consent was procured from them.

Assessment of severity of autism: Diagnosis of ASD was made by experienced Psychiatrist or Clinical Psychologist according to DSM-5[5] criteria and based on previous psychiatric reports. Medical practitioner confirmed ASD diagnosis in autistic group and normal functioning in control group. Severity of autism was rated using Childhood Autism Rating Scale (CARS-2), which is a behaviour rating scale. It consists of two 15-item rating scales which is completed by a trained clinician and a Parent/Caregiver questionnaire. CARS-2 identifies children 2 years and older with ASD and distinguishes between mild to moderate and severe autism.

Experimental procedure: Subjects suitable for our study criteria were screened. The time required for recording varied from subject to subject depending on their psychological status during the procedure. For normal children the study procedure went for approximately 20-25 minutes, including the initial time taken for subjects to adapt to the study setting. Basal Blood pressure (BP) and anthropometric characteristics like height, weight and body mass index (BMI) were evaluated.

Assessment of HRV: Lead II Electrocardiogram (ECG) was recorded using a computerised 4- channel data acquisition unit (Power lab 26-T, AD instruments, Australia) in sitting position for 5 minutes. From the ECG recording a sequential series of successive R-R intervals were obtained which was validated before analysis using a standardised procedure as recommended by the Task Force of European Society of Cardiology.[7] The data so gathered was then subjected to spectral analysis of HRV using Fast Fourier Transform (FFT) and indices were calculated. Two main spectral components were retained to quantify the power spectral density: low frequency (LF; 0.04 to 0.15 Hz); high frequency (HF; 0.15 to 0.40 Hz) bands and total power (TP: variance of all RR intervals). LF components represent both parasympathetic and sympathetic modulations[16] whereas HF is associated to parasympathetic modulation[7]. Additional calculation included LF/HF ratio which constitutes evaluation of the ANS balance (sympathetic/parasympathetic). If this ratio is <1, there is a parasympathetic predominance, whereas a ratio above 1 reflects a sympathetic predominance.[7,17] These data formed a tachogram and were exported. From the report obtained total power (TP in ms^2), absolute & normalized units of HF and LF HRV indices and LF/HF ratio were considered for statistical analysis.

Statistical Analysis

Statistical analysis was performed using SPSS 20.0. (SPSS- Inc., 233 South Wacker Drive, Chicago) software package.HRV indices recorded were expressed in terms of Mean + Standard error. Comparison of HRV indices between autistic and control group was performed using Student't' test. Probability value $p < 0.05$ was considered as statistically significant. The strength of association of severity of autism with HRV indices was assessed using Pearson correlation for parametric variables.

Results

Subject characteristics

The general subject characteristics are summarized in Table 1. The results suggest that autistic children exhibited a significantly higher weight (p= 0.020) and BMI kg/m^2 (p= 0.041) compared to their non-autistic

counterparts. All other characteristics like age, height, SBP, DBP, and basal heart rate did not show any significant difference between the groups.

Table 1- Subject characteristics

Characteristics	ASD	Control
Age (years)	10.1 ± 1.01	8 ± 1.03
Weight (kg)	32.7 ± 4.36*	20 ± 1.9
Height (m)	1.3 ± 0.07	1.2 ± 0.05
BMI (kg/m2)	18.8 ± 2.07*	13.9 ± 0.46
SBP (mm Hg)	97.7 ± 5.3	98.3 ± 2.84
DBP (mm Hg)	70.7 ± 5.09	67 ± 2.4
Heart rate (bpm)	94.42 ± 3.47	98.02 ± 3.19

Abbreviations: BMI- Body Mass Index, calculated as Weight (kg)/Height (m^2), SBP- Systolic blood pressure, DBP- Diastolic blood pressure, *p < 0.05

Table 2 shows comparison of HRV indices between the study groups. The LF absolute units were found to be significantly higher in the ASD group than the control group ($p = 0.034$); on the contrary, the HF absolute indices, despite exhibiting a lower range in ASD, was not significantly higher ($p = 0.008$) compared to their non-autistic counterparts. The HF and LF nu did not show statistical significance between the groups. . The TP values ($p = 0.023$) on the other side exhibited a significantly higher value in ASD group compared to controls.

Table 2- Heart Rate Variability Indices

HRV INDICES	ASD	Control
HF absolute (ms2)	651.57 ± 123.3	1262.62 ± 295.90
HF normalized	37.47 ± 3.6	43.1 ± 5.09
LF absolute (ms2)	1028.32 ± 138.46*	552.26 ± 59.3
LF normalized	40.55 ± 3.7	36.51 ± 4.32
TP (ms2)	4097.00 ± 877.2*	2180.78 ± 364.8
LF/HF ratio	1.12 ± 0.241	0.85 ± 0.25

Abbreviations: HF- High frequency, LF- Low frequency, TP- Total power, * p< 0.05

Table 3 shows the results of assessment of strength of association of severity of autism with cardiac autonomic parameter using Spearman rank correlation for non-parametric variables and Pearson correlation for parametric variables.

Table 3: Correlation of autonomic indices with severity of ASD.

Autonomic Indices	ASD severity	
	R	P
HF absolute (ms2)	0.034	0.83
HF normalized (nu)	0.06	0.71
LF absolute (ms2)	0.17	0.29
LF normalized (nu)	0.08	0.63
TP (ms2)	0.04	0.81
LF/HF ratio	0.02	0.89

Abbreviations: [R- Pearsons correlation coefficient, P- statistical significance,HF- High frequency, LF- Low frequency, TP- Total power]

Table 3 shows the results of assessment of strength of association of severity of autism with cardiac autonomic parameter using Pearson correlation for parametric variables.

Discussion

Cardiac autonomic regulation has emerged as one of the important psycho-physiological measures of various behavioral features in children and adults. Children with autism spectrum disorder are known to exhibit altered behavioral aspects. Since HRV is a validated indicator of the function of cardiac autonomic regulation, this study attempted to compare the short-term HRV power spectrums between children with and without autism spectrum disorders.

Findings of our study indicate that children with autism spectrum disorders are associated with cardiac autonomic dysfunction. This is reflected by a significantly higher absolute low frequency spectral band, the surrogate of cardiac sympathetic nervous activity, among autistic children compared to that of healthy controls. Further, the total power of HRV was also significantly higher in autistic children indicating that they have an overall greater cardiac autonomic modulation. However, the indices like absolute power of HF band and normalized HF and LF powers did not exhibit any statistical difference between the groups.

Measures of HRV are being increasingly applied in investigations of the central autonomic state and to study the fundamental links between various psychological processes and physiological functions.[8] It has been reported earlier that there is low baseline cardiac vagal tone with elevated sympathetic activity in autistic children.[11] Another study reported that autistic children are associated with lower resting cardiac vagal activity with no significant difference in sympathetic function.[18] Studies also have shown that elevated sympathetic activity is linked with several cardiovascular diseases. LF spectrum is a parameter that includes both sympathetic and parasympathetic activities[16, 19] and the presence of a significant difference of LF values, and TP between our two groups confirms that ASD and control groups have an altered cardiac autonomic function. Studies in children with ASD compared to TD controls under resting conditions as well as during mental stress have frequently reported increased heart rate suggesting an increased sympathetic activity. [20, 9]

Autism severity of the study subjects were evaluated by administering the Childhood Autism Rating Scale (CARS). Based on the obtained scores, we assessed the strength of association of severity of autism with HRV indices using Spearman rank correlation for non-parametric variables and Pearson correlation for parametric variables. However, there was no statistically significant correlation of severity with any of the variables (Table 3). This could be due to the relatively lesser number of autistic children in the severe grade in our study.

Findings of the present study indicate that children with autism are associated with elevated cardiac sympathetic activity with no difference in resting cardiac vagal tone indicating that autistic children have an early risk for cardiovascular disease. Further, higher total power observed in children with autism in this study is

contributed by their greater LF power spectrum of HRV. The behavioral response in ASD could be associated with their impaired sympathetic nervous activity. Our finding is based on relatively smaller sample size; therefore, evaluation including larger study population and using sensitive psycho-physiological measures like sympathetic skin response would help in better understanding of autonomic neural activity in autism spectrum disorders. The study of autonomic regulation in childhood psychiatric disorders may provide a better understanding of the etiology and aids in the prevention of cardiovascular diseases in adults.[21]

Conclusion

Study concludes that severity of autism was not associated with cardiac autonomic indices. ASD children exhibit altered cardiac sympathetic nervous activity. The altered behavioral responses in ASDs could be associated with their impaired sympathetic nervous activity. The core autistic symptoms which include impaired social interaction, repetitive and stereotypical behaviour could be a result of the differences in baseline arousal or stress which may be associated with impaired autonomic nervous activity. Future studies are needed to examine the association of this deregulation of ANS with symptoms and co-morbidity of ASDs.

Source of Funding: The study is a part of project funded by Department of Health Research (DHR), Indian Council of Medical Research (ICMR).

Conflicts of Interest: The authors have no conflict of interest to declare.

References

1. Song R, Liu J, Kong XJ. Autonomic Dysfunction and Autism Subtypes and Clinical Perspectives. N A J Med Sci,2016;9:172-180.
2. Sabyasachi Sircar. Principles of Medical Physiology. Second edition, Thieme Publishers Delhi. 2014;pp 642.
3. Iveta B, Igor O, Michal M, Ingrid T. Autonomic Nervous System in Children with Autism Spectrum Disorder. Cognitive Remediation Journal, 2015;4.
4. American Psychiatric Association. Diagnostic and statistical manual of mental disorders (5th edition.) Arlington, VA: American Psychiatric Publishing, 2013.
5. Tan YH, Xi CY, Jiang SP, Shi BX, Wang LB, Wang L. Auditory abnormalities in children with autism. Open Journal of Psychiatry, 2012;2:33-37.
6. Zygmunt A, Stanczyk J. Methods of evaluation of autonomic nervous system function. Arch Med Sci, 2010;6:11-18.
7. Task Force of the European Society of Cardiology. The North American Society of Pacing and Electrophysiology (Membership of the Task Force listed in the Appendix), Heart rate variability Standards of measurement, physiological interpretation, and clinical use. Eur. Heart J, 1996, 17, 354–381.
8. Berntson G.G, Thomas Bigger J., Jr, Eckberg D.L, Grossman P, Kaufmann P.G, Malik M, Nagaraja H.N, Porges S.W, Saul J.P, Stone P.H, et al. Heart rate variability: Origins, methods, and interpretive caveats. Psychophysiology, 1997: 34: 623–648.
9. Porges, S.W. The polyvagal theory: New insights into adaptive reactions of the autonomic nervous system. Clevel. Clin. J. Med, 2009: 76: S86–S90.
10. Bal, P.M, Jansen, P.G, Van Der Velde, M.E, de Lange, A.H, Rousseau, D.M. The role of future time perspective in psychological contracts: A study among older workers. J. Vocat. Beha, 2010;76:474–486.
11. Ming X, Julu P, Brimacombe M, Connor S, Daniels M. Reduced cardiac parasympathetic activity in children with autism. Brain Dev, 2005; 27:509-516.
12. Daluwatte C, Miles J.H, Christ S.E, Beversdo D.Q, Takahashi T.N, Yao G. Atypical pupillary light reflex and heart rate variability in children with autism spectrum disorder. J. Autism Dev. Disord, 2013; 43: 1910–1925.
13. Levine T.P, Sheinkopf S.J, Pescosolido M, Rodino A, Elia G, Lester B. Physiologic arousal to social stress in children with autism spectrum disorders: A pilot study. Res. Autism Spectr. Disord, 2012; 6: 177–183.
14. Bujnakova I, Ondrejka I, Mestanik M, Visnovcova Z, Mestanikova A, Hrtanek I, Fleskova D, Calkovska A, Tonhajzerova I. Autism spectrum disorder is associated with autonomic underarousal. Physiol. Res, 2016; 65: S673–S682.
15. Bricout, V.A, Pace, M, Dumortier, L, Favre-Juvin, A, Guinot M. Autonomic responses to head-up tilt test in children with autism spectrum disorders. J. Abnorm. Child. Psychol, 201; 46: 1121–1128.

16. Pomeranz B, Macaulay R.J, Caudill M. A, Kutz I, Adam D, Gordon D, et al., Assessment of autonomic function in humans by heart rate spectral analysis, Am. J. Phys, 1985; 248:H151–H153.
17. Malliani A. The pattern of sympathovagal balance explored in the frequency domain, News Physiol. Sci, 1999; 14: 111–117.
18. Montoni T, Yoko K. Autistic adolescent autonomic response to mental load. Japanese Journal of Child and Adolescent Psychiatry. 1999;40:316-328.
19. Parati, G, Mancia, G, Di Rienzo, M, Castiglioni, P. Point: Cardiovascular variability is/is not an index of autonomic control of circulation. J. Appl. Physiol, 2006; 101: 676.
20. Kushki A, Brian J, Dupuis A, Anagnostou E. Functional autonomic nervous system profile in children with autism spectrum disorder. Mol. Autism, 2014.
21. Shrinivasan K. Childhood Psychopathology and Autonomic Dysregulation: Exploring the Links using Heart Rate Variability. J. Indian Assoc. Child Adolesc. Ment. Health, 2007: 3: 96–104.

Correlation Between Built and Work Ability among Small Scale Industrial Workers at Malkapur, Karad

Rutuja Bhosale[1], G.Varadharajulu[2]

[1]Final Year, Faculty of Physiotherapy, [2]Professor, Department of Neurosciences, Faculty of Physiotherpay, Krishna Institute Of Medical Sciences Deemed To Be University, Karad, Maharashtra, India

ABSTRACT:

Background: The working capability of workers has the effect on productivity of the industry. Work ability has the greater impact on employee's well-being and decrease in the risk of musculoskeletal diseases, sick leave and early retirement. Further, a low work ability affects the company's productivity. There is paucity in the literature regarding field of small scale industrial workers.

Aim and objectives: To find the association between built and work ability among small scale industrial workers.

Materials and Method: The total numbers of 90 workers were examined to assess built. The measurements were taken as per the Heath-Carter anthropometric somatotype method by using weighing scale for weight, stadiometer for height, measuring tape for girth around biceps and calf, small sliding caliper for width of the femur and humerus and skinfold caliper for skinfold thickness. After collecting data it was divided under three categories, Ectomorphic, Mesomorphic and Endomorphic built. Subjects signed the consent form and then work ability score was calculated by the workability questionnaire.

Results: In this study both ectomorphic and mesomorphic showed negative correlation except endomorphic which showed positive correlation nearest to significance. There was no correlation between built and work ability. Study variables in this study such as age, gender and work ability revealed association with built. Thus , the present study concluded that there is no significant correlation between built and work ability

Conclusion: On the basis of the result of the study, it was concluded that there is no correlation between built and work ability among small scale industrial workers working in industrial colony, Malkapur, Karad.. The ectomorphic and mesomorphic built has the very good work ability and there was medium work ability among endomorphic individuals.

Keywords: *small scale industrial workers, Built, Workabilily.*

Introduction

Small scale industries characterize to those small entrepreneurs who are involved in production, manufacturing or service at a micro scale. Small scale industries show a vital role in the economic and social development of India in the post-independence period. Small scale industries construct the backbone of a developing economy with its effective, efficient, flexible and innovative entrepreneurial essence [(1)]. The small scale industry is recognized as an very crucial component of economic development and a critical element in helping to lift countries out of poverty [(2)].

Somatotype is defined as the quantification of the present shape and composition of the human body.

Corresponding Author
Rutuja Bhosale,
Final Year , Faculty of Physiotherapy, Krishna Institute Of Medical Sciences Deemed To Be University, Karad, Maharashtra, India. Contact No.7744068784
Email id:-bhoslerutuja0001@gmail.com

It has three types Endomorphy, Mesomorphy and Ectomorphy[3]**.** According to the American Psychologist W.H. Sheldon, the Endomorph is a human physical type tends towards roundness as per physique classification system. The extreme endomorph usually resemble a round head, a large internal organs relative to his size, rather short arms and legs with fat upper arms and thighs, but slender wrists and ankles . Mesomorph is characterized by greater than average muscular development. Mesomorph has square, massive head; broad, muscular chest and shoulders; a large heart; heavily muscled arms and legs; and minimal body fat. The mesomorphic types tend to develop muscle easily. Where Ectomorph is a type that tends towards linearity as classified by the physique classification system. An extreme ectomorph usually has a thin face with high forehead and receding chin; narrow chest and abdomen; a narrow heart; long ,thin arms and legs; little body fat and little muscle but a large skin surface and large nervous system. On the other hand the somatometry is measured as a fundamental research method in anthropology. It includes the bodily proportions and sizes in living individuals[3].

Anthropometry is the study of the measurement of the human body in terms of the dimensions of bone, muscle and adipose tissue[4]. Weight, stature(standing height), recumbent length, skinfold thickness, circumference (head, waist, limb, etc.), limb lengths and breadths are some of the measures which are included in anthropometric measurements[4].

The obesity has impact on workers capacity [5]. Factors associated with the poor work ability, as defined by Work ability Index were deficiency of leisure time, vigorous physical activity, poor musculoskeletal capacity. Older age, obesity, high mental work demands, lack of autonomy, poor physical work environment and high physical load [5].

Work ability denotes to a worker's job-associated functional capacity, or a worker's ability to continue working in his or her current job, given the challenges or demands of the job and his or her resources. In other words, it is a product of both the individual and the working environment. Prior work ability research from other fields has established practical support for many individual and work-related correlates of work ability, including physical and mental work demands[6]. Work ability affects an employee's well-being and reduces the risk of musculoskeletal diseases, sick leave and early retirement. Further, a low work ability affects the company's output [7]

When the work ability equals the required job demands, a patient is measured to be able to participate in work. Especially in purported high-demand jobs that are categorized by limited opportunities to reduce these demands constructed on the present ergonomics knowledge, the assessment of a patient's work ability needs careful deliberation to support return to work [8].

Methodology:

The study was conducted in the industrial colony , Malkapur , karad , Maharashtra. An observational study was carried out using a cross sectional study design. An approval for the study was obtained from the Protocol committee of the Institutional Ethical Committee of KIMSDU .Study samples of 92($n=4pq/L^2$ were selected ranging from adult of aged 18-50 years and irrespective of caste, religion & sex. Subjects were as per inclusion and exclusion criteria. The study duration was of 6 months. The procedure was explained to the individuals wiling to participate and written informed consent was taken . The materials used in this study includes Stadiometer, Weighing Scale, Measuring Tape, Small Sliding Caliper, Skinfold Caliper, Writing Material. These participants would be further investigated for Weight, Height, Skinfold thickness, Muscle girth measurements, Body mass index and bone width. To ensure the endomorphic built of the individual the measurement of skinfold thickness were taken .The participants were asked remove the clothing. The skinfold thickness then was measured at the triceps, calf , subscapular and supraspinal level by using skinfold thickness calliper. For the confirmation of the mesomorphic built measurements taken were height, calf girth, biceps girth, femur width and humerus width. Inch tape and small sliding caliper was used for muscle girth and bone width measurements respectively. In case of ectomorphic individuals the built was confirmed by the measurement of height and weight. For height and weight measurements Stadiometer and weighing machine was used respectively. Each measurement was taken thrice and the mean was taken out of these three to minimize human error. Then obtained values were plotted on the somatochart for validation of the built. The detailed instructions about workability questionnaire were given to the participants. Then subjects were given the work ability questionnaire. Data was documented and then sent for the statistical analysis.

STATISTICAL ANALYSIS AND INETERPRITATION:

1: Age Wise Distribution In The Study

Age (in Years)	Ectomorphic (n=40)	Mesomorphic (n=38)	Endomorphic (n=14)
18-29	26	22	9
30-45	14	16	5

Interpretation: Above table indicates that , out of 92 individuals the ectomorphic built had 26 and 14 number of subjects under the age group of 18-29 and 30-45 years respectively. Total number of 22 subjects under the age group of 18-29 and 16 under 30-45 years fell in the category of mesomorphic built. The endomorphic built had overall 9 and 5 number of subjects in the age group of 18-29 years and 30-45 years respectively.

Table 2: Gender wise Distribution.

Gender	Ectomorphic (n=40)	Mesomorphic (n=38)	Endomorphic (n=14)
Males	33	33	11
Females	7	5	3

Interpretation: Above table shows that out of 92 industrial workers, in the category of ectomorphic built there were 33 males and 7 were females. While , mesomorphic built had 33 males and 5 females. Total number of 11 male and 3 females under the endomorphic built were documented in this study.

Table 3: Shows that overall association between build and study variables.

Study Variables	Built			Chi-square	p-value
	Ectomorphic n=40	Mesomorphic n=38	Endomorphic n=14		
Age					
≤ 25	22	22	8	0.069	0.97
> 26	18	16	6		
Gender					
Male	33	34	14	3.14	0.21
Female	7	4	0		
Work Ability Score					
≤ 38	6	7	9	14.92	0.0006
> 39	34	31	5		

*significant when $p<0.05$

Interpretation:

The above table revealed that the association between built and study variables such as age, gender and work ability. We had found that the association between built and study variable found no significant $p>0.05$ except work ability where $p<0.05$.

Table 4: Descriptive Statistics among Study.

Study Variables	N	Minimum	Maximum	Mean	Std. Deviation
Ectomorphic	40	32.00	46.00	40.9500	3.73445
Mesomorphic	38	32.00	47.00	40.8684	4.06814
Endomorphic	14	31.00	43.00	35.9286	5.01481

Interpretation:

The above table showed that, for 40 number of ectomorphic individuals the mean was 40.95, standard deviation was 3.7344 with the 32 and 36 minimum and maximum value respectively. The mesomorphic individuals had minimum and maximum value of 32 and 47 respectively with the mean of 40.8684 and standard deviation 4.0681. For endomorphic individuals the mean was 35.928, standard deviation was 5.0148 with 31 and 43 minimum and maximum value respectively.

Table 5: Shows Correlation between Built and Work Ability Score.

Built	Work Ability			Chi-square value	p-value
	Moderate 28-36	Good 37-43	Excellent 44-49		
Ectomorphic n=40	6	26	8	14.995	0.0047
Mesomorphic n=38	7	23	8		
Endomorphic n=14	9	4	1		

Interpretation:

The above table showed that the correlation between built and work ability score and here we found that statistical significant association, where $p<0.05$.

Table 6: Correlation between built and work ability among small scale industrial workers.

Built vs. Work Ability	Correlation Coefficient ®	r2	95% CI	p-value
Ectomorphic	-0.06588	0.00434	-0.3699 to 0.2509	0.6863
Mesomorphic	-0.0938	0.0088	-0.4015 to 0.2329	0.5754
Endomorphic	0.4971	0.2471	-0.04566 to 0.8132	0.0706

Interpretation:

The above table revealed that the correlation between built and work ability, in this study both ectomorphic and mesomorphic shows negative correlation -0.06588 ($p>0.05$) and -0.0938 ($p>0.05$) except endomorphic which shows positive correlation 0.2471 nearest to significance. There was no correlation between built and work ability.

Results

In this study both ectomorphic and mesomorphic showed negative correlation except endomorphic which showed positive correlation nearest to significance. There was no correlation between built and work ability. Study variables in this study such as age, gender and work ability revealed association with built. We had found that the association between built and study variable has no significance except work ability. Thus , the present study concluded that there is no significant correlation between built and work ability.

Discussion

Built is one of the factor which influences the quality of labor. Many studies stated the obesity has effect on workers working capacity. The purpose of this study to find the correlation between built and work ability among small scale industrial workers.The individuals working small scale industries were selected as subjects .Each subject was selected as per inclusion and exclusion criteria. They were instructed about the study. The informed consent was taken from the subjects. The study was taken place at industrial colony Malkapur, Karad.

The Duration of the study was six months with sample size of 92 (females- 11 and males- 81) and age group of 18–60 years. Later, this group was divided into two different groups of age. The groups were from age 18-25 years and 30-45 years. Also the groups were divided in males and females. And the further division were done in accordance to the built for ectomorphic, endomorphic and mesomorphic.

Demographic data including age, gender, working duration, number of working years was collected .The built of the subject was assessed by The Heath-carter anthropometric somatotype method . In which the measurements were taken under three categories.

For Endomorphy individuals, the skinfold thickness of the following was measured in millimeter by skinfold caliper for the triceps, subscapular, supraspinal and calf.

The mesomorphic individuals were assessed by taking the width of the humerus , femur with the small sliding caliper.

The girth was measured by measuring tape for the following – calf , biceps.

The height of the subject was recorded by asking him to stand on the stadiometer.

By the heath carter anthropometric somatotype method ,for the ectomorphic individuals, the weight was taken on the weighing machine. The height was divided by the weight.

Each measurement was taken three times to minimize the human error. After the calculations the data was entered into the equation to derive the co-ordinates. The two dimensional chart was used to plot the somatochart.

The detailed instructions were given to the participants. The subjects were given the work ability questionnaire and they were explained how to mark the questionnaire.

In this study the statistical analysis of the recorded data was done by using the software SPSS version20. Arithmetic mean & standard deviation was calculated for each outcome measure. Arithmetic mean was derived from adding all the values together and dividing the total number of values.MS Excel was used for drawing various graphs with given frequencies and the various percentages that were calculated with the software.

Christiane Wilke*, Philip Ashton, Tobias Elis, Bianca Biallas and IngoFroböse “Analysis of work ability and work-related physical activity of employees in a medium-sized business”

Concluded that there no significance between age and work related physical activity.

In the present study the overall association between built and the study variables such as age and gender found no significance when $p>0.05$except the work ability where $p<0.05$.

The demographic parameters such as age and gender were associated with the ectomorphic built showed no significance with the unpaired t-value=0.66 and p value=0.44 for the age. . The mean for age group 15-

29 was 40.65 and SD was 3.63.For the age group 30-45 the mean was 41.25 and SD of 4.29. For gender it was unpaired t-value=0.59 and 0.56 respectively.

The association between endomorphic built and the demographic parameters showed the statistical significance between age but no statistical significance between gender.

The unpaired t-value and p-value for this association was 6.202 and<0.0001 for age and 1.67 and 0.11 for gender respectively.

Joyce A. Pebrix "Relationship between somatotype and motor fitness" showed that there was significant relationship between mesomorphy and power. They added further about inverse relationship between enomorphy and strength and power.

This study revealed that the correlation between ectomorphic and mesomorphic built with the work ability among small scale industrial workers showed the negative correlation -0.06588 and -05754 with p value 0.6863 and 0.5754 respectively.

The endomorphic built showed the positive correlation 0.2471 which was near to significance with the p value of 0.0706. There was no significant correlation between work ability.

Teodor TÓTH, Monika MICHALÍKOVÁ, Lucia BEDNARČÍKOVÁ, Jozef ŽIVČÁK, Peter KNEPPO "SOMATOTYPES IN SPORT" have mentioned in their studies that mesomorphic built has medium fast energetic expenditure. Re- acts to strength training with rapid accumulation of muscle mass.

This study concluded that in mesomorphs the mean work ability was 40.86 same as the ectomorphic i.e. "very good" with minimum and maximum score of 31 and 43 respectively.

Kuijer PPFM, Gouttebarge V, Wind H, van Duivenbooden C, Sluiter JK, Frings-Dresen MHW "Prognostic value of self-reported work ability and performance-based lifting tests for sustainable return to work among construction workers." This article proved that the lower lifting strength test differs the ability to return to work.

The present study has shown that the endomorphic individuals had the mean work ability score of 35.92 i.e. "medium" with standard deviation 5.0148 and minimum and maximum score was 31 and 43 respectively.

Christiane Wilke*, Philip Ashton, Tobias Elis, Bianca Biallas and IngoFroböse "Analysis of work ability and work-related physical activity of employees in a medium-sized business"

Rated the work ability as good, but according to them there is lack of evidence regarding the work related physical acitivity.

The statistics in the present study shows the ectomorphic individuals had the mean work ability of 40.95 i.e. "very good" on the work ability index and standard deviation 3.73 with minimum work ability of 32 and maximum of 46.

Thus , the present study concluded that there is significant correlation between built and work ability with the p value <0.05. Hence the alternative hypothesis is accepted.

Conclusion

On the basis of the result of the study, it was concluded that there is no correlation between built and work ability among small scale industrial workers. The ectomorphic and mesomorphic built has the very good work ability and there was medium work ability among endomorphic individuals. There was no difference in parameters seen in male and female participants.The endomorphic individuals need to improve their work ability.

Conflicts of Interest: There were no conflicts of interest in this study.

Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna Institute Of Medical Sciences Deemed To Be University, Karad.

Refferences

1. Banik S. Small Scale Industries in India: Opportunities and Challenges.
2. Fatusin AF. Characteristics of Industrial Labour among Small Scale Manufacturing Enterprises in Ondo State. Journal of Human Resources. 2014 Jun;2(2):91-111.
3. Tóth T, Michalíková M, Bednarčíková L, Živčák J, Kneppo P. Somatotypes in sport. Acta mechanica et automatica. 2014 Mar 1;8(1):27-32.

4. Centers for Disease Control and Prevention. The Third National Health and Nutrition Examination Survey (NHANES III 1988–1994) Reference Manuals and Reports: Body Measurements (Anthropometry) Oct. 1998 (citedDec2014).

5 van den Berg T, Elders L, de Zwart B, Burdorf A. The effects of work-related and individual factors on the Work Ability Index: a systematic review. Occupational and environmental medicine. 2008 Nov 18.

6. McGonagle AK, Fisher GG, Barnes-Farrell JL, Grosch JW. Individual and work factors related to perceived work ability and labor force outcomes. Journal of Applied Psychology. 2015 Mar;100(2):376.

7. Wilke C, Ashton P, Elis T, Biallas B, Froböse I. Analysis of work ability and work-related physical activity of employees in a medium-sized business. BMC research notes. 2015 Dec;8(1):803.

8. Kuijer PP, Gouttebarge V, Wind H, van Duivenbooden C, Sluiter JK, Frings-Dresen MH. Prognostic value of self-reported work ability and performance-based lifting tests for sustainable return to work among construction workers. Scandinavian journal of work, environment & health. 2012 Nov 1:600-3.

Attitude And Utilization of Services Under Rajiv Aarogyasri Scheme in Private Health Care Set-Up At Rajahmundry, Andhra Pradesh

Saptarishi Bose[1], Sushant Kumar Mishra[2] , Sipra Komal Jena[3]

[1]Assistant Professor, [2]Professor & HOD, [3]Professor, Dept. of Community Medicine at GSL Medical College, Rajahmundry, AP.

Abstract

Background: Healthcare services help to keep diseases under control and raise life expectancy. Andhra Pradesh is a state which accounts 9.20% of below poverty line population of its total population. To meet the need of tertiary health care for such people the government of Andhra Pradesh started the Rajiv Aarogyasri Health Insurance Scheme on to improve access of poor to quality medical care and for providing financial protection against high medical expenses. The present study was undertaken to assess the health service delivery to poor population of Rajahmundry and their utilization of these services and to identify any gaps or lacunae in these services provided.

Objectives: 1. To study the socio demographic and the present health condition of the people availing the services under Rajiv Aarogyasri Scheme.2)To assess their behavior & attitude towards the services provided to the patients by private health care providers under guidelines of "Rajiv Aarogyasri scheme". & their utilization & client satisfaction. **Materials And Methods:** A facility based cross sectional study focusing on personal and demographic characteristics, client satisfaction of the service offered to them was designed. The clients, service providers etc. were interviewed with the help of pretested proforma & the results were analyzed. **Results & Conclusions:** Service delivery by private outlets accredited under Rajiv Aarogyasri Scheme is effectively functioning.

Key words*: Age, religion, caste, socioeconomic status, health status, awareness, utilization etc.*

Introduction

Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity according to World Health Organization (WHO).[1] Health is a human right and hence health care should be made available universally[2]. The economic burden are relatively greater for the poor people, who are handicapped by the ill health and who stand to gain the most from the underutilized resources[3]. Tertiary care is often expensive for people with low incomes, so those with conditions requiring tertiary care often go untreated or are left with devastating hospital bills, both of which exacerbate poverty.[4] In 1995-96 an estimated 2.2% of the Indian population fell into poverty because of out-of-pocket spending[5] and it increased to around 3.2% in 1999-2000[6], worsening their poverty. Andhra Pradesh is a state which accounts 9.20% of below poverty line population. Majority being farmers or daily wage earners. To meet the need of tertiary health care for such people the government of Andhra Pradesh started the Rajiv Aarogyasri Health Insurance Scheme on 01.04.2007 to improve access of poor to quality medical care and for providing financial protection against high medical expenses. The scheme provides financial protection to families living below the poverty line up to Rs. 2 lakhs in a year for the treatment of serious ailments requiring hospitalization and surgery. The beneficiaries of the scheme are the members of Below Poverty Line (BPL) families, as enlisted and photographed in BPL Ration Card and available in Civil Supplies Department database.

A beneficiary can avail services for the procedures covered under the scheme. The same is applicable for diagnostics also, if eventually the patient does not

undergo any type of surgery or therapy[8].

Even though, the scheme may look fool proof, well-designed and well- implemented, it may not be successful until & unless the people are aware of the scheme & utilize the services provided.

So the present study was undertaken to assess the awareness, behavior, attitude of poor population of Rajahmundry and their utilization of these services.

Materials and Method

Study design: Hospital based study

Study area: G.S.L General Hospital and Swatantra Hospitals Which provided complete medical care under Rajiv Aarogyasri scheme in Rajahmundry.

Study Subjects: Clients utilizing the services provided by the two hospitals within the study period

Study period: October 2017 – December 2017

Sample size: 400

Study tool: Predesigned and pretested schedule of questions

Study variables: Age, Sex, Income Groups, Residing Areas, Occupation, Disease, Outcome etc

Statistical analysis: All statistical analysis was performed by using SPSS version 20 and MS- EXCEL 2007. The values are presented as mean + or- SD, percentages & proportions

Inclusion criteria:

1. Beneficiaries enrolled under the scheme and admitted in the facility for at least 24 hours.

2. Patients giving consent to participate in the study

Exclusion criteria:

1. Patients who died within 24 hours of receiving treatment

2. Patients who are admitted for less than 24 hours and shifted out.

Methodology

Data was collected from both the selected health facilities for a period of 3 months. All the beneficiaries attending these two hospitals within the study period, satisfying the inclusion criteria were selected for study. After informing them about the complete details of the study and taking their consent, they were interviewed with the help of a pre-designed & pretested proforma & information was noted. The sample size came up to 400. The data collected was analyzed.

Results

Of the 400 study subjects majority 150 (37%) belonged to age group of 30-44 yrs followed by 113 (28%) in the age group of 45-59 yrs. Geriatric age group (above 60 yrs) consisted of 87 (22%)beneficiaries. Among all the study participants, 209 (52%) were males and 191 (48%) were females. Out of 400 study subjects, majority of them i.e.; 385 (96%) were Hindus followed by Muslims and Christians comprising 8(2%) and 7(2%) respectively. Majority of beneficiaries belonged to other backward caste which accounted to 196 (49%) of the study population. Out of 400 beneficiaries, 261 (65%) were illiterate and 83 (21%) had education up to Primary school level. 38 (9%) and 18 (5%) were educated up to Middle school and High school level respectively. [Classification is according to Modified BG Prasad socioeconomic scale (2016)[9]. Of the total 400 Clients, 87 (22%) were unemployed/Housewives 223 (56%) were unskilled workers like labours or domestic servants, 78 (19%) were semiskilled and 12 (3%) were skilled workers. Out of 400, 393(98%) of study subjects belonged to Upper Lower socioeconomic class & rest 7 (2%) belonged to Lower Middle socioeconomic class.

Information Pertaining to Sickness

The time of arrival to RAS (Rajiv Gandhi Aarogyyasri Scheme) accredited hospital after the onset of symptoms or illness was within 24 Hrs. for 80(20%) out of 400. About 138 (35%) subjects came within 1-7 days and 101 (25%) came within 7-15 days whereas 80 (20%) arrived after 15 days. Among 400 subjects, 149 (37%) came with surgical problems, 108(27%) came with cancer, 76(19%) came with fractures. These are followed by stroke, gynaec problems &other medical problems with 8%, 7% & 2% respectively.

Awareness regarding RAS

Out of 400 clients, 360 (90%) were aware of Rajiv Aarogyasri Scheme whereas 40 (10%) were not aware. The source of information for the beneficiaries regarding

RAS was mostly through friends & relatives 183 (51%) out of those aware. Health care workers contributed about 15% (54/360). About 35(10%) were among other source of information like those who availed the services before or their relatives etc. 33(9%) subjects, were informed by doctors. About 30 (8%) were informed through media & 25 (7%) by their experience as they have availed the services before. Of total 400 subjects, 360(90%) were aware of eligibility criteria for availing services under the RAS scheme, whereas 40(10%) were not aware.

Out of 360 study subjects, who were aware regarding the eligibility criteria, only 20(5%) had complete awareness & 340(95%) had partial awareness. All the 400 beneficiaries had some card to avail services. Out of 400, 142(35%) had white card i.e.; the card possessed by people below poverty line. Around 239(60%) had Rajiv Aarogyasri Card. About 12(2%) of them possessed Chief Minister Camp office letter & 7(3%) of them had Temporary Andhra Card.

Reporting Mode to RAS facility

Out of 400 beneficiaries, 116(29%) were accompanied by previous RAS patients or relatives, 107(27%) were direct walk INS, 71(18%) came with referral by doctor from PHC, 54(14%) were accompanied by health workers, 42(10%) were referred by private practitioners, 10(2%) came through emergency services,

First Source of Contact at RAS accredited hospital

Among 400 clients, 339 (85%) first contacted Aarogyamitra, followed by 23(6%) who consulted a doctor at hospital, followed by 22(5%) who contacted Aarogyasri coordinator of hospital, whereas 16(4%) contacted other health workers.

Department Of Admission

Out of 400 Beneficiaries, majority of them 149(37%) were admitted in department of surgery & allied, followed by department of oncology, 108(27%). About 76 subjects (19%) were admitted in department of orthopedics, 39(10%) were admitted in department of medicine &allied, whereas 28(7%) were admitted in department of Obstetrics & Gynecology.

Client Satisfaction

Out of 400 patients, 369(92%) were satisfied with services provided in hospital, whereas 31(8%) were not satisfied.

Reason for dissatisfaction

Out of 31 beneficiaries, who were not satisfied by the services provided, 10(32%) were dissatisfied by nursing care & 3(10%) by services provided by doctors & remaining 18(58%) were unhappy with overall services provided by the hospital.

Satisfaction with the scheme

However, all 400 patients were satisfied by the services provided by the scheme.

Department wise Satisfaction

Out of 400 beneficiaries, 149(37%) were admitted in department of surgery & allied, of which 131(88%) were satisfied with the services, followed by department of oncology i.e 10 104(96%) , 76 (19%) were admitted in department of orthopaedics , of which 73(96%) were satisfied , 39(10%) were admitted in department of medicine & allied , of which 36(92%) were satisfied. Out of the 28(7%) patients admitted to department of OBGY, 25(89%) were satisfied with the services provided.

Out of total 400 beneficiaries, 188(47%) felt the services were very good, 89(22%) felt they were satisfactory, 51(13%) felt they were good, whereas 41(10%) & 31(8%) felt the services provided were excellent & unsatisfactory respectively

Of 400 beneficiaries, 220(55%) liked the overall care, whereas 87(22%) liked the reception, 47(12%) & 46(11%) liked the medical care by doctors & nursing care respectively

Willingness to share information & avail services again:

All the beneficiaries i.e.; 400 (100%) are willing to share information of this scheme & avail services again with others.

Table 1: Awareness Regarding RAS

Knowledge about Aarogyasri	Number(n)	Percentage (%)
Yes	360	90
No	40	10
Total	400	100

Table 2: Source of Information

Source of Information	Number(n)	Percentage (%)
Frnds & Rltvs	183	51
Health Care Worker	54	15
Media	30	8
Doctors	33	9
Prvsly Availed Services for other complaints	25	7
Others	35	10
Total	360	100

Table 3: Whether satisfied by the services provided in hospital

Whether satisfied by the services	Number(n)	Percentage (%)
Yes	369	92
No	31	8
Total	400	100

Table 4: Quality of Services Rated By Beneficiaries

Quality of Services	Number(n)	Percentage (%)
Excellent	41	10
Very Good	188	47
Good	51	13
Satisfactory	89	22
Unsatisfactory	31	8
Total	400	100

Discussion

It was seen in the present study that majority of beneficiaries belonged to age group of 30-44 yrs i.e., 37%. In a study done by Rao et.al[10] also, 29.7% beneficiaries also belonged to 30-44 yrs of age. In another study done by Kadam et.al[11], also, beneficiaries belonging to 30-44 yrs was 28.6% which is similar to the present study..

In the present study, 52% of the beneficiaries were males and 48% were females. In the study done by Rao et.al[10], 53.6% were males and 47.4% were females, which is similar to present study.

In the study done by Dr.D.Shreedevi[12], 38% were illiterates which is similar to the present study. It shows that though majority of the beneficiaries were illiterate they were aware of the existence and functioning of the scheme.

In the present study it was observed that 98% of the beneficiaries belonged to Upper Lower Class and 2% of the beneficiaries belonged to Lower Middle Class.as per Modified BG Prasad Scale[9]. They are very much availing the government schemes better than all the other classes.

About 49% of Backward Caste population were utilizing the health services.

In the present study, it was observed that the majority (37%) of the beneficiaries came with surgical problems & 27% of beneficiaries came for cancer treatment. 19% of beneficiaries suffered from fractures. So people are availing the scheme for diseases which has devastating effect economically on them

The study showed that more than half of the beneficiaries came to RAS accredited centers due to financial problems for free treatment.

In the present study 29% of the beneficiaries reported to study setting with relatives or people who previously availed the services in the same facilities.. It shows that people are aware of the facility and services provided in the facility and they are having good impression about it.

It was seen that, in present study people come from distant places, which shows that people had trust in the services provided by the private health facilities.

In the present study, it was seen that 90% of the enrolled beneficiaries had at least some knowledge regarding eligibility criteria for treatment under the schemes showing that the people are becoming more health conscious & are aware about various government schemes..

In present study, 37% of beneficiaries underwent surgical treatment , 27% came for treatment under Oncology department. 19% underwent surgeries in Orthopedics department which shows that people are availing the scheme for treatment of ailments which was an economic burden for them.

Around 92% were satisfied with the services provided in the hospital. In the study done by Dr. D.Shree Devi et.al[12], 94% of the beneficiaries were satisfied which is almost similar to the present study.

Around 47% of the clients gave rating of very good for the services provided & 22% of the clients gave rating of satisfactory, which shows that majority of the people were satisfied with the services provided in the scheme.

In the study, it was seen that all the beneficiaries were willing to share the information regarding the scheme and the health facility which shows that they are happy with the services

Conclusion and Recommendations

At the end of the study, we hereby conclude that **"The private outlets accredited under Rajiv Aarogyasri Scheme is effectively functioning."**

On the basis of findings from our study, the following aspects related to Rajiv Aarogyasri scheme are recommended:

- Regular auditing by the higher authority can be conducted to check whether hospitals are complying with the protocol guidelines.

- Training the hospital staff regarding the scheme for its effective functioning

- The government needs to review the scope for preventing the diseases currently being treated by the RAS through greater investment in health promotion .The government needs to use a method such as accreditation to improve and standardise high quality care across the system. The government needs to use renewal of empanelment as a lever to stimulate change & to explore how to benefit those individuals who belong to the most marginalized populations.

Ethical Clearance- Taken From Institutional Ethical Committee

Source of Funding – Self

Conflict of Interest - Nil

References

1. World Health Organization. World Health Organization definition of palliative care. World Health Organization Website. Available online: http://www. who. int/cancer/palliative/definition/en. 2014.
2. VAANI G. Rural Healthcare: Towards a Healthy Rural India. Rural Health Care: Towards a Healthy Rural India—Gramvaani—Community-Powered-Technology. 2013 Jul;3.
3. Yellaiah J. Health insurance in India: Rajiv Aarogyasri health insurance scheme in Andhra Pradesh. IOSR J Humanities Social Sci. 2013 Jan;8(1):7-14.
4. Sood N, Bendavid E, Mukherji A, Wagner Z, Nagpal S, Mullen P. Government health insurance for people below poverty line in India: quasi-experimental evaluation of insurance and health outcomes. Bmj. 2014 Sep 25;349:g5114.
5. Peters DH, Yazbeck AS, Sharma RR, Ramana GN, Pritchett LH, Wagstaff A. Better health systems for India's poor: findings, analysis, and options. The World Bank; 2002 May 1.
6. Garg CC, Karan AK. Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India. Health policy and planning. 2008 Dec 17;24(2):116-28.
7. Kumari L. Poverty eradication in India: A study of national policies, plans and programs. Researchers World. 2013 Apr 1;4(2):68.
8. Shankaraiah K. *Study of Changing Consumption Patterns in Venkatapuram village of Andhra Pradesh* (Doctoral dissertation, TISS).
9. Mangal A, Kumar V, Panesar S, Talwar R, Raut D, Singh S. Updated BG Prasad socioeconomic classification, 2014: A commentary. Indian journal of public health. 2015 Jan 1;59(1):42.
10. Rao M, Ramachandra SS, Bandyopadhyay S, Chandran A, Shidhaye R, Tamisettynarayana S, Thippaiah A, Sitamma M, George MS, Singh V, Sivasankaran S. Addressing healthcare needs of people living below the poverty line: a rapid assessment of the Andhra Pradesh Health Insurance Scheme. Natl Med J India. 2011 Jan 1;24(6):335-41.
11. Rao M, Kadam S, Sathyanarayana TN, Shidhaye R, Shukla R, Ramachandra SS, Bandyopadhyay S, Chandran A, Anitha CT, Sitamma M, George MS. A rapid evaluation of the Rajiv Aarogyasri community health insurance scheme in Andhra Pradesh, India. InBMC proceedings 2012 Dec 1 (Vol. 6, No. S1, p. O4). BioMed Central.
12. Shreedevi D. Evaluation Of Rajiv Aarogyasri Scheme In Andhra Pradesh And Survey Of Patients Opinion. Indian Journal of Research in Commerce, Economics & Management VOLUME NO. 4 (2014), ISSUE NO. 10 (OCTOBER) ISSN 2231-4245. Page 25-30 A.

Analyzing the Positional uncertainties in 3dcrt ca breast Patients with Free Breathing and Active Breath Coordinator Gating Immobilization Devices

Sarath s Nair[1], Meena Devi[2], Krishna Sharan[3], Jyothi nagesh[4], Shambhavi C[5], Sajeesh S Nair[6]

[1]lecturer,[3]Professor, [4]Senior Grade Lecturer, Dept. of Radiotherapy and Oncology, Kasturba Medical College manipal, [2]Associate professor, Dept. of physics and applied science, Noorul Islam higher education, Kumara coil [5]Assistant Professor, Dept. of Medical physics, School of Allied Health Sciences, Manipal,[6]medical physicist/RSO, Dept. of radiotherapy and oncology, General hospital Ernakulum

Abstract

Aim: The aim of this study is to rule out the difference in positional setup errors when using immobilization device such as thermoplastic mould for free breathing and vacloc with ABC gating in ca breast patient treating with 3DCRT technique.

Objective: The study is to compare the patient setup uncertainties using two different immobilization device, one with standard thermoplastic mould and other with vacuum cushion with active breath control gating in our clinical setup.

Methodology: fourteen patients with ca breast are taken for the study. seven patients are undergone immobilization using standard thermoplastic moulding and remaining seven patients undergone, vacuum cushion with active breath control DIBH (deep inspiration breath hold) gating. CT was taken and 3dcrt plan were done according to the standard protocol. Prior to the treatment CBCT was taken, matching was done in XVI with the reference images, to rule out any positional shifts. Positional Shifts on all 3 axes such x, y, z is noted with rotational shift. Comparison were done on systematic error (Σ), random error (σ), mean displacement vector (R), mean setup error (M).

Result: immobilization device used by vacloc with DIBH ABC gating shows very less shifts in all direction, especially longitudinal direction compared with mould one, which we are using routinely in our department.

***Keywords**: ABC, CBCT, xvi, DIBH gating, 3DCRT*

Introduction

Radiotherapy is one of the most effective mode of treatment for all types of carcinoma. There are different techniques in radiotherapy such as 3dcrt, forward planning, imrt, vmat, Tomotherapy etc, present today. Ca breast is a common cancer found in women all over the world with symptoms include lump or mass in the breast, nipple discharge or redness, changes in the skin such as puckering or dimpling, and swelling of part of the breast. Breast conservative therapy is the most common technique in radiotherapy for saving breast. It is done usually after lumpectomy, adding radiation after a surgery lowers the risk of cancer recurrence in the affected breast.

Many women go through radiation therapy for breast cancer, and roughly more than 60 percent of people with early-stage breast cancer will undergo adjuvant radiotherapy followed by surgery. It also helps in reduces the breast cancer death rate. The important and main step in radiotherapy is to immobilize the target, so that the beam can only target the carcinoma and spares the normal tissue. It is a very difficult process especially in thorax and abdomen region to retain the same position on every single day for the treatment, due to the involuntary motion it involves. The nature of breast, supraclavicular nodes, its region of avoidance contours etc. Different means of immobilization devices, are there especially for ca breast to reduce

the positional errors. Thermoplastic mould is one of its kind and commonly used in all radiotherapy center for the radiation treatment, even there are breast board, wedges, etc can also be used. While using this types of immobilization devices the main concern is the errors caused by the involuntary movement such as breathing movement. To limit this types of errors gating's are coming in the picture. By the help of gating technique, we can arrest the breathing motion errors, one of its kind is active breath coordinator device. Respiratory gating is used when there is a need to reduce the anatomical movement in the thorax and abdomen due to breathing and cardiac motion.it is intended for breath hold during simulation and treatment delivery[1].The Active Breathing Coordinator (ABC) allows for temporary and reproducible immobilization of internal thoracic structures by monitoring the patient's breathing cycle and implementing a breath hold at a predefined lung volume level. Active Breathing Coordinator provides non-invasive, internal immobilization of anatomies affected by respiratory motion, such as the breast, lung, liver, pancreatic etc. This is achieved through comfortable, simple and efficient assisted breath-hold techniques. Linked to the digital accelerator through the Response™ gating interface. Respiratory-gated radiotherapy offers a significant potential in improving the irradiation of tumor sites affected by respiratory motion such as lung, breast, and liver tumors [2 ,12].

in this study we were evaluating the impact of controlled breathing using , Active breath coordinator gating with normal free breathing with thermoplastic mould in our radiotherapy setup.

Methodology

There are studies showing reduction in heart dose can be achieved for many left-sided breast and chest wall patients using deep inspiration breath-hold[4].There are studies done in various department in ca breast using different gating methods using infrared, markers or fiducial which are surgically inserted, real time tracking using kv xray beam etc. This study is conducted at Kasturba Hospital using ELEKTA HD versa XVI cbct. Ethical approval was granted by the Institutional Ethics Committee, Kasturba Medical College, Manipal. The study was also registered under CTRI. fourteen breast cancer patients who were planned to treat with 42.5 Gy in 16 fractions were chosen for this study. Age range from 41 to 67 yrs., out of this 8 patients are with T1N2aM0 stage.

Seven patients were immobilized using thermoplastic chest mould (klarity) with four clips and seven by using vacloc with active breath coordinator in deep inspiration breath hold under Standard Operating Procedure in moulding room. Selection for the ABC gating is completely biased. Before the gating, patients are well explained and trained for the procedure. Patients with previous history of lung, heart problem, etc are avoided from ABC gating.

Contours, prescription are done based on ICRU protocol[3]. Standard tangential 3dcrt beam planning was generated using 6 mv or 10 mv photon with wedge. Plans are evaluated by experienced radiation oncologist before sending for verification and treatment. Patients were imaged with CBCT on first consecutive three days and every third day during their course of treatment. CBCT was taken before each fraction. In all, 6 CBCT images were acquired for each patient for 3 weeks. A total of 84 images are obtained. Image registration was done first by automatic and then by manual adjustment by the same person for all the patients. Patients were positioned supine, with both arms raised above their head and immobilized by thermoplastic mould[5]. During the mould making process, three fiducial markers were placed on the patient's body with the support of laser for isocenter reference mark. CT was taken with slice thickness of 5 mm in Philips brilliance 16 big bore and pushed Monaco™ TPS V5.11.02 treatment planning system (TPS) for delineation of the targets and OAR. once plan was done, all plans were approved by a radiation oncologist and transferred from TPS to CBCT system for the treatment delivery along with the corresponding planning CT datasets which will be used as the reference image data sets. The planning CT-scan was imported into the XVI database via DICOM. XVI system consisted of kilo-voltage X-ray source arm and amorphous silicon flat panel imager, is together with Elekta HD versa® (Elekta Ltd, UK) linear accelerator was used as the IGRT system to acquire onboard CBCT images. Patient's 3D-CBCT images are acquired at isocenter after applying the shift from the origin, which we got from the treatment planning station. Rotational shifts such as pitch, yaw and roll are not considered in this study. If the rotational error is more than 3^{o}, patients are repositioned and images are taken once again

Images in cbct were acquired within one-minute time span, 360-degree rotation with the patient immobilized in the treatment position same like during CT acquisition. M20 collimator cassette was used on all patients giving

a nominal irradiated scan length at the isocentre of approximately 26 cm and reconstruction diameter of approximately 40 cm. the acquisition parameters were 120 kV, (with clinical filter F1), maintaining the lower dose to the patient's skin but improving image quality. The image acquisition parameter of xvi is given in table 1 below. Commissioning and calibration of the CBCT isocentre to the linear accelerator isocentre was performed prior to this study according to recommended guidance AAPM TG 58[5].

Table 1: acquisition parameters of xvi CBCT

KV	**120**
MAS	140
Gantry rotation	Clockwise (3600 arc)
Collimator	M20
Filter	F1
Frame	660
Reconstruction filter	wiener
XVI software	Version 5.0.3
Nominal scan dose	3.8 mGy

Image registration was first done automatically by using Clip-box registration (CBR) method, the volume of interest is defined on the CT image in the form of a box drawn around the anatomy of interest[4]. The registration between image sets is limited only to the voxels within the clip box which contains the volume. It is a rigid registration process and does not include any margins during image matching. Once automatic matching was done next step was to do a manual matching to rule out the small mismatch correction in automatic clip box registration. In manual registration we use mouse to move the reference image with translational and rotations. Even though Manual matching is a time taking registration, it is superior than automatic one[4]. Out of automatic matching, the gray value (T + R) registration use grayscale intensity values of the voxels in the registration volume. The algorithm used here is correlation ratio procedure. The bone (T+R) mode of automatic registration use chamfer matching algorithm[9], to calculate the same as bone densities. Since the algorithm is not very sensitive to image noise, this registration can have done very quickly.

The deviation between the actual and intended position in a patient treatment is called the setup errors. Mainly two types of setup errors are present while treating a patient in external beam radiotherapy, such as systematic and random error. Systematic part of an error is one which occur systematically (same direction and magnitude) throughout the delivery[7]. This types of errors may be introduced into the treatment during immobilization preparation, planning, while transferring the data, during delivery etc.so Systematic errors are sometimes called as treatment preparation errors, It can be calculated by standard deviation of the mean error of individual of that population and is represented by the symbol $\sum$. whereas random error which is represented by σ, is one which direction and magnitude of error will vary from each fraction during the treatment. This type error is usually occurring during treatment delivery phase may be due to patient's setup, tumor position, intra-fraction movement and sometimes called as daily execution errors. Which can be calculated by the root mean square of the standard deviation of each patient.

It is easy to reduce the random error to some extent than systematic error[5]. The mean setup error (M) is the average of the setup error in each direction. Whereas mean displacement vector which quantifies the distance and direction of patient setup errors can be calculated using

$$M = \sqrt{(AP)^2+(RL)^2+(SI)^2}$$

Where RL, SI, AP is deviation in three axis of patients respectively[8].

Results and Discussion

It is shown in study done by Mageras GS, Yorke E that Gated treatment offers reduced respiratory motion with less patient effort than DIBH[10].However in this study gating was done in DIBH mode where normal OARS can be saved at the same extend[11]. The result of present study is expressed in tables and chart given below. The mean and standard deviations were calculated. The mean value expressed the systematic error and the standard deviation describes the random error of individuals[7]. The residual population systematic setup errors data are shown in fig 2. The major shifts are

noted in longitudinal direction (SI), the mean of superior inferior (SI), in mould is 4 mm in mould and 1 mm in ABC gating. The random error in RL, SI, AP is 1.6, 4.4, 1.4 mm in ABC gating, where as in mould it is 1.7, 6.1, 2.4 mm respectively. The patient's translational errors of both mould and gating are shown below in fig 1.

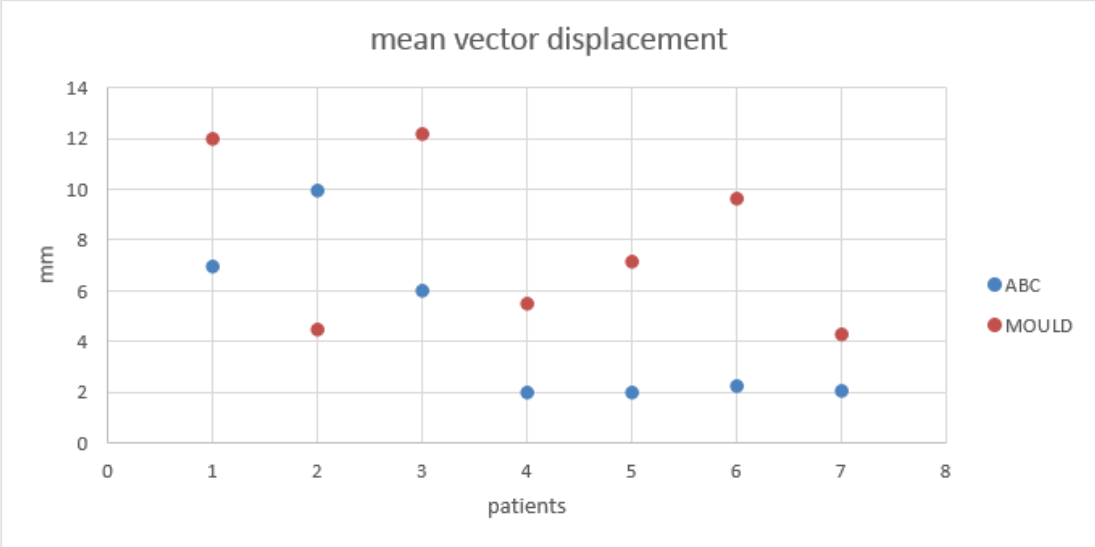


Fig 1: scatter plot distribution of mean vector displacement for each patient in ABC gating and mould immobilization

The vector displacement for mould varies from 3.6 mm to 12 mm, whereas in ABC gating it is from 2.1 to 10 mm. The sample size chosen for this study is very less, more number of samples are needed to know the exact shift difference in all axes. The random error noted for ABC gating is 1.6, 4.5,1.4 mm and 2.0, 6.0, 2.0 mm for mould in RL, SI, AP respectively. The systematic errors of population are given below in fig 2.

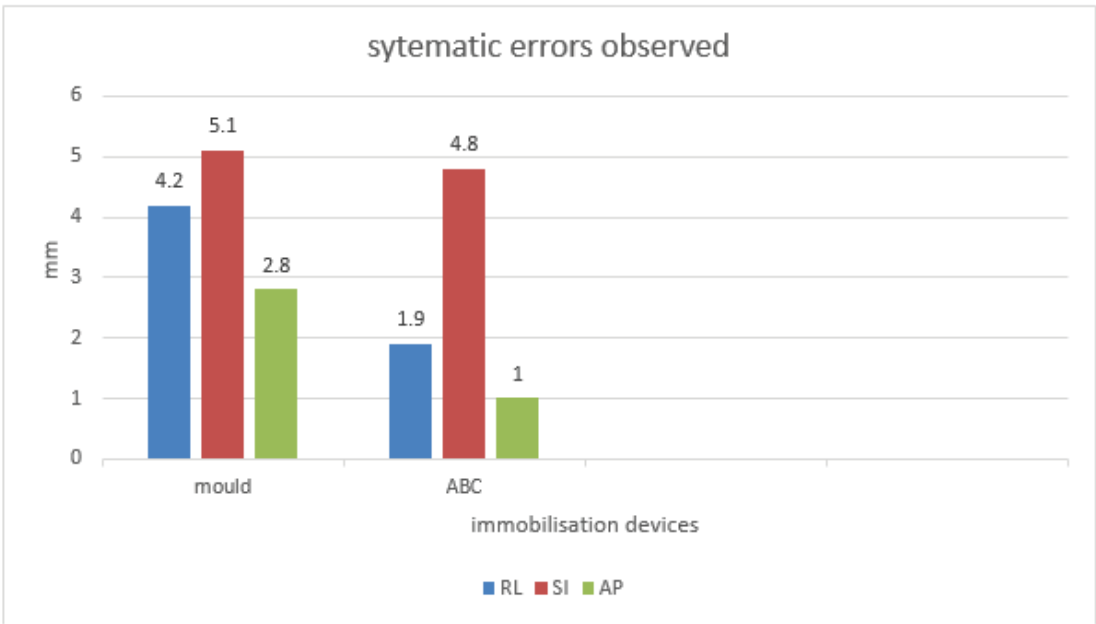


Fig 2: population Systematic (Σ) errors calculated

(X (RL): Medio lateral, Y (SI): Craniocaudal, Z (AP): Anteroposterior) all reading are in mm)

Conclusion

From this study, in our clinic it is found that by using active breath control gating, we can reduce the systematic and random error to a great extended compared with the normal free breathing mould immobilization. One drawback noted in ABC gating is that selection of patient which is a biased one, a complete cooperation of patient is a must for doing all this procedure. Second it is a tedious process compared with the mould technique. A proper training of patient is needed, prior to immobilization simulation and treatment

Conflict of Interest: No potential conflict of interest relevant to this article

Source of Funding: It is Self-funded study

References

1. Active breathing coordinator ™ R3.0, instruction Elekta limited: document id 150143301
2. Philippe Giraud and Annie Houle. Respiratory Gating for Radiotherapy: Main Technical Aspects and Clinical Benefits. Hindawi Publishing Corporation ISRN Pulmonology Volume 2013, Article ID 519602,
3. The International Commission on Radiological Units and Measurement. Prescribing, Recording, and Reporting Photon Beam Therapy. ICRU Report No.50. 1993; Bethesda, Maryland, USA: ICRU;
4. Steve Walston, DO, Allison M. Quick, MD, Karla Kuhn, CMD,and Yi Rong, PhD Dosimetric Considerations in Respiratory-Gated Deep Inspiration Breath-Hold for Left Breast Irradiation, Technology in Cancer Research &Treatment 2017, Vol. 16(1) 22–32
5. AAPM REPORT NO. 58 managing the use of fluoroscopy in medical institutions Report of Task Group VI of the Radiation Protection Committee, October 1998
6. IPEM; on target: ensuring geometric accuracy in radiotherapy: royal college of radiologist 38 Portland place London W1B 1JQ 2008
7. van Herk M. Errors and margins in radiotherapy. Semin Radiat Oncol 2004; 14:52-64.
8. P Mohandas, D. Khanna1, T. Manoj Kumar etc. Study to Compare the Effect of Different Registration Methods on Patient Setup Uncertainties in Cone-beam Computed Tomography during Volumetric Modulated Arc Therapy for Breast Cancer Patients, journal of medical physics,2018 vol 43, issue 4 oct-dec
9. 11.Gilhuijs KG, el-Gayed AA, van Herk M, Vijlbrief RE. An algorithm for automatic analysis of portal images: Clinical evaluation for prostate treatments. Radiotherapy Oncol 1993; 29:261 – 8.
10. Mageras GS, Yorke E. Deep inspiration breath hold and respiratory gating strategies for reducing organ motion in radiation treatment. Semi Radiat Oncol. 2004;14(1):65-75.
11. Nissen HN, Appelt A. Improved heart, lung and target dose with deep inspiration breath hold in a large clinical series of breast cancer patients. Radiother Oncol. 2013;106:28–32.
12. Lu HM, Cash E, Chen MH, et al. Reduction of cardiac volume in left-breast treatment fields by respiratory maneuvers: A CT study. Int J Radiat Oncol Biol Phys. 2000;47(4):895-904

Effectiveness of Health Intervention on Birth Preparedness on Knowledge and Outcome of Pregnancy among Primi Antenatal Mother in Selected Hospital of Pune

Sofiya Khan[1], Seeta Devi[2], Ranjana Chavan[2], Shitalwaghmare[2]

[1]II year M.Sc (N), [2]Asst. Professor , Symbiosis College of Nursing, Symbiosis International (Deemed University), Pune

Background of the Study: Birth preparedness and complication readiness is a strategy to promote the timely use of skilled maternal and neonatal care, especially during child birth based on the theory that preparing for childbirth and being ready for complication and reduce delay in obtaining care Annual global estimate of 287,000 maternal deaths were recorded in 2010 as a result of complication of pregnancy and childbirth.

Methodology: In the present study Quantitative research approach is applied approach is applied and quasi experimental pre –test post-test design is used sample all primi mother sample size 60 primi mother sampling technique non- probability convenience sampling setting the selection of study setting is on the basis of the feasibility of conducting study and availability of sample. Study will be conducted in Talera and Bhosri hospital, PCMC,Pune

Results: Birth preparedness and complication since all the p-values are large (greater than 0.05), none of the demographic variables was found to have significant association with the mode of delivery Maternal complication during labor.In the present study pretest, 20% of the primi antenatal mothers had poor knowledge (Score 0-3), 66.7% of them had average knowledge (score 4-6) and 13.3% of them had good knowledge (score 7-10) regarding birth preparedness. In post-test, 5% of them had average knowledge (score 4-6) and 95% of them had good knowledge (score 7-10) regarding birth preparedness.

Conclusion: In this study indicates that the knowledge of the women regarding birth preparedness improved remarkably after health intervention Researcher applied paired t-test for the effectiveness of health intervention on Knowledge of woman regarding birth preparedness among antenatal mother

Keywords*: Knowledge, Preparation, Readiness, Pregnancy, Complication*

Introduction and background

Childbirth is a natural and universal phenomenon. Although labour is often thought of as one of the most painful events in human experience, supportive care is intended to ease a woman ‘s anxiety and discomfort. A wide variety of relief measures, pharmacological and non-pharmacological are available for woman in labour pregnant women become more focused about labour and birth of a child as they approach the final phase of pregnancy midwives and maternity nurses play a vital role in helping pregnant woman to overcome their fear and anxieties about labour[1]

Globally, eight hundred women die every day due to pregnancy or child birth related complications. Almost all maternal deaths (99%) occur in developing countries, and more than half of this deaths occur in Sub-Saharan Africa[2]

In India approximately 15% of pregnant women develop life-threatening complications hence need for emergency obstetric care. These complications

Corresponding author:
Ms. Sofiya Khan
Symbiosis College of Nursing, II year M.Sc (N)
Symbiosis International (Deemed University),
Pune 411004

are unpredictable and may progress rapidly to a fatal outcome. Knowledge of danger signs of obstetric emergencies and appreciation of the need for rapid and appropriate response when emergencies occur may reduce delay indecision making and in reaching health facilities. Danger signs in pregnancy are vaginal bleeding, severe headache, severe vomiting, swelling of hands and face, difficulty in breathing fits, fever, reduction or absent fetal movement and drainage of liquor[3].

Mothers who dream of a safe pregnancy and a healthy baby. However, every pregnant woman faces the risk of sudden, unpredictable complications that could and in death or injury to herself or to her infant. Birth preparedness and complication readiness is a strategy that encourages pregnant women, their families, and communities to effectively plan for births and deal with emergencies, as knowledge and practice preparedness and Knowledge of birth preparedness and complication readiness was higher than knowledge of pregnancy danger signs (complication readiness) in many studies, whilst implementation of Birth preparedness and complication readiness interventions was lower than level of knowledge in all studies[4]

Operational Definitions:

Preparation: It is helps ensure that woman can when labour begin and can also reduce the days that that occur experience obstetric complication.

Readiness: It promote active preparation and decision making for delivery by pregnant woman.

Pregnancy: The state of carrying a developing embryo or fetus within the female.

Knowledge: It is important to raise awareness of personal and professional accountability, inform the improve patient care.

Antenatal mother: In this study antenatal mother refers to pregnant mother who are attending antenatal ward checkup.

Objectives:

- To assess the knowledge of woman regarding birth preparedness.
- To assess the effectiveness of health intervention on birth preparedness and complication readiness on outcome of pregnancy among antenatal mother.
- To find the association between outcome of pregnancy and selected demographic variable.

Hypothesis: H_o-There is no significant association between labour preparedness and complication readiness program on outcome of pregnancy.

Methodology

In the present study Quantitative research approach is applied approach is applied and quasi experimental pre –test post-test design is used sample all primi mother sample size 60 Primi mother sampling technique non-probability convenience sampling setting the selection of study setting is on the basis of the feasibility of conducting study and availability of sample. Study will be conducted in Talera and Bhosri hospital, PCMC, Pune In the present study pretest, 20% of the Primi antenatal mothers had poor knowledge (Score 0-3), 66.7% of them had average knowledge (score 4-6) and 13.3% of them had good knowledge (score 7-10) regarding birth preparedness. In post-test, 5% of them had average knowledge (score 4-6) and 95% of them had good knowledge (score 7-10) regarding birth preparedness. This indicates that the knowledge of the women regarding birth preparedness improved remarkably after health intervention Researcher applied paired t-test for the effectiveness of health intervention on Knowledge of woman regarding birth preparedness among antenatal mother

Results

SECTION I

Analysis of data related to the knowledge of woman regarding birth preparedness

Table No 1: Knowledge of woman regarding birth preparednessparticipants in terms of frequency and percentage n-60

Knowledge	Pretest	
	Freq	%
poor (Score 0-3)	12	20.00%
Average (Score 4-16)	40	66.70%
Good (score7-10)	8	13.30%

SECTION II

Analysis of data related to the effectiveness of health intervention on birth preparedness and complication readiness on outcome of pregnancy among antenatal mother

Table 2: Effectiveness of health intervention on Knowledge of woman regarding birth preparedness among antenatal mother in terms of frequency and percentagesn=60

Knowledge	Pretest		Posttest	
	Freq	%	Freq	%
Poor (Score 0-3)	12	20.00%	0	0.00%
Average (Score 4-6)	40	66.70%	3	5.00%
Good (Score 7-10)	8	13.30%	57	95.00%

Table No 3 : Paired t-test for the effectiveness of health intervention on Knowledge of woman regarding birth preparedness among antenatal mother

n=60

	Mean	SD	T	Df	p-value
Pretest	4.9	1.7	12.4	59	0
Posttest	8.9	1.9			

Table No 4: Effectiveness of health intervention on self- preparedness among

Antenatal mother in terms of frequency and percentages

Self-preparedness item	Pretest				Posttest			
	Yes		No		Yes		No	
	Freq	%	Freq	%	Freq	%	Freq	%
Do you know the date of delivery	28	46.7%	32	53.3%	58	96.7%	2	3.3%
Do you know your blood group	15	25.0%	45	75.0%	56	93.3%	4	6.7%
Did you save the money for delivery	8	13.3%	52	86.7%	55	91.7%	5	8.3%
Did you plan the plan for delivery	9	15.0%	51	85.0%	53	88.3%	7	11.7%
Did you arrange the transport facility	10	16.7%	50	83.3%	52	86.7%	8	13.3%
Do you know the oriental item repaired form delivery (clothe,relativity)	13	21.7%	47	78.3%	51	85.0%	9	15.0%
Did you identify the health care Preston who is going to	9	15.0%	51	85.0%	59	98.3%	1	1.7%

Since all the p-values are large (greater than 0.05), none of the demographic variables was found to have significant association with the Maternal complication during labor.

Discussion and Conclusion

The primary aim of this study is to assess the effectiveness of health intervention on birth preparedness on knowledge and outcome of pregnancy among antenatal mother in selection as in hospital of Pune city. Discussion of the result of data analyzed as based on the objective of the study of birth preparedness and complication readiness among pregnant women in India was found very low as every pregnant woman should be expected to prepare for birth and complication. Specifically, from the key elements of birth preparedness plan very low percent of pregnant women prepared for the emergency situation during pregnancy and childbirth an improve knowledge of women's birth preparedness and complication readiness plan

A self – made variable is used for the present study on the basis of the objective and it was considered to be most appropriate teaching for assessing the effectiveness of health intervention on birth preparedness on knowledge and outcome of pregnancy among Primi antenatal mother. there search design adopted for this study was quasi –experimental group pre test posttest research design. A no probability, purposive sampling technique was used to select 60 Primi antenatal mother.

The obtained data were entered into master sheet for tabulation and statistical processing the finding of the study is discussed in the term of objective

Ethical Clearance – Ethical clearance was obtained from ethical committee of symbiosis college of nursing.

Conflict of interest -NIL

Source of Funding-Self

References

1. Agarwal S, Sethi V, Srivastava K, Jha PK, Baqui AH. Birth preparedness and complication readiness among slum women in Indore city, India. Journal of health, population, and nutrition. 2010 Aug;28(4):383.
2. World Health Organization, Unicef. Trends in maternal mortality: 1990 to 2013: estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division: executive summary. World Health Organization; 2014. Accessed at
3. Moran AC, Sangli G, Dineen R, Rawlins B, Yaméogo M, Baya B. Birth-preparedness for maternal health: findings from Koupéla district, Burkina Faso. Journal of health, population, and nutrition. 2006 Dec;24(4):489.
4. Moshi FV, Ernest A, Fabian F, Kibusi SM. Knowledge on birth preparedness and complication readiness among expecting couples in rural Tanzania: Differences by sex cross-sectional study. PloS one. 2018 Dec 28;13(12):e0209070.
5. Del Barco RC. Monitoring birth preparedness and complication readiness. Tools and indicators for maternal and newborn health.
6. Ekabua, J. E., Ekabua, K. J., Odusolu, P., Agan, T. U., Iklaki, C. U., &Etokidem, A. J. (2011). Awareness of birth preparedness and complication readiness in southeastern Nigeria. ISRN obstetrics and gynecology, 2011.
7. Gagnon, A. J., &Sandall, J. (2007). Individual or group antenatal education for childbirth or parenthood, or both. Cochrane database of systematic reviews, (3).

Study to Assess the Knowledge of People About Dengue Fever in Selected Rural Area of Mangalore

Suchithra BS

Asst. Professor, Dept. Of Community Health Nursing , Nitte Usha Institute of Nursing Sciences, Paneer, Deralakatte post , Kotekar beeri road, Mangalore -575018

Abstract

Health is the precious possession of all human beings as it is an asset for an individual and community as well. Like health, disease is a dynamic process and it is just the opposite of health. Effective control of communicable diseases is necessary for national development and economic self dependence. **The aim of the study** is to assess the knowledge of people about dengue fever in selected rural area of Mangalore. M**ethodology :** A quantitative, non-experimental research approach was used for the present study. Research design survey design. 150 subjects between the age 20-60 yrs were collected by using purposive sampling method. The study was conducted in Kalkatta area, under Natekal PHC.**Results:** The majority of in rural people 88(59%) were in the age group of 20-30 years. In rural area 79(53%) people were aware about dengue fever. Source of information showed that majority 59(75%) in rural people got information from paper, TV and media. The present study depict that 64(43%) of rural people have poor knowledge, 85(56%) of rural were having average knowledge and 1(1%) of rural people had good knowledge about dengue fever.

Present study revealed that there is association between level of knowledge and selected demographic variable like age and religion.

Conclusion: The present study depict that 64(43%) of rural people have poor knowledge, 85(56%) of rural were having average knowledge and 1(1%) of rural people had good knowledge about dengue fever.

Key words: *dengue fever, knowledge, rural.*

Introduction

Mosquito-Borne Diseases or mosquito-borne illness is disease caused by bacterial, viruses, parasites transmitted by Mosquitoes. This can transmit disease without being affected themselves.[1] Dengue is a main leading problem to human kind. Some mosquitoes are vectors for some of the diseases. Typically the diseases are caused by viruses or tiny parasites.[2]

Dengue fever is a serious public health problem in terms of its morbidity and mortality. It reports from almost all countries and it is endemic in the tropical countries. Dengue fever is an infectious mosquito-borne disease caused by dengue virus. Its symptoms include fever, head ache, muscle and joint pains and rash resembles measles. The presence of muscle and joint paints gives an alternative name to the dengue fever as ‹break bone fever›. [3]

Dengue is transmitted to humans by the Aedes aegypti or more rarely the Aedes albopictus mosquito. The mosquitoes that spread dengue usually bite at dusk and dawn but may bite at any time during the day, especially indoors, in shady areas, or when the weather is cloudy.[4]

India is one of the seven identified countries by reporting incidence of Dengue Fever/Dengue Haemorrhagic Fever outbreaks and may soon transform into a major niche for dengue infection in the near future. The first confirmed report of dengue infection in India dates back to 1940s, and since then more and more new states have been reporting the disease which mostly strikes in epidemic proportions often inflicting heavy morbidity and mortality, in both urban and rural environments.[5]

Background

Dengue fever usually starts suddenly with a rapidly climbing high fever, that's why the temperature in dengue fever is called a 'saddleback' type temperature, severe headaches, retro-orbital pain behind the eye, nausea & vomiting, loss of appetite, rashes develop on the feet or legs 3 to 4 days after the beginning of the fever, swelling and pain in muscles and joints. The joint pain in the body has given dengue fever the name that is "break bone fever". The common symptoms of dengue fever may go in around 10 days, but complete recovery from dengue fever can take more than a month.[6]

Dengue is currently the most common arboviral infection worldwide. It is endemic in almost all tropical and sub-tropical regions of the world; approximately 40% of the world population is at risk of acquiring a dengue infection. [6]

Dengue is a tropical disease affecting 110 countries throughout the world and placing over 3 billion people at risk of infection. According the World Health Organization 70 to 500 million persons are infected every year including 2 million who develop hemorrhagic form and 20,000 who die. Children are at highest risk for death. [7]The community health nursing experience and the increased incidences of dengue in India, made researcher to assess the awareness among people in rural and urban area about dengue fever so as to prevent dengue in future by administering the self information module.

Methodology

A quantitative, non-experimental research approach was used for the present study with survey design. Total 150 subjects between the age 20-60 yrs including both male and female were enrolled by using purposive sampling method. The study was conducted in Kalkatta area, under Natekal PHC. The institutional ethical permission was obtained. Permission from the medical officer was obtained inorder to carry out the study. Demographic performa and structured knowledge questionnaire to assess the knowledge regarding dengue fever and its control measures was administered. It was on the basis of arbitrary classification. The structured knowledge questionnaire were consist of 20 items and score was classified as good (score 14-20) , Average (score 7-13) and poor (score 0-6) . The tool validity and reliability was assessed. Informed consent was obtained from the subjects; demographic performa and structured knowledge questionnaire were administered.

Results

The present study revealed that out of 150 subjects in rural area majority 88(59%) of them were in the age group of 20-30 years.. Distribution of subjects according to the religion showed that among rural area 33(22%) were Hindu, 117(78%) were Muslims. Percentage distribution of rural people according to the education showed that in the rural area 14(9%) were illetrate, 38(25%) were primary education, 81(54%) were gone up to high school, 17(12%) were graduates. In rural area 79(53%) were aware about dengue. Percentage distribution of samples according to the source of information showed that majority 59(75%) in rural got information from paper, TV.

Table 1: The knowledge of People about Dengue Fever in selected rural area of Mangalore.

n = 150

Level of knowledge	Frequency	Percentage
Poor (0-6)	64	43
Average (7-13)	85	56
Good (14-20)	1	1
Total	150	100

The Present study shows that 64(43%) of rural people have poor knowledge, 85(56%) were having average knowledge and 1(1%) had good knowledge about dengue fever.

Present study revealed that there is association between level of knowledge and selected demographic variable like age and religion. And there is no association between level of knowledge and selected demographic variable like sex, education, occupation, and source of information.

Discussion

The present study revealed that out of 150 samples in rural area 88(59%) of them were in the age group of

20-30 years and mean age group is 29 yrs, this finding is supported by the study conducted in Malaysia the result showed that Mean age of respondents was 34.4 (± 5.7) years, and the age ranged from 18 to 65 years. [8]The study Javed N et all shows that the mean age group is 14.72 ±1.09.[9] Percentage distribution of rural people according to the education showed that in the rural area 14(9%) were illetrate, 38(25%) were primary education, 81(54%) were gone up to high school, 17(12%) were graduates and In rural area 79(53%) were aware about dengue. Similar finding was found in the study by Deepika T, Sharma G,Gupta M, they concluded in the study , 98.6% were literate and majority (99.4%) had heard about dengue fever.[10]

Percentage distribution of samples according to the source of information showed that majority 59(75%) in rural got information from paper, TV this finding was supported by the study by Jevid N et all shows that in their study majority 72.9% received knowledge on Dengue through TV and radio. [9]

The Present study shows that 64(43%) of rural people have poor knowledge, 85(56%) were having average knowledge and 1(1%) had good knowledge about dengue fever. The findings of the study was contradictory to the study by Yboa BC, Leodoro J , the result shows that more than half of the respondents had good knowledge (61.45%) on dengue symptoms and preventive measure. [11]The result of study by Yusuf MA, Ibrahim AN supports the present findings it shows that total 148/49.3% of the participants demonstrated a moderate level of knowledge, 140 (46.7%) a neutral level of attitude and 156 (52%) a low level of practice towards dengue fever prevention. 23A study conducted in Thailand, also showed that out Of the 1650 persons, 67% had good knowledge of dengue. [12]

Present study revealed that there is association between level of knowledge and selected demographic variable like age and religion. This finding was contradictory with study by Haraphan H et all shows that level of education, occupation, marital status, monthly income, socioeconomic status (SES) and living in the city were associated with the knowledge level.[13]

Conclusion

The present study concludes that the majority of the rural people i.e 56% of them had average knowledge on dengue fever and its control measures. Has the study is limited to only rural area and it would have been better to assess the practice of vector control measure.

Ethical Clearance- Obtained from Institutional Ethical committee

Source of Funding-Self

Conflict of Interest –NIL

References

1. K.Park.Park's. The text book of preventive and social medicine :Baton publication ;20th edition. 672.
2. Beyneman D.2004.medical parasitology in :medical microbiology,Brooks,G.F,J.S,Butel and S.A Morse(eds) :23rd edition mcgrawhill,boston. 661-701
3. Antony J, Celine TM.A descriptive study on Dengue fever reported in a Medical College Hospitl. Sahel Med J 2014; 17:83-6.
4. Rothman AL (2004). Dengue: defining protective versus pathologic immunity. J. Clin. Invest. 113 (7): 946–51
5. Debarati Guha-Sapira and Barbara Schimmer .Dengue fever: new paradigms for a changing epidemiology .Emerging Themes in Epidemiology 2005, 2:1 doi:10.1186/1742-7622-2-1
6. Pinheriro FP, Corber SJ et all. Situation of dengue and dengue haemorragic fever and its emergence. World health statistics quarterly 1997; 50(3-4)
7. Kissoon N (July 2010). "Dengue hemorrhagic fever and shock syndromes". Pediatr. Crit. Care Med. 12 (1): 90–100.
8. Benthem, Khantikul H, Panart K, Kessels PJ et all. Knowledge and use of prevention measures related to dengue in northern Thailand. Tropical Medicine and International Health. Nov 2002: 7(11) :993–1000.
9. Javid N,Ghaznfar H, Naseem S. Knowledge of Dengue Among Students Exposed to Various Awareness Campaigns in Model Schools of Islamabad: A Cross-Sectional Study. Open access 2018 Apr; 10(4): e2455.
10. Deepika T, sharma G, Gupta M. Assessment of knowledge, attitude and practice of dengue in factory workers of Amritsar, Punjab. International Journal of Basics of Pharmacology:5 (1); 2016.

11. Yboa BC, Leodoro J. Labrague. Dengue Knowledge and Preventive Practices among Rural Residents in Samar Province, Philippines. College of Nursing & Health Sciences, Samar State University, Philippines. American Journal of Public Health Research, 2013 Jan (2): 47-52.

12. Yusuf MA, Ibrahim AN. Knowledge, attitude and practice towards dengue fever prevention and associated factors among public health sector health-care professionals: in Dire Dawa, eastern Ethiopia.June 2019 : 91-104.

13. Harapan H, Rajamoorthy Y,Anwar S et all. Knowledge, attitude, and practice regarding dengue virus infection among inhabitants of Aceh, Indonesia: a cross-sectional study BMC Infect Dis. 2018; 18: 96.

A Propitous Genetic Impact on Neurodevelopmental Disorders - A Flagstone for Personalized Medicine

Sujitha P.J[1], V. Gomathi[2]

[1]PhD Research Scholar, Department of Pharmacology, Vinayaka Mission College of Pharmacy, Salem, Tamil Nadu, India. [2]Associate Professor, Department of Pharmacology, Vinayaka Mission College of Pharmacy, Salem, Tamil Nadu, India

Abstract

There has been a precipitous advancement of unequivocal technological and methodological upgradings in genetics and genomics, thereby allowing to identify atypical mutations that are involved in complex neurodevelopmental conditions. Neoteric advancements in genomics such as whole – exome or whole genome sequencing have endorsed scientist to identify extensive mutations underlying NDDS. In this review we are recapitating the new-fangled developments in genomic analysis and deciphering it into clinical practice.

Key Words: *genetics, whole – exome sequencing, whole genome sequencing, genomics, neurodevelopmental conditions, NDD*

Introduction

One among the prominent health problems existing in paediatric health care is neurodevelopmental disorder (NDD).[1] About 3 percentage of the general population is to be posed by some form of NDDs.[2] Moreover, the spread of the disease is increasing significantly in people with poor socioeconomic status and health care, especially in the developing countries.[3] NDDs can be defined in a wide term for a multifarious group of conditions symbolized by disability in cognition, communication, behaviour and motor skills, because of abnormal brain development.[4,5] There are no curative pharmacological treatments for cognitive delay.[6] Thus, children with NDDs usually undergo treatment with a collage of rehabilitative therapies and early intervention strategies to optimize their developmental potential. NDDs could be categorized based on defects such as intellectual functioning, speech, language, and fine motor skills, and could coexist with a recognized syndrome. The existence of minor dysmorphism (facial and other superficial physical abnormalities) / multiple congenital anomalies (MCA) may coexist with symptoms of NDD in some instances. In patients with NDDs, the most common clinical features are intellectual disability (ID) or developmental delay (DD), voice delay (VD), linguistic delay (LD) and autism spectrum disorder (ASD). NDDs in children include attention-deficit/hyperactivity disorder (ADHD), autism, learning disabilities, intellectual disability (also called as mental retardation), conduct disorders, cerebral palsy and impairments in vision and hearing. The real dimension of the issue is mainly difficult to evaluate due to disorder definition, sampling processes, tool variations, cultural and environmental differences, training of information collectors and disorder awareness.[7,8] It has been proposed that 85% of children with neurodevelopmental illnesses live in low – and middle income nations, but little information is available to support this. The incidence of neurodevelopmental disorders in India, a study carried out by members of the International Clinical Epidemology Network (INCLEN) disclosed that 10 percent hilly area, 13 percent urban areas and 18 percent rural areas were found to have one or more NDDs in children aged 2 to 9 years. The tribal prevalence was 4.96%, possibly reflecting lower infant

Corresponding Author
Sujitha P.J
Ph.D Scholar, Department of Pharmacology,
Vinayaka Mission College of Pharmacy,
Yercaud Main Road, Kondappanaickenpatti,
Salem-636008, Tamil Nadu, India.
Email Id: sujipj08@gmail.com
Contact No. 08903526056

and child survival.[9] A significant interplay between environment and genes is also required to explain complicated NDD etiology associated by abnormality in brain morphology and/or functional activity, including those with a strong genetic element. maternal infection, chemical pollutants, dietary factors, medications, stress, deprivation are the various environmental irritants which may impede with typical brain development pathways, eventually augmenting the chance of either subclinical neuropsychological changes or clinical situations such as learning disabilities, autism spectrum disorders (ASD)[10] and attention deficit / hyperactivity disorder (ADHDs).

Pathology

Astrocyte dysfunction that affects neural circuit development is widely accepted pathomechanism of NDD.[11] Variations in exact timing of the neurogenic to glyogenic switch can lead to death or surplus of astrocytes, which leads to reduction of neuronal survival, synapse formation or limit the available number of neurons to contribute to specific circuits. Discharge of toxic factors or absence of survival or/and synaptogenic signals may precipitate pathogenesis of neural circuits.[12] MRI studies of autistic and normal patients showed brain abnormalities such as hyperplasia of cerebellar white matter, neocortical gray matter and cerebellar white matter in young age which slowed the growth further.

Role of Genetics in NDD

Inch - perfect technological and methodological breakthroughs in genomics have been rapidly evolving, enabling for the detection of mutations engaged in complicated neurodevelopmental disorder. A study exploring gene to phenotype connections for neurodevelopmental disorders classified genes centered on the particular disease were annotated and confirmed that genes connected with various diseases tend to be more multifunctional than specific (mentioned in Table 1). Also genes associated with Fetal Alcohol spectrum Disorder (FASD) were more multifunctional than Autism Spectrum Disorder (ASD) or Cerebral Palsy (CP).

Microarray based technologies for comparative genomic hybrization analysis has permitted the unmasking of submicroscopic microdeletions or microduplications also known by copy number variations (CNVs). Comparative genomic hybridization inquests suggest that rare copy number variations at numerous loci are muddled in the inducement of mental retardation, ASD and schizophrenia. These studies shows that the rearrangements were not disease specific, with possible oddment of maternally derived 15q13 duplication of gene TSPAN7, previously shown in MR and ASDs was spotted in case with schizophrenia.[15]

Animal Models of NDD

Animal models for NDD focus on a four tiered approach such as

i. Scoring for morphological changes in neural cells and in brain regions.

ii. Examination for alterations in brain activity and connectivity.

iii. Neurological behaviours such as sensory alteration, motor abnormalities and seizures.

iv. Higher order behaviour such as learning and memory or social behaviour changes etc.

Traditional models include environmental models such as neonatal brain infection using borna virus, [16] prenatal exposure of valproic acid in rodents, [17] prenatal influenza model, [18] LPS induced model[19] and thyroid models[20] for cerebellar dysfunction which causes NDD.

Genetic Models [21,22,23]

Various models for autism include staggerer mice (mutation of retinoic acid receptor related orphan receptor alpha gene), [24,25] SHANK3 (gene encodes for a post synaptic protein) existing shank3 models have not yet directly inspected on cerebellum, it is expressed in granule cells,[26,27] ENGRAILED2-En2 (involved in development of hind brain and cerebellum, it demonstrate decreased play, social behaviour, increase aggressive behaviour),[28,29] FMR1 (Gene encodes for fragile X mental retardation protein),[30,31,32] $FOXP_2$ (transcription factor, mutation causes excruciating speech and language disorder).[33,34] Tuberous Sclerosis Complex due mutation in TSC_2[35,36] and GABA receptors[37,38] are also studied in autism animal models. Genes studied in schizophrenia model involves G72/G30, [39, 40] Df (16) AKO, [41] DISC1.[42,43]

Although latest improvements in psychiatric genetics and epidemiological research have facilitated development of animal models, very few models have explicitily researched the impacts of mutation or environmental variables in cerebellum. More study

should be conducted in models to gradually regulate concentrations of expression of risk variables in purkinjee cells, as well as concurrent manipulation of genetic risk variables in the cerebellum and frontal cortex to decipher the function of separate brain linkages.[44]

Treatment For NDD

Conspicuous progress has been produced in defining the neurobiological processes of several diseases and the outcome of these diseases are being modified by targeted treatments.[45] A massive collaborative study from a various institutions, department, medical colleges, NGOs throughout India and USA, found the ubiquitousness of NDDs to be nearly 12% in Indian children of age group 2-9 years. Close to 1 in 8 chidren are suffering from not less than one of the NDDs. Recent advances suggest that through manipulations of environment or pharmacotherapy period - like plasticity can be reactivated in the adult brain. These scrutinies explore a tantilizing option that targeted pharmacological treatments in conjunction with training or rehabilitation schemes could relieve or reverse NDD symptoms even after critical department periods have ended. [46]

Personalised Therapeutic Approaches for NDDs:

Exposing various molecular pathways to evaluate novel therapeutic strategies became possible owing to the coalescence of genetics and functional analysis. Genomic sequencing guides the way from patient DNA to personalized medicine. DNA from patients with NDDs are used for sequencing, next generation sequencing which will be used to decipher the genetic code within exons (Whole Exom Sequencing) or entire genome (Whole Genome Sequencing). Mutations are identified in a series of genes with NDDs. The mutations are reinvigorated in various models in order to understand underlying mechanism which reveals targets that endorse the implementation of personalized medicine. Branched chain amino acids (BCAA) and antisense oligonucleotides (ASO) are two examples. The use of same drug for different diseases are used in drug repurposing due to novel mechanisms identified.[47] For example, Angelman syndrome which results from the functional mutations in the maternal allele of the imprinted UB3A gene or paternal allele is silenced by a lengthy noncoding RNA (UBE3A antisense transcript). In an AS mouse model study, reserachers have incorporated antisense oligonucleotides (ASOs) for unsilencing the maternal allele thereby normalizing the UB3A protein concentrations which resulted in the improvement of cognitive functions.[48] Replacing a defective gene may also be carried out by gene therapy using adeno – associated virus (AAV) vectors.[49] The application of antisense oligonucleotides and adeno – associated virus is challenging in clinical trial since safety and pharmacokinetic profile is not well established.[50]

Stem Cell Therapy in NDDS

A common motif among NDDs is a reduced capacity of affected Neural Stem Cells to proliferate, differentiate and migrate. Recent pluripotent methods have effectuated the possibility of modelling neurodevelopmental diseases integrated with genetic impairments. Patient fibroblasts were transformed into pluripotent stem cells to produce adequate neuronal progeny, specifically the cortical neurons which is responsible for higher cognitive skills in humans.[51] Induced pluripotent stem cells (ipsc) has provided new privileges for analysing brain development and the countrecoup of its dysfunctions in NDDs. Also it facilitated the analysis of neuronal phenotypes after the derivation of patients somatic cell into neurons, besides it is used in-vitro in case of syndromic and non-syndromic forms of ASD[52] and shankopathies(mutation of SHANK genes).[53] iPSCs are also used in reconstruction of brain circuitary using neural transplantation of human neurons into mouse brain.[54]

Main limitations of human iPSC cells in vitro: the cell reprogramming rate relies on cell types of the donor and culture conditions.[55] Various models are proposed to analyse the programming processes and transcription factors and epigenetic regulators and their role.[56] These techniques do not come across as sufficiently effective to reprogram human primary fibroblasts accurately.[57] A fresh, optimized technique combining mod mRNA with reprogramming variables and enhanced cell culture[58] environments is encouraging and appears to provide an alternative strategy to human fibroblast reprogramming for ASD and associated syndromes.[59] The low cell reprogramming efficiency observed to date has made it much harder to simultaneously derive separate isogenic cell kinds from the same human iPSC. In vitro systems do not permit the reproduction of globular cellular homeostasis and cell orientation and projections within the separate cortical layers. New movements which include three-dimensional culture systems[60] and brain organoids [61] have been developed for iPSC models. In addition, advances in genome editing technologies allow the genetic manipulations of iPSC in a site-specific way.

Conclusion

At current scenario, the treatments available for NDDs consists of both behavioural therapies and drugs for comorbidities such as irritability and anxiety, while in most cases the mainstay symptoms of NDDs are still unsolved. Numerous molecular pathways being identified in NDD which resulted from the combination of genetics and functional analysis. Genetic findings made personalizing the existing pharmacotherapy or behavioural interventions other than new targets for therapy. Because of the complexity of NDDs, versatile methods that combine genetics, functional genomics, robust biological models and objective reaction measures such as biomarkers,[62] as well as scientists and clinician's potential to work together will be crucial.

Acknowledgement: I thank my guide Dr. V. Gomathi for her assistance and comments that greatly improved the manuscript.

Funding

This work did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical Clearance: Nil.

Conflict of Interest: Nil

Table1: Specific and multifunctional genes for various neurodevelopmental disorders. [13,14]

Disease category	No.of specific genes	Total No. of Genes	% of Specific Genes
ASD	189	321	69.8
FASD	27	106	25.5
CP	23	124	22.1

References

1. Sartor F., Anderson J., McCaig C., Miedzybrodzka Z., Müller B., Mutation of genes controlling mRNA metabolism and protein synthesis predisposes to neurodevelopmental disorders. Biochem Soc Trans. 2015; 43:1259-1265 https://doi.org/10.1042/BST20150168.
2. Testa A., Giannuzzi R., Sollazzo F., Petrongolo L., Bernardini L., Daini S., Psychiatric emergencies (part I): psychiatric disorders causing organic symptoms. Eur Rev Med Pharmacol Sci. 2013; 1: 55-64. https://www.ncbi.nlm.nih.gov/pubmed/23436668.
3. Yeargin-Allsopp M., Boyle C., Overview: the epidemiology of neurodevelopmental disorders. Ment Retard Dev Disabil Res Rev. 2002; 8: 113- 116. https://doi.org/10.1002/mrdd.10030.
4. Mullin A.P., Gokhale A., Moreno-De-Luca A., Sanyal S., Waddington J.L., Faundez V., Neurodevelopmental disorders: mechanisms and boundary definitions from genomes, interactomes and proteomes. Transl Psychiatry. 2013; 3: e329. https://doi.org/10.1038/tp.2013.108.
5. Picker J.D., Walsh C.A., New innovations: therapeutic opportunities for intellectual disabilities. Ann Neurol. 2013; 74: 382-390. https://doi.org/10.1002/ana.24002.
6. Loeb M.E., Eide A.H. Mont D., Approaching the measurement of disability prevalence: the case of Zambia. Alter-Eur J Disabili Res. 2008; 2: 32-43.
   10.1016/j.alter.2007.06.001.
7. Trani J.F., Bakhshi P., Challenges for assessing disability prevalence: the case of Afghanistan. Alter-Eur J Disabili Res. 2007; 2: 44-64. 10.1016/j.alter.2007.10.003.
8. Konanki, Ramesh, Mishra, Devendra, Gulati, INCLEN Study Group., et al., "INCLEN Diagnostic Tool for Epilepsy (INDT-EPI) for Primary Care Physicians: Development and Validation." Indian Pediatrics. 2014; 51: 539-543.
   https://www.indianpediatrics.net/aug2014/aug-613-619.htm.
9. Bill, B.R., Lowe, J.K., DyBuncio, C.T., and Fogel, B.L., Orchestration of neurodevelopmental programs by RBFOX1: Implications for autism spectrum disorder. Int. Rev. Neurobiol. 2013; 113: 251–267. https://doi.org/10.1016/B978-0-12-418700-9.00008-3

10. Fatemi S.H., Role of reelin in pathology of autism. Molecular psychiatry. 2002; 7: 919-920. https://doi.org/10.1038/sj.mp.4001248

11. Steven A Sloan., Ben A Bares., Mechanisms of astrocyte development and their contributions to neurodevelopmental disorders, current opinion in neurobiology 2014; 27: 75-81. https://doi.org/10.1016/j.conb.2014.03.005.

12. Ashburnes M., Ball C.A., Blake J.A., et al., Gene ontology tool for unification of biology, The gene ontology consortium Nat Genet. 2000; 25: 25-29. https://doi.org/10.1038/75556

13. Elodie Portales- Casamar et al., Neurocarta: aggregating and sharing disease – gene relations for the neurosciences BMC genomic 2013; 14: 129. https://doi.org/10.1186/1471-2164- 1 4 - 129

14. Audrey Guilmatre, Christele Dubourg, Anne-Laure Mosca et al., Recurrent Rearrangements in synaptic and neurodevelopmental genes and shared biologic pathways in schizophrenia, autism and mental retardation. Arch Gen Psychiatry. 2009; 66: 947-956. doi:10.1001/archgenpsychiatry.2009.80

15. Lipkin W.I., Briese T., Hornig M., Borna disease virus - fact and fantasy. Virus Res. 2011; 162: 162–172. https://doi.org/10.1016/j.virusres.2011.09.036.

16. Roullet F.I., Lai J.K., Foster J.A., In utero exposure to valproic acid and autism--a current review of clinical and animal studies. Neurotoxicol Teratol. 2013; 36: 47–56. https://doi.org/10.1016/j.ntt.2013.01.004.

17. Wu W., Peden D., Diaz-Sanchez D., Role of GSTM1 in resistance to lung inflammation. Free Radic Biol Med. 2012; 53: 721–729. https://doi.org/10.1016/j.freeradbiomed.2012.05.037.

18. Kneeland R.,E., Fatemi S.H., Viral infection, inflammation and schizophrenia. Prog Neuropsychopharmacol Biol Psychiatry. 2013; 42: 35–48. https://doi.org/10.1016/j.pnpbp.2012.02.001.

19. Piontkewitz Y., Arad M., Weiner I., Tracing the development of psychosis and its prevention: what can be learned from animal models. Neuropharmacology. 2012; 62: 1273–1289. https://doi.org/10.1016/j.neuropharm.2011.04.019.

20. Sadamatsu M., Kanai H., Xu X., Liu Y., Kato N., Review of animal models for autism: implication of thyroid hormone. Congenit Anom. 2006; 46: 1–9. https://doi.org/10.1111/j.1741-4520.2006.00094.x.

21. Yasuda S., Ishida N., Higashiyama A., Morinobu S., Kato N., Characterization of audiogenic-like seizures in naive rats evoked by activation of AMPA and NMDA receptors in the inferior colliculus. Exp Neurol. 2000; 164: 396–406. https://doi.org/10.1006/exnr.2000.7401.

22. Gejman P.V., Sanders A.R., Kendler K.S., Genetics of schizophrenia: new findings and challenges. Annu Rev Genomics Hum Genet. 2011; 12: 121–144. https://doi.org/10.1146/annurev-genom-082410-101459.

23. Ey E., Leblond C.S., Bourgeron T., Pletnikov M.V., Behavioral profiles of mouse models for autism spectrum disorders. Autism Res. 2011; 4: 5–16. https://doi.org/10.1002/aur.175.

24. Jaaro-Peled H., Ayhan Y., Pletnikov M.V., Sawa A., Review of pathological hallmarks of schizophrenia: comparison of genetic models with patients and nongenetic models. Schizophr Bull. 2010; 36: 301–313. https://doi.org/10.1093/schbul/sbp133.

25. Jolly S., Journiac N., Vernet-der Garabedian B., Mariani J., ROR alpha, a key to the development and functioning of the brain. Cerebellum. 2012; 11: 451–452. https://doi.org/10.1523/JNEUROSCI.1443-11.2011.

26. Nguyen A., Rauch T.A., Pfeifer G.P., Hu V.W., Global methylation profiling of lymphoblastoid cell lines reveal epigenetic contributions to autism spectrum disorders and a novel autism candidate gene, RORA, whose protein product is reduced in autistic brain. FASEB J. 2010; 24: 3036–3051. https://doi.org/10.1096/fj.10-154484.

27. Durand C.M., Betancur C., Boeckers T.M., et al., Mutations in the gene encoding the synaptic scaffolding protein Shank3 are associated autism spectrum disorders. Nat Genet. 2007; 39: 25–27. https://doi.org/10.1038/ng1933.

28. Chomiak T., Hu B., Alterations of neocortical development and maturation in autism: insight from valproic acid exposure and animal models of autism. Neurotoxicol Teratol. 2013; 36: 57–66. https://doi.org/10.1016/j.ntt.2012.08.005.

29. Petit E., Herault J., Martineau J., Perrot A., Barthelemy C., Hameury L., Sauvage D., Lelord G., Muh J.P., Association study with two markers

of a human homeogene in infantile autism. J.Med. Genet. 1995; 32: 269–274.

30. Goodrich-Hunsaker N.J., Wong L.M., McLennan Y., Adult female fragile X permutation carriers exhibit age-and CGG repeat length-related impairments on an attentionally based enumeration task. Front.Hum.Neurosci. 2011; 5: 63. https://doi.org/10.3389/fnhum.2011.00063.
31. Koekkoek S.K., Yamaguchi K., Milojkovic B.A., et al., Deletion of FMR1 in Purkinje cells enhances parallel fiber LTD, enlarges spines, and attenuates cerebellar eyelid conditioning in Fragile X syndrome. Neuron. 2005; 47: 339–352. https://doi.org/10.1016/j.neuron.2005.07.005.
32. Olmos-Serrano J.L., Corbin J.G., Burns M.P., The GABA(A) Receptor Agonist THIP Ameliorates Specific Behavioral Deficits in the Mouse Model of Fragile X Syndrome. Dev Neurosci. 2011; 33: 395–403. https://doi.org/10.1159/000332884.
33. Kang C., Drayna D., Genetics of speech and language disorders. Annu Rev Genomics Hum Genet. 2011; 12: 145–164. https://doi.org/10.1146/annurev-genom-090810-183119.
34. Bacon C., Rappold G.A., The distinct and overlapping phenotypic spectra of FOXP1 and FOXP2 in cognitive disorders. Hum Genet. 2012; 131: 1687–1698. https://doi.org/10.1007/s00439-012-1193-z.
35. Reith R.M., Way S., McKenna J 3rd, Haines K., Gambello M.J., Loss of the tuberous sclerosis complex protein tuberin causes Purkinje cell degeneration. Neurobiol Dis. 2011; 43: 113–122. https://doi.org/10.1016/j.nbd.2011.02.014.
36. Tsai P.T., Hull C., Chu Y., et al., Autistic-like behaviour and cerebellar dysfunction in Purkinje cell Tsc1 mutant mice. Nature. 2012; 488: 647–651. https://doi.org/10.1038/nature11310.
37. DeLorey T.M., Sahbaie P., Hashemi E., Homanics G.E., Clark J.D., Gabrb3 gene deficient mice exhibit impaired social and exploratory behaviors, deficits in non-selective attention and hypoplasia of cerebellar vermal lobules: a potential model of autism spectrum disorder. Behav Brain Res. 2008; 5: 207–220. https://doi.org/10.1016/j.bbr.2007.09.009.
38. Fujita E., Tanabe Y., Imhof B.A., Momoi M.Y., Momoi T., A complex of synaptic adhesion molecule CADM1, a molecule related to autism spectrum disorder, with MUPP1 in the cerebellum. J Neurochem. 2012; 123: 886–894. https://doi.org/10.1111/jnc.12022.
39. Shi J., Badner J.A., Gershon E.S., Liu C., Allelic association of G72/G30 with schizophrenia and bipolar disorder: a comprehensive meta-analysis. Schizophr Res. 2008; 98: 89–97. https://doi.org/10.1016/j.schres.2007.10.004.
40. Drews E., Otte D.M., Zimmer A., Involvement of the primate specific gene G72 in schizophrenia: From genetic studies to pathomechanisms. Neurosci Biobehav Rev. 2012; 37:2410–2417. https://doi.org/10.1016/j.neubiorev.2012.10.009.
41. Ellegood J., Markx S., Lerch J.P., et al., Neuroanatomical phenotypes in a mouse model of the 22q11.2 microdeletion. Mol Psychiatry. 2013; 19: 99–107. https://doi.org/10.1038/mp.2013.112.
42. Sullivan P.F., Questions about DISC1 as a genetic risk factor for schizophrenia. Mol Psychiatry. 2013; 18: 1050–1052. https://doi.org/10.1038/mp.2012.182.
43. Thomson P.A., Malavasi E.L., Grünewald E., Soares D.C., Borkowska M., Millar J.K., DISC1 genetics, biology and psychiatric illness. Front Biol (Beijing). 2013; 8: 1–31. https://doi.org/10.1007/s11515-012-1254-7.
44. Shashi V., et al., The utility of the traditional medical genetics diagnostic evaluation in the context of next-generation sequencing for undiagnosed genetic disorders. *Genet. Med.* 2014; 16: 176–182. https://doi.org/10.1038/gim.2013.99.
45. Kim Y. S., & Leventhal B. L., Genetic epidemiology and insights into interactive genetic and environmental effects in autism spectrum disorders. Biol. Psychiatry. 2015; **77**: 66–74. https://doi.org/10.1016/j.biopsych.2014.11.001.
46. Tarlungeanu., Novarino., Genomics in NDDs- an avenue to personalized medicine. Experimental and molecular medicine. 2018; 50: 100. https://doi.org/10.1038/s12276-018-0129-7.
47. Meng L., et al., Towards a therapy for angelman syndrome by targeting a long non - coding RNA. Nature 2015; 518: 409-412. https://doi.org/10.1038/nature13975.
48. Gadalla K.K., et al., Development of a novel AAV gene therapy cassette with improved safety features and efficacy in a mouse model of Rett syndrome. Mol. Ther. Methods clin. Dev. 2017; 5: 180-190.

https://doi.org/10.1016/j.omtm.2017.04.007.

49. Beaudt A.L., Meng L., Gene – targeting pharmaceuticals for single – gene disorders. Hum.Mol.Genet. 2016; 25: $R_{18} – R_{26}$. https://doi.org/10.1093/hmg/ddv476.
50. Aline Vitrac, Isabelle Cloez- Tayarani., Induced pluripotent stem cells as a tool to study brain circuits in autism– related disorders. Stem Cell Research and Therapy. 2018; 9: 226. https://doi.org/10.1186/s13287-018-0966-2.
51. Patriarchi T., Amabile S., Frullanti E., Landucci E., Lo Rizzo C., Ariani F., et al., Imbalance of excitatory/inhibitory synaptic protein expression in iPSC-derived neuronsfrom FOXG 1 patients and in FOXG1 mice. Eur J Hum Genet. 2016; 24: 871-80. https://doi.org/10.1038/ejhg.2015.216.
52. Leblond C.S, Nava C., Polge A., Gauthier J., Hugut G., Lumbroso S., et al., Meta-analysis of SHANK mutations in autism spectrum disorders: a gradient of severity in cognitive impairments. PLOS Genet. 2014; 10: e1004580. https://doi.org/10.1371/journal.pgen.1004580.
53. Epsumy – Camacho I., Michelsen K.A., Gall D., Linaro D., Hasche A., Bonne Fornt J., et al., Pyramidal neurons derived from human pleuripotent stem cells integrate efficiently into mouse brain circuits in-vivo. Neuron. 2013; 77: 440-56. https://doi.org/10.1016/j.neuron.2012.12.011.
54. Nefzer C.M., Rossello F.J., Chen J., Liu X., Knaupp A.S., Firas J., et al., Cell type of origin dictates the route of pluripotency. Cell Rep. 2017; 21: 2649-60. https://doi.org/10.1016/j.celrep.2017.11.029.
55. Theunissen T.W., Jaenisch R., Molecular control of induced pluripotency. Cell Stem Cell. 2014; 14: 270-34. https://doi.org/10.1016/j.stem.2014.05.002.
56. Liu L.L., Brumbaugh J., Bar-Nur O., Smith Z., Stadtfeld M., Meissner A., et al., Probabilistic modelling of reprogramming to induced pluripotent stem cells. Cell Rep. 2016; 25: 3395-406. https://doi.org/10.1016/j.celrep.2016.11.080.
57. Kogut I., Mc Carthy S.M., Pavlova M., Astling D. P., Chen X., Jakimenko A, et al., High- efficiency RNA based reprogramming of human primary fibroblasts. Nat Commun. 2018; 9: 745. https://doi.org/10.1186/1480-9222-13-3.
58. Gunhanlar N., Shpak G., Van der Kroeg M., Gouty-colomer L.A., Munshi S.T., Lendemeijer B., et al., A simplified protocol for differentiation of electrophysiologically mature neuronal networks from human induced pluripotent stem cells. Mol Psychiatry 2018; 23: 1336-44. https://doi.org/10.1038/mp.2017.56.
59. Park J., Wetzel I., Marriott I., Dreace D., D' Avanzo C., Kim D.Y., et al., A 3D human triculture system modelling neurodegeneration and neuroinflammation in Alzheimer's disease. Nat Neurosci. 2018; 21: 941-51. https://doi.org/10.3389/fneur.2018.00797.
60. Pasca A.M., Sloan S.A., Clarke L.E., Tian Y., Makinson C.D., Huber N., et al., Functional cortical neuronsand astrocytes from human pluripotent stem cells in 3D culture. Nat Methods. 2015; 12: 671-8. https://doi.org/10.1038/nmeth.3415.
61. Birey F., Andersen J., Makinson C.D., Islam S., Wei W., Huber N., et al., Assembly of functional forebrain spheroids from human pluripotent cells. Nature. 2017; 545: 54-9. https://doi.org/10.1038/nature22330.
62. Loth E., et al., Identification and validation of biomarkers for autism spectrum disorders. Nat Rev.Drug Discovery. 2016; 15: 70-73. https://doi.org/10.1038/nrd.2015.7.

Type of manuscript: Original article.

Impact of Cancer Related Fatigue on Health Related Quality of Life in Cancer Survivors

Supriya S. Jadhav[1], T. Poovishnu Devi[2]

[1]Final year BPTh Student, [2]Associate Professor, Department of Oncology. Krishna College of Physiotherapy, KIMSDU

Abstract

Background: Cancer related fatigue is multidimensional and has a negative impact on physical, mental, emotional and social health. Most of the time cancer related fatigue is under-reported by patients and under-treated by clinicians, and it may hamper the quality of life in cancer survivors. This study focusses on assessing the impact of fatigue on health related quality of life in cancer survivors.

Objective: To find the impact of cancer related fatigue on health related quality of life in cancer survivors.

Material and Methodology: In this cross sectional study, 66 cancer survivors were enrolled between the age group of 40 and 70, who completed treatment 3 months prior to the study and scoring of fatigue between 3 and 10 in rate of perceived exertion scale. Thus SF-36 questionnaire was used to determine the impact.

Result: According to this study there is a decline of 61.81% in general health, 57.121% in physical functioning, 44.88% in role physical, 41.41% in role emotional, 40.57% in social functioning, 40.75% in mental health, 38.75% in vitality and 37.61% in pain. This indicates an overall decline in the quality of life of the cancer survivors which sums up to 51.46% with P value <0.0001, which considered extremely significant.

Conclusion: Many cancer survivors experienced moderate to severe fatigue which affects their health related quality of life. There is need to develop interventions for effective management of cancer related fatigue to improve quality of life.

Key Words: *Health related quality of life, cancer related fatigue, cancer survivors.*

Introduction

Cancer is the disease that results when cellular changes causes the uncontrolled growth and division of cells. There are many causes of cancer and some are preventable. Smoking is one of the most common cause of cancer. Cancer shows various local and systemic symptoms. Swelling, abnormal bleeding, pain and local skin changes are some local symptoms seen in cancer patients. While the systemic symptoms are fever, excessive fatigue, weight loss and generalized skin changes[12].

Cancer related fatigue is recognized as one of the most common and distressing side effects of cancer and its treatment[1]. Fatigue may also present before treatment onset and typically increases during cancer treatment, including treatment with radiation, chemotherapy, hormonal, and/or biological therapies. Prevalence of fatigue during treatment ranges from 25% to 99%[1]. Fatigue is subjective symptom and is the most bothersome adverse effect of cancer[4].

Cancer-related fatigue is more severe, more persistent, and more debilitating than "normal" fatigue caused by lack of sleep or overexertion and is not relieved by adequate sleep or rest. Studies showed that the intensity and duration of fatigue experienced by cancer patients and survivors is significantly caused greater impairment in quality of life. Cancer-related fatigue is multi-dimensional and may have negative impact on physical, mental, and social health including generalized weakness, diminished concentration, decreased motivation or, and emotional liability. Although

cancer related fatigue shares some characteristics with depression, patients experience fatigue as a central symptom that impairs functional abilities and social functioning[1].

Causes of cancer-related fatigue mainly includes any cardiovascular disease, low platelet count (thrombocytopenia), anaemia, any recent major surgery, fever or active infection. It also includes pain, emotional distress (depression, anxiety), sleep disturbances (insomnia, sleep apnoea), side effects of medications, nutritional disorders (dehydration, malnutrition and electrolyte imbalance), lack of exercise and myopathies, etc[2, 3].

Cancer may cause fatigue due to disturbed circadian rhythms. Circadian rhythms are exogenous or endogenous physiological patterns that run on an approximate 24-hour cycle and modulate several biological functions. It regulates the expression of genes with circadian rhythmicity, resulting in daily oscillations of proteins and is disrupted in cancer patients due to abnormal or uncontrollable cell division and tissue damage. This disruption of clock damages organization of gene and protein expressions, leading to deregulated cell proliferation[13, 14].

Altered circadian also includes changes in endocrine rhythms, metabolic processes, immune system and rest activity patterns. ATP is the major source of energy for contraction of skeletal muscle. Disturbed metabolism processes causes failure to replenish ATP and compromises muscle function[13, 14].

Fatigue in cancer is multifactorial and maybe influenced by a variety of demographic, medical, psychosocial, behavioural and biological factors[1]. Cancer related fatigue clinically presents with reduced physical performance, physical inactivity, avoidance of participation, feeling of helplessness, depressed mood[2].

In the majority of studies, 30% to 60% of patients report moderate to severe fatigue during treatment, which in some cases may lead to treatment discontinuation. Fatigue typically improves in the year after treatment completion. Studies of long-term cancer survivors suggest that approximately one-quarter to one-third experience persistent fatigue for up to 10 years after cancer diagnosis. Fatigue has a negative impact on physical activity, social functioning, emotional health, and activities of daily living and causes significant impairment in overall quality of life during and after treatment. Fatigue may also be a cause for shorter survival[1].

Despite the prevalence and negative impact of cancer-related fatigue, this symptom is under-reported by patients and undertreated by clinicians. One of the barriers to the assessment and management of fatigue is the lack of information about mechanisms underlying this symptom, risk factors, and effective treatments[1].

Quality of life is a major concern in cancer survivors. Cancer survivors experience many symptoms that affect their quality of life. The symptom that most commonly interferes with activity of daily living is fatigue. When compared with other symptoms, fatigue persist in a substantial number of cancer survivors. The different domains of quality of life such as physical and psychological well-being, familial relationship, sexual and personal abilities, economic well-being is hampered[5,10].

Methodology

This cross sectional survey was carried out on 66 subjects which were selected on basis of convenient sampling method. This study was done from Krishna hospital, karad and was completed in 6 months.

Statistical Analysis And Results

Statistical analysis of the recorded data was done. Study design is cross sectional. Arithmetic mean and standard deviation was calculated for each outcome measure. T test was done. The study has p value <0.0001 and is extremely significant.

Table 1- Scoring of the health related quality of life according to the scales

Scales	Mean
General Health	196.909
Physical Functioning	428.79
Role Physical	220.4545
Role Emotional	175.75
Social Functioning	118.86
Mental Health	298.21
Vitality	245.303
Pain	124.77

Interpretation

The graph shows decline in physical functioning, role physical, role emotional, vitality, mental health, social functioning, pain and general health. Thus, there is an overall decline in the quality of life in cancer survivors.

Table 2 – Mean and standard deviation.

Score Name	MEAN±SD
General Health	190.909±86.784
Physical Functioning	428.89±157.89
Role Physical	220.4545±100.38
Role Emotional	175.75±82.389
Social Functioning	118.86±31.142
Mental Health	296.21±41.496
Vitality	245.303±93.648
Pain	124.77±29.462

Discussion

Fatigue is the most commonly experienced in the pre-treatment and post-treatment phase. According to various studies, tumor and treatment methods used can induce fatigue. Fatigue in cancer is multifactorial and may be influenced by a variety of demographic medical, psychological, behavioral and biological factors. Fatigue lasts longer than other treatment side effects and is the symptom reported to interfere most substantially with activities of daily living. The health related quality of life in the cancer survivors shows a significant decline in various aspects of life. The areas where quality of life in cancer survivors is affected are: Physical functioning, Role physical, Role emotional, Vitality, Mental health, social functioning, Pain and General health. These are the components which determine the health related quality of life.

This study aims at finding the impact of cancer related fatigue on health related quality of life in cancer survivors. And the following factors were assed 1, the severity of fatigue and its effect on health related quality of life in cancer survivors 2, to find the type of cancer survivors who perceive more fatigue.

This study was completed with 66 cancer survivors of both the sexes who were between the age group of 40 and 70 years, completed treatment 3 months prior to the study, scoring of fatigue between 3 and 10 in the rate of perceived exertion scale.

This study was completed in 6 months of duration and was conducted in Krishna Institute of Medical Sciences 'Deemed to be' University, Karad. An informed written consent was obtained from the subjects were undergone a test using SF-36 questionnaire and according to the result, conclusion was obtained.

According to the survey the most commonly seen cancers in an around karad is leukemia, carcinoma cervix, oral cancer and lung cancer. Leukemia is a cancer of blood forming tissues including bone marrow and those survivors experienced more fatigue , 8.5 out of 10 according to rate of perceived exertion scale. Carcinoma cervix is another common cancer which had more fatigue. And followed by oral cancer and lung cancer. Most of the population in this geographical area are addicted to tobacco chewing, cigarettes and bidi smoking which results in lung cancer or oral cancer.

After analyzing the data, there is a decline in the different aspects of quality of life in cancer survivors. There is a decline of 61.81% in general health, 57.121% in physical functioning, 44.88% in role physical, 41.41% in role emotional, 40.57% in social functioning, 40.75% in mental health, 38.75% in vitality and 37.61% in pain. This indicates an overall decline in the quality of life of the cancer survivors which sums up to 51.46%.

Conclusion

This study concludes that the health related quality of life is severely affected in cancer survivors with moderate to severe fatigue. The data analysis concluded that there is more decline in general health, physical functioning, role physical and role emotional followed by mental health , social functioning, vitality and pain. According to this study an overall decline in the quality of life of the cancer survivors is up to 51.4%.

Conflict of Interest: The authors declare that there is no conflict of interest.

Ethical Clearance: An ethical clearance certificate was obtained from the Institutional Ethical Committee Krishna Institute of Medical Sciences Deemed to be University, Karad.

Acknowledgement: The authors would like to express their special gratitude towards all the patients that participated in the study. We would also like to thank our families and institution for their everlasting support which enabled us to continue our research activities.

Source of Funding: Self.

References

1. Bower JE. Cancer-related fatigue—mechanisms, risk factors, and treatments. Nature reviews Clinical oncology. 2014 Oct;11(10):597.
2. Horneber M, Fischer I, Dimeo F, Rüffer JU, Weis J. Cancer-related fatigue: epidemiology, pathogenesis, diagnosis, and treatment. Deutsches Ärzteblatt International. 2012 Mar;109(9):161.
3. Mock V, Abernethy AP, Atkinson A, Barsevick AM, Berger AM, Cella D, Cimprich B, Cleeland C, Eisenberger M, Escalante CP, Hinds P. Cancer-related fatigue clinical practice guidelines in oncology. JNCCN Journal of the National Comprehensive Cancer Network. 2007 Nov;5(10):1054-78.
4. Wang XS, Zhao F, Fisch MJ, O'Mara AM, Cella D, Mendoza TR, Cleeland CS. Prevalence and characteristics of moderate to severe fatigue: a multicenter study in cancer patients and survivors. Cancer. 2014 Feb 1;120(3):425-32.
5. Nayak MG, George A, Vidyasagar MS, Mathew S, Nayak S, Nayak BS, Shashidhara YN, Kamath A. Quality of life among cancer patients. Indian journal of palliative care. 2017 Oct;23(4):445.
6. Sinha R, van den Heuvel WJ, Arokiasamy P. Validity and reliability of MOS short form health survey (SF-36) for use in India. Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine. 2013 Jan;38(1):22.
7. Poort H, Kaal SE, Knoop H, Jansen R, Prins JB, Manten-Horst E, Servaes P, Husson O, van der Graaf WT. Prevalence and impact of severe fatigue in adolescent and young adult cancer patients in comparison with population-based controls. Supportive Care in Cancer. 2017 Sep 1;25(9):2911-8.
8. Horneber M, Fischer I, Dimeo F, Rüffer JU, Weis J. Cancer-related fatigue: epidemiology, pathogenesis, diagnosis, and treatment. Deutsches Ärzteblatt International. 2012 Mar;109(9):161.
9. Curt GA, Breitbart W, Cella D, Groopman JE, Horning SJ, Itri LM, Johnson DH, Miaskowski C, Scherr SL, Portenoy RK, Vogelzang NJ. Impact of cancer-related fatigue on the lives of patients: new findings from the Fatigue Coalition. The oncologist. 2000 Oct 1;5(5):353-60.
10. Helgesson Ö, Lissner L, Månsson J, Bengtsson C. Quality of life in cancer survivors as observed in a population study of Swedish women. Scandinavian journal of primary health care. 2007 Jan 1;25(4):220-5.
11. Lee SH, Min YS, Park HY, Jung TD. Health-related quality of life in breast cancer patients with lymphedema who survived more than one year after surgery. Journal of breast cancer. 2012 Dec 1;15(4):449-53.
12. Article title: cancer Website site: En.m.wikipedia.org URL: https://en.m.wkipedia.org/wiki/Cancer
13. Fu L, Kettner NM. The circadian clock in cancer development and therapy. InProgress in molecular biology and translational science 2013 Jan 1 (Vol. 119, pp. 221-282). Academic Press.
14. Sancar A, Lindsey-Boltz LA, Gaddameedhi S, Selby CP, Ye R, Chiou YY, Kemp MG, Hu J, Lee JH, Ozturk N. Circadian clock, cancer, and chemotherapy. Biochemistry. 2014 Oct 29;54(2):110-23.

‘Health Isn’t Wealth’-An Indian Reality

Swati Soni

Associate Professor, Marketing, Jaipuria Institute of Management, Jaipur,

Abstract

An age old adage suggests that ‘Health is Wealth’, but unfortunately this is not the case in India. Health of an individual and consequently healthcare should ideally be non-negotiable, but health care in India is a relegated reality. There is no equity. There is no access to affordable healthcare. On one hand India is poised to become a medical tourism destination by 2020 while on the other hand the masses have no anchor. Health insurance can salvage the situation but somehow the concept is undersold and there is a very weak conviction even amidst the elite to buy adequate insurance. Most Indian households are either uninsured or underinsured. Out-of –pocket expenses on healthcare are thus on a rise. The authors draw attention on the Indian healthcare industry and suggest that lessons can be drawn from the models prevalent in Japan and Netherlands. The authors build a strong case for a mandatory health insurance for the masses and propose a model for the same.

Keyword(s): *Healthcare, Health Insurance, Healthcare Expenditure*

Background

Healthcare should ideally be non-negotiable, but access to affordable and acceptable healthcare is a privilege for only an esoteric few in India, with 67% of the Indian rural population living in abject denial. For these 67% of masses, healthcare means standing for hours in a queue irrespective of the urgency and immediacy of the situation. Additionally, 60 million people, which approximately equates to the size of the population of UK, go overdrawn while accessing the health care in case of medical exigencies and thus forced below the poverty line. India is infamously renowned to have the world’s lowest public health budgets, which is a little more than 1 % of the country’s Gross Domestic Product (GDP) while out- of- pocket (OOP) expenses are substantial percent of the total cost of health care. Indians spend highest on healthcare in terms of out – of – pocket expenditure in the world. The exorbitant OOP spending on healthcare coupled with a very meagre penetration of health insurance, make health care for all a formidable challenge.

A personal Finance Advisory firm, Big Decisions, in a December 2016 survey revealed that only 18.8% of middle-income urban Indians have a health insurance which is fairly low.[1] The 17.8% insured are also inadequately insured-as the cover is barely enough to meet less than 67% of their medical exigency expenses. Inadequate coverage translates into substantial out of pocket expenses. A review of about 9 lakh claims spanning across a period of five years shows a strong decline in claims received as compared to the actual treatment cost incurred. The gap witnessed a substantial I increase, when the treatment costs was more than Rs 3 lakh per treatment. For instance in the year 2015, for a treatment cost above 10 lakhs close to 30 and claims were received, while almost 85% claims were received for below Rs 3 lakh treatment expenses.

Medical inflationary trends have made healthcare much more unaffordable than ever before. Between 2011-2016, treatment costs of communicable diseases and vascular diseases both have increased by 9.3%, and 2-13% per year respectively. Lifestyle diseases too are at an all-time high. Ironically enough, owning a health insurance has become costlier at a time when it is most needed. The cost of health insurance premiums (for a two member family) post the age of 35 years has soared by the range of 9-16%. The figures indicate that though owning a health insurance at an early age makes a lot of economic prudence, but it’s too less and too late.[2]

Indian Healthcare- At an Intersection

Reports suggest that India is all poised to become a corridor for health with a USD 8 million market for medical tourism by 2020. This is largely attributable to

the emergence of accredited healthcare infrastructure-second largest in the world led by Thailand. This is indeed a glaring paradox because while we are all set to cater to a medical tourist, our own denizens are pushed to an edge for want of an affordable, acceptable, accessible health care. The schism is wide and the two extremes never seem to meet. A little ray of hope in the abyss is a noteworthy improvement in a few health indicators viz. life expectancy, maternal mortality, and infant mortality rate (Refer Table 1) but the health care expenditure indicators still seem to be very disparaging when compared the other countries in the world (Refer Table 2).

Table 1: Comparative Health Indicators

Health Indicators (2014)	**India**	**Indonesia**	**Brazil**	**China**	**Thailand**
Life Expectancy (LE)	68	69	74	76	74
Infant Mortality Rate (IMR)	39	24	14	10	11
Maternal Mortality Ration (MMR)	181	133	46	28	21

Note: LE at birth is in years; IMR is per 1000 live births; MMR is per 1, 00,000 live births

Source: World Bank Data, the World Bank website, https://data.worldbank.org/,accessed in 3 Sept, 2017.

Table 2: Comparative Health Expenditure Indicators

Healthcare Expenditure Indicators (2014)	India	Indonesia	Brazil	China	Thailand
Health Expenditure per capita(Purchasing Power Parity)	75	100	948	420	360
Public Health Expenditure (as a percentage of Total Health Expenditure)	30	38	46	56	86
Private Health Expenditure (percentage of Total Health Expenditure)	70	62	54	44	14
Health Expenditure, Public (percentage of Govt. Expenditure)	5	6	7	10	24
OOP Health Expenditure(percentage of Total Health Expenditure)	62	47	26	32	8
OOP Health Expenditure(percentage of Private Expenditure on Health)	89	75	47	72	57

Note: OOP health expenditure is the percentage of private expenditure on health.

Source: World Bank Data, the World Bank website, https://data.worldbank.org/,accessed in 3 Sept, 2017.

Current Challenges

High out-of-pocket expenditure contributes to 89% of the total private expenditure on health (Refer Table 2). This is an obvious social burden and Universal Health Coverage (UHC) is seemingly the only possible way out. Public spending on healthcare is one of the world's lowest at just 1.3

% of the GDP (Refer Figure 1).

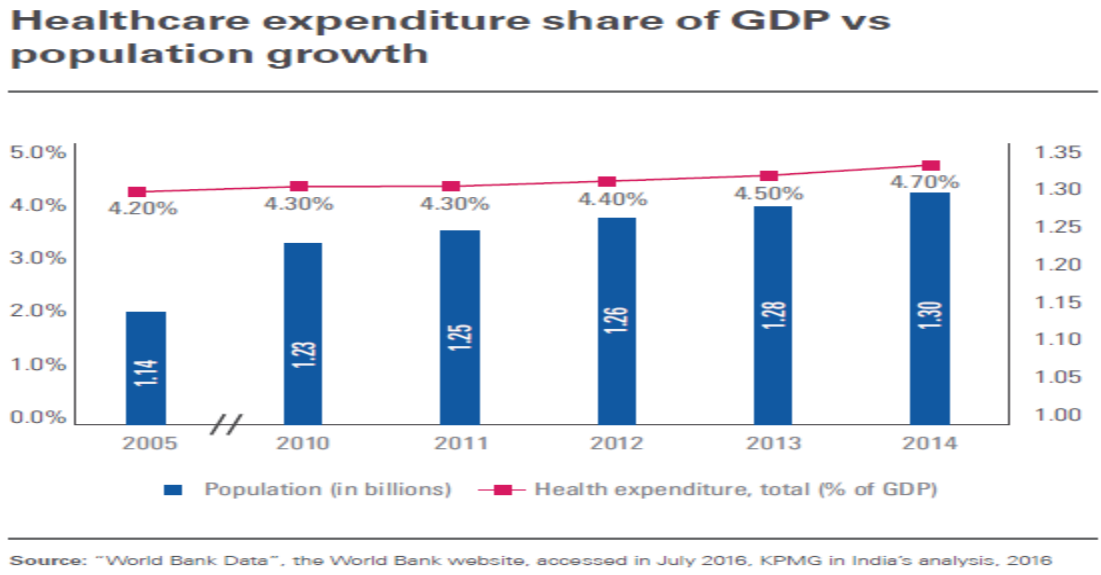


Figure 1: Healthcare Expenditure as a percentage of GDP vs. Population Growth

Source: World Bank Data, the World Bank Website, accessed in Sept, 2017

The last decade has witnessed a population rise of more than 15% while the healthcare expenditure as a percent of GDP has seen a very marginal rise from 1.14% of GDP in 2005 to 1.30% of GDP in 2014. A rise of a meagre 0.16% in a decade- when the country facing the dual burden of an increased incidence of both communicable diseases and lifestyle diseases shall serve little good. (Refer Table 3).

Table 3: Deaths from Diseases across Countries

Country	Communicable Diseases	Non-Communicable Diseases
Germany	22	365
UK	29	359
US	31	413
Japan	34	244
China	41	576
Brazil	93	514
Malaysia	117	563
Indonesia	162	680
Global Average	178	539

Con... **Table 3: Deaths from Diseases across Countries**

Bangladesh	235	549
Nepal	252	678
India	253	682
Pakistan	296	669
Myanmar	316	709
Afghanistan	363	846
South Africa	612	711

Age Standardized Mortality Rates by Causes (Per 1, 00,000 Population)

Source: NSSO, WHO

Additionally, there is a serious dearth of infrastructure and shortage of skilled professionals. India has only 0.9 beds per 1000 individuals while the same is 2.9/1000 globally and WHO recommended standard is 3/1000. There is a significant inequity in the distribution of this deficient health care ecosystem, which is conspicuous by its very absence in the rural areas. 75% of the available healthcare infrastructure is an urban delight, with those who need it the most being deprived of the most of it.

The Netherland Experience

The Euro Health Consumer Index, 2015 rates the Netherlands as the best healthcare provider in Europe. The Health Insurance Act 2006, mandates every resident and payroll tax payer should enjoy a mandatory health insurance cover.[3] The new act has also terminated the distinction between sickness funds and private health insurance. Now, a single health insurance scheme is in place to cover the entire population. An element of market competition is evident as the health insurers must compete aggressively on type of policy, quality care and premiums. The consumers are empowered to choose the service provider and the policy. No insurer can ever refuse an applicant and deny access, or charge a greater premium or exclude waivers for pre-existing ailments. Insurers are mandated to fix a single and universal premium rate for every type of health policy in order to preempt any unfair competition. Additionally, all insured are required to pay a premium which is related to their income. This premium is fixed by the government as 6 percent for the employed citizens and 4.4 percent for the self-employed citizens. The income level above which an income-related premium has to be paid is Ä30,000. The premiums do not vary with age, gender, past disease history or future risk. This ensures equity and a 30 year old healthy adult pays the same premium as an 80 year old risk prone and disease exposed individual. Children under 18 have a state sponsored premium. Subscribers with relatively low income levels receive a "health insurance subsidy" by the government to facilitate them to purchase a policy.

Learning from Japan

The law mandates every citizen to be covered with health insurance. Those who are employed are covered by a work scheme and the self-employed and the unemployed are mandated by the government to insure themselves under the national health insurance scheme run by the government. The premium is based on a mix of factors-viz. income level, number of dependents to care for and a valuation of the titled property. Subscribers pay only 30% of cost of inpatient and outpatient expenses, including emergencies, whilst a balance of 70% is sponsored by the government. Senior citizens above 70 years are expected to pay only 10% of the expenses, with the balance being borne by the government.

Health for All-The Road Ahead

Health for all is an unfinished agenda in India. There are challenges galore-ranging from lack of finances and infrastructure to lack of awareness. Publicly financed services are thus no panacea to answer the fiscal burden faced by the financially challenged. The government schemes have not been able to work wonders owing to lack of awareness amongst the beneficiaries regarding the provisions, entitlement and the modus operandi involved to avail benefits. India needs an urgent and

immediate revamp of the existing healthcare strategy with a strong focus on newer financing options.[4]

The pertinent questions are:

- How can a country with world's second largest population see a high penetration of health insurance?
- How can every household be reasonably to be able to afford a decent access to health care in case of unforeseen health contingencies?

The answer indeed lies in Mandatory Health Insurance. These is a seemingly brilliant idea to circumvent the likely disaster that is imminent in the absence of health for all. Mandatory health insurance is a kind of system under which cost of healthcare for enrolled members of the population is borne by the government and government mandate for compulsory enrollment for all the members of a population.[5] An innovative micro insurance model needs to be explored to insure those who lie in deprivation at the bottom of the pyramid. A platform that enjoys 'credence' and has a 'wide reach' needs to be identified. A plethora of such public and private platforms are available. For example at a very meagre amount of Rs. 1 per day (Rs. 360 per year) per D2H subscriber base of 56 million household subscribers, a huge corpus can be generated that can provide a health cover to the 200 million deprived households. This is a holistic and inclusive model where all pay for their care.[6]

A Proposed Model

Insurer	**Platform**	**Beneficiaries**
Provides Health Insurance Policies	An interface between insurer and insured and collects premium on a monthly basis	Bottom of the pyramid households
Public Sector Insurance Companies Public-Private-Partnership Based Insurance Companies	Telephone subscribers>one billion D2H Subscribers>56 million	200 million deprived households

If all the members get covered by a mandatory equity instrument, the price of premium shall become affordable to the masses, irrespective of the risk one entails. Buying a health cover is any time a better option than spending all savings on treatment and getting pushed to abject poverty. Not only is this a prudent proposition for the financially disadvantaged, but also for the so called affluent kinds, who have still not voluntarily bought the idea of health insurance. They take pride in buying airline tickets of Rs. 10,000/ but still resist the idea of a health insurance cover. Studies reveal that in next 30 years there shall be an increased incidence of respiratory diseases, thanks to the alarming pollution levels, and also lifestyle diseases owing to the sedentary lifestyles of the masses. Government should make health insurance mandatory for this segment of the population, or else it would see them quietly slipping into lower economic strata owing to unforeseen expenses on health contingencies.

Drawing a Leaf from the Auto Insurance Regulation

The health care industry needs to draw a leaf from the auto insurance regulation. The Motor Vehicles Act 1988 mandates that any vehicle released from the showroom has to be insured before it can venture on the Indian roads. The idea behind the mandate is risk mitigation. The mandatory insurance helps in dispersing the cost of premium and making it affordable to all subscribers. The premium paid by one subscriber helps in providing coverage to another subscriber who has incidentally met with an accident. A palpable and pulsating human life is indeed dearer than any vehicle chugging on the roads! If the government can be so austere about a vehicle

being insured, what stops from making health insurance mandatory for the masses?

Ethical Clearance: The data has been collected from secondary sources.

Source of Funding: Self

Conflict of Interest: Nil

References

1. Yogita K. 82% of Urban Middle – Income Indians Don't Have Health Insurance: Big Decisions Survey. Economic Times (Delhi). 2016 Dec 20; Sect. A: 12 (col. 1).
2. Deepak Y. Health Insurance Should be Made Mandatory. Economic Times (Delhi). 2012 Jun 12; Sect. A: 7 (col. 6).
3. Stevens H. Health Insurance in the Netherlands. Netherlands: Ministry of Health;2017.
4. Savedoff, W.D. Governing Mandatory Health Insurance: Learning from Experience. The International Bank for Reconstruction and Development / The World Bank, Washington; (2008).
5. Nair K .Post-Budget sectoral point of view. KPMG Healthcare; (2017).
6. Mudaliar J. Mandatory Health Insurance: A Step towards Universal Health Coverage. KPMG CII; (2016).

Concurrent Strength Training with Yogasana Practices on Power Parameter of Women Hockey Players

T. Priya[1], K. Muralirajan [2], K. Alaguraja[1], K. Selvakumar[1]

[1]Research Scholar, [2]Professor, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamilnadu, India

Abstract

The purpose of the present study was to investigate the efficacy of concurrent strength training with yogasana practices on power parameter of women hockey players. To achieve the purpose of the study thirty women hockey players were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 18 to 25 years. The selected subjects were divided into two equal groups consists of 15 women players each namely experimental group and control group. The experimental group underwent combined concurrent strength training and yogasana practices programme for six weeks. The control group was not taking part in any training during the course of the study. Leg explosive power was taken as criterion variable in this study. The selected subjects were tested on leg explosive power was measured through standing broad jump. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to combined concurrent strength training and yogasana practices given to the experimental group on leg explosive power when compared to control group.

Keywords: *concurrent strength training, yogasana practices, leg explosive power and 't' ratio.*

Introduction

Explosive strength is essential factor that can be determined the performance of the hockey players during the particular actives. Concurrent strength training made a unique method for promote the strength of an individual. Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations). To practising yoga regularly it can make you into sound body and sound mind. Yoga is the costless permanents treatment for more diseases, alaguraja, k[1]. It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole, alaguraja, k. et.al[2].

One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures), alaguraja, k. et.al,[3]. The science of Yoga Nidra is based on the receptivity of consciousness. When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical, yoga, p. et. al.,[4]. Training is a chain process that can be able to attain certain needs of the person's goal, alaguraja, k[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports, alaguraja, k. et.al.,[6]. Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy, alaguraja, k. et.al,[7]. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person, alaguraja, k.[8]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual, alaguraja, k. et.al,[9]. Today's there is an escalating emphasis on appearing smarter, feeling better and living longer. In order to

achieve these ideals as, scientific evidence tells us that one of the keys is high fitness and exercises, alaguraja, k. et.al,[10]. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs of the person. It's a scientific process the person must be follow the basic principles yogasana practice, alaguraja, k.[11]. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all, selvakumar, k. et.al,[12]. Yogic action, or inner technique, such as breath control, parthasarathy., s. et.al,[13].

Research Methodology

Selection of subjects

The purpose of the study was to find out the combined effect of concurrent strength training with yogasana practices on power parameter of women hockey players. To achieve this purpose of the study, thirty women hockey players were selected as subjects at random. The age of the subjects were ranged from 18 to 25 years.

Selection of variable

Independent variable

- Combined concurrent strength training and yogasana practices

Dependent variable

- Leg Explosive Power

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as a concurrent strength training and yogasana practices group (Experimental Group) and control group. The experimental group underwent combined concurrent strength training and yogasana practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following power parameter namely leg explosive power was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable leg explosive power was measured through standing broad jump at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

Analysis Of The Data

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

Table I: Analysis of t-ratio for the pre and post tests of experimental and control group on Leg explosive power (Scores in mm Hg)

Variables	Group	Mean		Degree of freedom	't' ratio
		Pre	Post		
Leg explosive power	Control Group	1.75	1.76	14	0.39
	Experimental Group	1.76	1.82	14	16.99*

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on leg explosive power were 1.75 and 1.76 respectively. The obtained 't' ratio was 0.39, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on leg explosive power were 1.76 and 1.82 respectively. The obtained 't' ratio was 16.99* since the obtained 't' ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in systolic blood pressure. It may be concluded from the result of the study that experimental group improved in leg explosive power due to six weeks of combined concurrent strength training and yogasana practices.

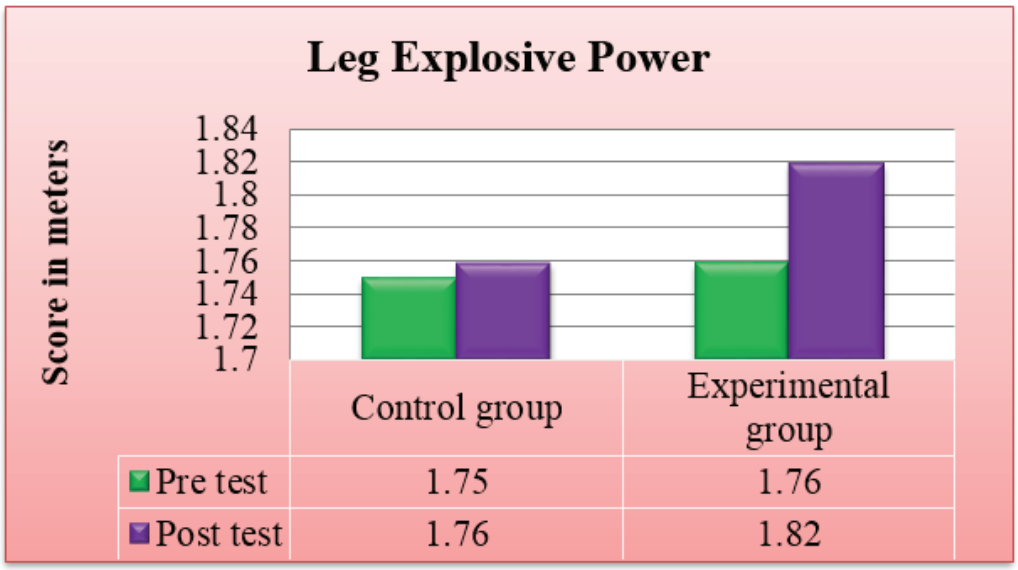


Figure-1: Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on Leg explosive power

Discussions on Findings

The result of the study indicates that the experimental group, namely combined concurrent strength training and yogasana practices group had significantly improved the selected dependent variable, namely Leg explosive power, when compared to the control group. It is also found that the improvement caused by combined concurrent strength training and yogasana practices when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on leg explosive power after the training period.

2. There was a significant improvement in systolic blood pressure. However the improvement was in favor of experimental group due to six weeks of combined concurrent strength training and yogasana practices.

Source of Funding: Funding

Conflict of Interest: Nil.

Ethical Clearance: With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human

subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research.* 2019; *9,* (10), pp. 73-74.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. *International Journal of Yoga, Physiotherapy and Physical Education.* 2017; *2*(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. *Indian Journal of Applied Research,* 2019; *9,* (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. *International Journal of Advanced Education and Research,* 2019; *4* (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research,2019; 9,* (10), pp. 73-74.
6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. *International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3* (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. *Journal of Information and Computational Science,*2019*; 9*(8), pp. 483-487.
8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 2019; 9* (10), pp. 73-74.
9. Alaguraja, K., & Yoga, P. Analyze of pranayama technique on physiological parameter among rural school students. *Journal of Information and Computational Science, 2019; 9*(8), pp.545-550.
10. Alaguraja, K., Yoga, P., James Rathinaraj, S., R., & Selvakumar, K. A study on yoga intervention on maximal oxygen uptake among stress patient. *Indian Journal of Applied Research,2019; 9* (9), pp. 38-39.
11. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 20019; 9*(10), pp. 73-74.
12. Selvakumar, K., & Yoga, P. (2019). Influence of yogic practice on flexibility among college students. *Indian Journal of Applied Research,2019; 9,* (7), pp. 45-46.
13. Parthasarathy., & Dhanaraj. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. *Indian Journal of Applied Research,2019; 9*(11), pp. 45-46.

Female Smoking: A Rising Concern in India

Tania Mukherjee[1], Patralika Bhattacharjya[2], Sakhi Roy[2].

[1]Post Graduate Student, Amity School of Economics, Amity University West Bengal, Kolkata

Abstract

Cigarette smoking is the dominant form of tobacco use across the world. There is growing concern about to the increasing trend of female smoking in India. The overall female smoking is growing at a faster rate than male, which is an emerging concern and requires attention of policy makers. A recent WHO report stated that, 'in quickly developing India, female cigarette smoking exists mainly among the urban elite classes of large cosmopolitan cities, which may reflect women's aspiration to 'equal' the social position of men'. Our result suggests smoking cannot be defined with education, and for occupation cigarette smoking is mostly among the higher income groups whereas bidi, gutkha are mostly among the low-income groups.

Keywords: *Female Smoking, India, Trends.*

Introduction

Around 42.4% of men, 14.2% of female and 28.6% (266.8 million) of all adults in India currently use tobacco (smoke and/or smokeless tobacco)[11] .The World Health Organization predicts that India will have fastest rise in death rates for tobacco use in the first two decades of 20th century and most death will be at the productive years of adult life. Tobacco use imposes a significant economic burden on society. The burden caused by tobacco use more than outweighs the economic benefit from their manufacture and sale. India is the second largest consumer of tobacco products and third largest producer of tobacco in world. Each year more than five million deaths are there in the world for consuming any form of tobacco.

Cigarette smoking is the dominant form of tobacco use all across the world. When a person smokes, a dose of nicotine reaches the brain within about ten seconds. At first, nicotine improves mood and concentration, decreases anger and stress, relaxes nerves and reduces amount of food we consume every day. Regular doses of nicotine lead damages to the brain, which then lead to nicotine withdrawal symptoms when the supply of nicotine decreases. Smoking temporarily reduces these withdrawal symptoms and can therefore boost the habit. This cycle is how most smokers become chain smoker. Social and psychological factors play an important part in keeping smokers smoking.

For past two decades female smoking has become rising concern in developing and also developed countries[4,8,9]. The prevalence of female smoking is likely to rise to 20% by 2025 worldwide. It is observed that for females who smoke cigarettes daily, there is increased effect for infertility, still birth and also sudden infant death syndrome (SIDS). Studies showed that the possible risk of fatal breast cancer rises up to 75% for women who smoke two or more packs regularly.[5] Smoking behavior of women differs from that of men[11] . Females are more motivated to smoke and find it hard to quit.

We have focused on this topic because women are the one who gives birth so the entire future generation is dependent on them and if they continue smoking then not only, she suffers but also the new born as smoking significantly damages reproductive organs of females.

The *objectives* of this study is to find out

(i) the trend of female smoking in India,

(ii) Analyze the number of cigarettes smoked on average per day according to age, gender, education and occupation, whether smoking imitation is high among

Corresponding author:
Name: Sakhi Roy
Designation: Assistant Professor, Amity University West Bengal, Kolkata, Address: Major Arterial Road (South-East), Action Area II, New Town, Kolkata, West Bengal 700135.

women than men,

(iii) Conduct a correlation and regression analysis to understand the determinants of Smoking in India. We check weather Education and Working status has effect on the cigarettes smoked by females.

Materials and Method

This paper is descriptive and analytical both and is based on secondary data of NSS 50 (1990), NSS 52 (1993), NFHS 2 (1998), NFHS 3 (2005), GATS 1 (2009), GATS 2 (2016) ,where NSS is Nation Sample Survey, NFHS is National Family Health Survey and GATS is Global Adult Tobacco Survey (an initiative of World Health Organization). From that perspective this paper is qualitative and quantitative both. For correlation and regression analysis data is used NFHS 3 (2005), as the latest raw data of NFHS4 (2016) is not available. Here we have used multiple correlations and then multiple regression. To estimate the joint effect of education in single years and females currently working, on cigarettes smoked in last 24 hours. Here regression equation is,

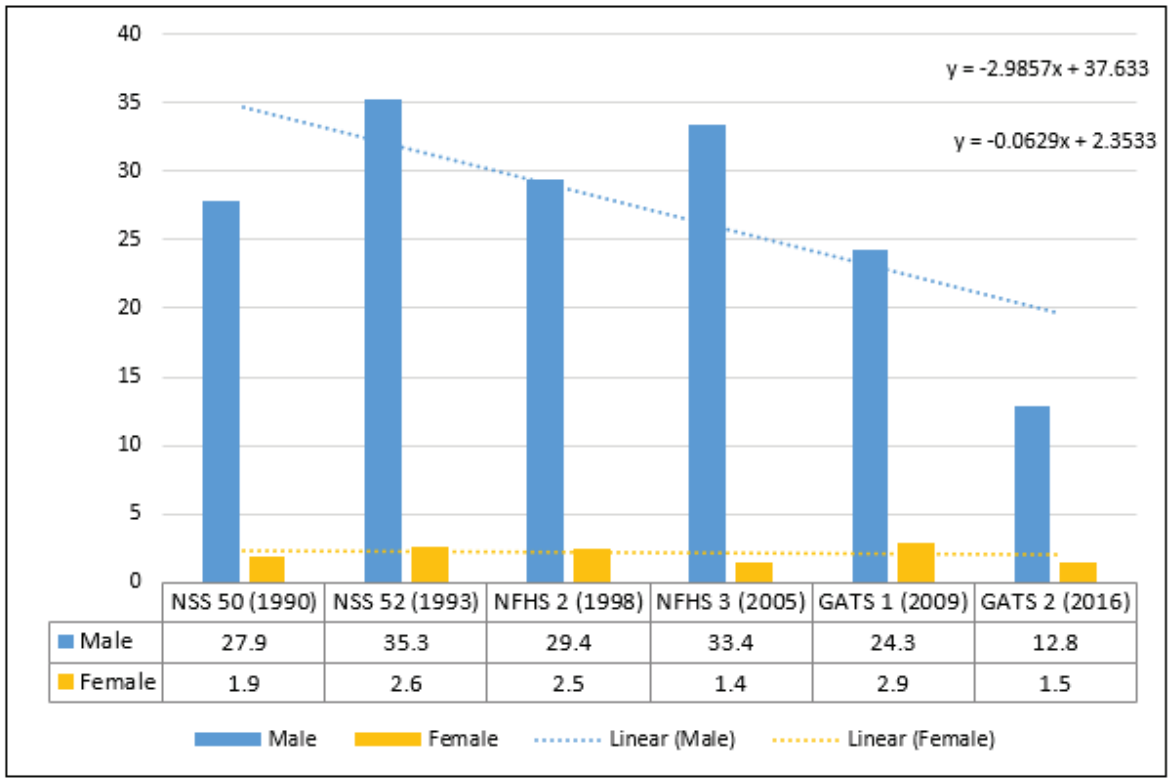
Where, is the dependent variable that is cigarettes smoked in last 24 hours, are the parameters of the model and is the error term,is education in single years, is females currently working. To run the correlation and regression model we have used the software STATA 12.

Findings

I. Smoking Trends among Women:

Figure 1 shows that smoking prevalence (in percentage terms) among male has an overall declining trend. During the period 2009-2016 there is significant decrease (24.3% -12.8%) in smoking trend among male. However, there is rising trend of female smoking during 2005-2009 (1.4-2.9), in 2016 there is a decrease in female smoking but it is greater than in 2005.

We show this data in a comparative bar diagram in Figure1. Here trend line shows the declining trend of male smoking and a steady trend line of female smoking.



Data Source: NSS 50 (1990)[7], NSS 52 (1993)[7], NFHS 2 (1998)[7], NFHS 3 (2005), GATS 1 (2009), GATS 2 (2016)

Figure 1: Smoking Trends according to Gender

Table 1 show that prevalence of female smoking is more among illiterate, which decreased with increasing years of schooling at different time periods. During the period of 2005-2009 smoking trend among illiterate people has risen from 3%-6%, in 2016 it decreased 3.3%, not so much significantly but smoking trend among literate women is fluctuating each year. Table 1 highlight that female illiterates are more prone to smoking, whereas smoking is much less among females who have ten years of educational qualification.

Table 1: Female Smoking Trends according to Literacy

Parameter	**NFHS 2 (1998) (in %)**	**NFHS 3 (2005) (in %)**	**GATS 1 (2009) (in %)**	**GATS 2 (2016) (in %)**
Illiterate	4	3	6	3.3
<5 years	0.8	0.9	1.6	1.1
5-9 years	0.3	0.15	0.5	0.4
>=10 years	0.1	0.05	0.1	0.1

Data source: NFHS 2 (1998)[7], NFHS 3 (2005)[7], GATS 1 (2009)[1], GATS 2 (2016)[2]

II. Number of Cigarette smoked on average per day according to age, gender, education and occupation:

Table 2: Number of Cigarettes Smoked on average per day according to age, gender, education and occupation.

	Number of Cigarettes smoked						
	<5	5 to 9	10 to 14	15 to 24	25+	Total	Mean
Age							
15-24	54.1	34.3	7.6	1.9	2.1	100	5.1
25-44	46.6	30.7	16.1	3.6	2.9	100	6.8
45-64	46.2	27.4	14.8	8.3	3.4	100	7.4
65+	52.7	26.7	11.1	6.1	3.3	100	6.5
Gender							
Male	45.4	30.8	15.2	5.7	2.9	100	7
Female	72.5	17.5	5.7	0.4	4	100	5.2
Education							

Cont... **Table 2: Number of Cigarettes Smoked on average per day according to age, gender, education and occupation.**

No formal schooling	53.8	24.5	10.8	6.6	4.2	100	7.3
<Primary school	51.4	23.9	17.1	5.1	2.4	100	7
Primary but > Secondary schooling	42.1	32.8	17.9	4.8	2.3	100	6.5
Secondary and above	47.1	32.4	12.9	4.6	2.9	100	6.6
Occupation							
Government and nongovernment	50.7	29.9	12.4	4.7	2.4	100	6.6
Self employed	47.1	28.2	15.8	5.7	3.2	100	7
Student	37	57.3	3.5	0.1	2.1	100	5.5
Home maker	47	30.3	14.9	3.3	4.5	100	6.8
Retired or unemployed	52.2	32	8.2	5.3	2.3	100	5.7

Data Source: GATS 2 (2016)[2]

Table 2 present the percent distribution of daily cigarette smokers classified by number of cigarettes smoked every day. Overall, a typical cigarette smoker in India smokes an average of 6.8 cigarettes every day. The mean number of cigarettes smoked per day by men is 7.0 which is higher than by female (5.2). The frequency of cigarettes per day among rural smokers (7.2) is higher than urban smokers (6.3). Although, prevalence of smoking is less among young adults (aged 15-24 years), mean number of cigarettes smoked by young adults is 5.1. The mean number of cigarettes smoked per day decreases with increase in level of education—from7.3 cigarettes per day among those with no formal education to 6.5-6.6 cigarettes per day among those with primary or more education. The mean number of cigarettes smoked per day is higher among self-employed (7.0) cigarette smokers. The mean of number of cigarettes smoked per day by female is less than male, but 72.5% female smokes less than 5 times per day, which is much higher than male. 4% female smokes more than 25 times per day which is also higher than male. Here we can see that who smokes cigarette 5-9 times on average per day, are students. In extreme case of more than 25 times smokers are somewhat same in every occupation and gender.

III. Initiation of Daily Smoking:

Among 20 to 34 years old smoking initiation is high and associated with greater daily cigarette consumption. For this young people are facing early health hazards especially for women, who facing health hazards which are much more severe than men and also a threat to the society as it affects at the time of the child birth. In Table 3 we can see there that women are making initiation of smoking much more than men

Table 3: Initiation of daily smoking (age 20-34)

	2009-10	2016-17
Overall	17.9	18.9
Gender		
Male	18.1	18.8
Female	14.7	21.2

Data source: GATS (2009-10)[1], GATS (2016-17)[2]

Initiation of daily smoking is higher among female than men. Overall smoking initiation has risen to 18.9% in 2016-17 form 17.9% in 2009-10. According to gender, smoking initiation by men slightly has risen in 2016-17 than 2009-10 whereas female initiation of daily smoking has significantly risen in 2016-17, from 14.7% in 2009-10 to 21.2%.

IV. Smoking and Pregnancy:

Smoking and pregnancy are related to many effects on health and reproduction. This includes preterm birth, low birth weight, birth defects of the mouth and lip. On average smoking during pregnancy doubles the chances that a baby will be born too early or with weight less than 51/2 pounds at birth. GATS 2 data mentions that in India 1.3% pregnant women aged between 25-49 ages are currently smoking. 1.3% is not a big percentage but is not negligible.

Non-smokers who breathe in second hand smoking are affected almost as much as smokers. In day to day life people now are breathing smoke not fresh air. Non-smokers are also now suffering health issues related with lung, heart etc. Second hand smoking is more dangerous when it comes to pregnant women as they have to inhale the smoke and it effects as much as a woman who smokes at the time of pregnancy.

GATS 2 highlights that pregnant women are being exposed to second hand smoke. People are still neglecting the second hand dangers. At home 37.7% pregnant women are exposed to second hand smoke only in one month and at any public place 25.9% pregnant women are exposed.

Table 4: Percentage of pregnant women exposed to second hand smoke

	At home (in one month)	**At any public place**
India	37.7	25.9

Data Source: GATS 2 (2016)

V. Correlation and Regression Analysis

In order to find the association or interdependence, we use Correlation and Regression analysis. Here number of cigarettes smoked in last 24 hours is the dependent variable and education in single years and females currently working are independent variable.

Table 5: Correlation Results

	Number of cigarettes smoked in last 24	**Education in single years**	**Females currently working**
Number of cigarettes smoked in last 24 hours	1.0000		
Education in single years	-0.1484* (0.0000)	1.0000	
Females currently working	0.0309 (0.1928)	-0.1448* (0.0000)	1.0000

Author's own compilation.

From Table 5 we can see a negative correlation between number of cigarettes smoked in last 24 hours and education in single years. This means higher the education, lower the cigarette smoking among women. Higher education means women are aware of the health hazards due to smoking so they avoid it, and women with lesser education, due to lack of awareness- smoking is more among them. On the other hand, correlation between number of cigarettes smoked in last 24 and females currently working is almost insignificant. The correlation between Education in single years and females currently working is negative, but it is not possible and makes no sense, so we can say it is a spurious correlation, i.e., a relationship between two variables that appear to

have interdependence or association with each other but actually do not and often caused by a third unseen factor.

Regression Analysis:

In the regression analysis the dependent variable is number of cigarettes smoked in last 24 hours and independent variables are Education in single years and Females currently working. We find that Education has a statistically negative significant association with smoking.

The R-squared here is 0.023, which is interpreted as the ratio of the sample variation in number of cigarettes that is explained by variations in Education and working status of Females. A value of R square that is nearly equal to zero indicates a poor fit of the OLS line. Low R-squared in regression equations are not uncommon, especially for cross-sectional analysis.

Table 6: Regression Results

	Number of cigarettes smoked in last 24 hours
Education in single years	-0.270***
	(-6.70)
Females currently working	0.363
	(1.17)
Constant	6.896***
	(27.17)
N	1781
R-squared	0.023
Rsme	6.519

t statistics in parentheses
*$p<0.05$, **$p<0.01$, ***$p<0.001$

Here goodness of the fit of the model is low also the data is quite old to interpret the present situation. As the latest raw data of NFHS 4 is not available to us so it is not possible to run a correlation, regression model so, we have used the available raw data of NFHS3 2005.More women are joining workforce and out of stress women are smoking more than before which we can see in the recent data of GATS 2016-17.

It is found that 'Casual and social smoking is on rise amid young working women'[10].The survey also found that only 2% of female are heavy smokers (smoking a pack a day or more), majority of them said that peer pressure and work-related pressure pushed them to increase number of cigarettes they smoked. Smoking for weight loss was also cited as a reason.

Conclusion

The findings of this study show a rising trend of female smoking. Less than 5 cigarettes smoked on average per day, is greater among female which suggests that females are not chain smokers. The study highlights that female illiterates are more prone to smoking, whereas smoking is much less among females who have ten years of educational qualification. Smoking cannot be defined with education or occupation, because most of the female smokers are working, so are aware of the health hazards. Smoking might be to relief their stress or to make an experiment or influenced by someone.

The reasons for smoking are mostly psychological. One might think that smoking among friends is glamorous, it helps to fit with the crowd, it feels sophisticated, and it shows independence of womanhood. Some also smoke out of depression and anxiety. Thus, addiction to nicotine makes it hard to quit smoking, but this addiction can be eliminated once the psychological reasons can be overcome. Females need to fight to have equal access to all opportunities and behaviors, without being judged or stereotyped for them, but that doesn't mean that they should do anything they can. Some addictions are best

avoided, even if they help smash a stereotype. It is time for them to create new "gender-neutral" norms that serve both genders better and help females to be their best version of themselves.

Conflict of Interest: Nil.

Source of Funding: Self funded.

Ethical Clearance: Analysis done based on secondary data.

References

1. Global Adult Tobacco Survey India, GATS1 (2009-10), Retrieved from https://www.who.int/tobacco/surveillance/en_tfi_india_gats_fact_sheet.pdf
2. Global Adult Tobacco Survey India, GATS2 (2016-17) , Retrieved from https://www.who.int/tobacco/surveillance/survey/gats/GATS_India_2016-17_FactSheet.pdf
3. Government of India, Department of Health and Family Welfare, (2017), Retrieved from https://mohfw.gov.in/node/3236
4. Rani M, Bonu S, JhaP,Nguyen S N, Jamjoum L. Tobacco use in India: prevalence and predictors of smoking and chewing in a national cross-sectional household survey*, BMJ Journals.* 2003 *Volume 12, issue 4.*
5. National Center for Chronic Disease Prevention and Health Promotion (US) Office on Smoking and Health. The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General. Atlanta (GA): Centers for Disease Control and Prevention (US); 2014. 6, Cancer.
6. National Family Health Survey, India, NFHS3, Retrieved from http://rchiips.org/nfhs/nfhs3.shtml
7. National Family Health Survey, India, NFHS4,Retrieved from http://rchiips.org/nfhs/nfhs4.shtml
8. Goel S, Tripathy J P,Singh R J,Lal P. Smoking trends among women in India: Analysis of nationally representative surveys (1993–2009). *South Asian J Cancer.* 2014 Oct-Dec; 3(4): 200–202.
9. Roy P, Goel S. Is female smoking rising or declining in India? *South Asian J Cancer*. 2015 Apr-Jun. *Volume 4(2): 99–100*
10. Mishra S, Joseph R A, Gupta P, Pezzack B, Faujdar, Sinha D N, Dikshit R, PatraJ,Jha P. Trends in bidi and cigarette smoking in India from 1998 to 2015, by age, gender and education, *BMJ Global Health*. 2016.*Volume 1, issue 1.*
11. ShenoyJ. Smoking on rise among young working women in urban India. The Times of India. 2018 Mar 8.
12. World Health Organization, Female smoking, Retrieved from https://www.who.int/tobacco/en/atlas6.pdf

Ordinal Birth Order and Behavioural /Emotional Problems: A Study among Dyslexic Children in Kerala

Thomas M.V[1], Vinod Kumar S[2]

[1]Research Scholar, [2]Assistant Professor, School of Behavioural Sciences, Kannur University, Kerala

Abstract

Reading disability or dyslexia is a lifelong condition with an early childhood manifestation of inability to read. About 30% of learning disabled children have behavioural and emotional problems.(12) Birth order among the siblings is one of the important family dynamics which determine the psychological well-being of reading disabled children. **Objectives:** To find out whether any difference in behavioural/emotional problems exist between various birth order positions of dyslexic children. ***Design:*** Exploratory Design. ***Participants:*** Dyslexic Children studying in Malayalam Medium Lower Primary Schools. ***Sample Size:*** 122. ***Sampling Method:*** Purposive Sampling. ***Tools:*** Personal Data Schedule, Dyslexia Screening Checklist (Malayalam), Seguin Form Board, Specific Learning Disorder Diagnostic Tool (2) and CBCL. (1) ***Statistical Tests:*** Means, Standard Deviations and ANOVA. **Results:** The comparison of mean values of CBCL syndrome scales and birth order positions were not significant. **Conclusion:** The study concluded that the ordinal birth positions of dyslexic children could not make any alterations in the behavioural and emotional problems.

Keywords: *Dyslexia, Birth Order, Behavioural Problems, Emotional Problems*

Introduction

There is a biological instinct among many living creatures for a sibling competition to attain parental favour and resources. Human beings also have such behaviours which sometimes shown as sibling rivalry. (17) The early-born children have an adaptive advantage if they build and maintain strong parental & family ties, whereas later-born children will be more successful if they have rebellious tendencies (7).

Birth order among the siblings is one of the important family dynamics which determine the psychological well-being of children in a family. Birth order refers to the ordinal position that a child occupies within the family (7). The 'Ordinal Position' which is actual order of birth of the sibling (15). Children with reading disabilities exhibit many emotional and behavioural symptoms and their ordinal birth order exert variations in its severity and occurrence.

Birth order plays a crucial role in the occurrence and maintenance of psychological problems among reading disabled children. It is directly connected with parental favour and thereby ensures family support by the early born children. The late born children become more aggressive and rebel and revolts within the family to attain parental favour. The secure and insecure positions of siblings within the family due to birth order make them more vulnerable to psychological problems along with the existing disabilities like dyslexia.

Several theories has been put forward regarding the characteristics different birth order positions. Alfred Adler explained birth order through 'Individual Psychology' and used birth order as one of the cornerstones of his theories of personality, and he suggested that, early born-children are more likely to adopt traditional family orientation than later-born children and it is 'Conservation of Traditions' (7). Another proposition was 'Family Resource Theory' which suggested that, each additional child in the family, further stretches to available house hold resources including money, house hold space, and parental attention. It suggest that, the siblings may present a threat to healthy development, because they compete for resources that parents have available to invests in individual offspring. (9)

The Confluence Model was suggested by Zajonc & Sulloway (18) explained that, each new child in a family in a way that inhibits intellectual growth for all children in the family. It also suggested that, there will be a

'tutoring effect' that is intellectually facilitated for the children who have younger siblings to teach [7]. Birth order is a predictor of family dynamics, personality and intellectual capabilities of an individual. It also affects when any of the siblings have a mental or physical disability and when disabilities become challenge among those siblings who show altered psychological roles [4]. The resilience capacity of an individual sometimes depends upon their ordinal birth-order position. Early-born children are more adaptive than later-born children. Adler regarded fisrt-borns as power hungry conservatives, middle-borns as competitive and younger children as spoiled and lazy.[17]

Children with learning disabilities are often associated with several internalizing and externalizing problems. Sahoo, Biswas & Padhy [12] reported that about 30% of learning disabled children have behavioural and emotional problems which range from attention deficit hyperactivity disorder (most common) to depression, anxiety, suicide to substance abuse (least common). Sreedevi, George, Sriveni & Rangaswamy [16] conducted a study which revealed that, children with learning disabilities are exhibiting significant behavioural problems than children without learning disabilities. The mostly reported emotional problem was anxiety. Hyperactivity, opposite defiant conduct disorder and sluggish tempo are the common behavioural problems [8]. Arnold et al., [3] reported that, poor readers exhibit higher levels of depression, trait anxiety and somatic complaints than typical readers.

Behavioural and emotional problems co-existing with dyslexia act as a double edged sword which hurts the individual with long lasting scars. Lack of support from parents and family members makes an individual with dyslexia more vulnerable to psychological issues leading to various behavioural and emotional problems. This 'double disability' makes them hard to be resilient with poor academic performance and behavioural issues.

Method

Design: The study was conducted to explore the behavioural problems of dyslexic children on the basis of ordinal birth order. The study was conducted using exploratory design.

Participants: The participants of the study were dyslexic children studying in Malayalam medium schools with age ranging from 8 years to10 years. The total number of children selected was 122 using simple random sampling method. Only Malayalam medium children studying in 3rd and 4th standards were included in the study.

Tools:

Dyslexia-Screening Checklist (Malayalam). It was used to identify the children with reading problems and consists of 11 items. The checklist was rated by teachers. If any of these items was found with child, he/she was sent for further diagnostic procedures.

Seguin Form Board. It is a non-verbal method for assessing the intellectual abilities of children for 5 years to 15 years. It serves as a quick measure for general intelligence.[10] It is a measure of intelligence using the shortest among the trials considered for calculating mental age and is a most useful measure to test form perception, movement and intelligence.

Specific Learning Disorder Diagnostic Tool-SLDDT (Reading Test). It is diagnostic tool developed by Alex & Kumar.[2] The test was developed in Malayalam and contains five dimensions such as phonological processing, alphabet knowledge, single word reading, oral reading, oral language and motor skill. The reading sub test consists of rapid naming, letter identification, word identification, vocabulary, verbal fluency, semantic fluency, bead threading, reading passage, comprehension and pseudo word reading. The reliability of the tests for classes 3rd and 4th are 0.70 and 0.96 respectively. The criterion-related validity for classes 3rd and 4th are 0.955 and 0.977 respectively. The test is used in the current study was to diagnose the dyslexic children who were screened as having reading problems.

Child Behaviour Check List (CBCL-Malayalam) 6-18 Years. The CBCL is one among the Achenbach System of Empirically Based Assessment (ASEBA) developed by Thomas Achenbach.[1] The CBCL 6-18 years consists of school age forms and hand scored profile. There were 113 items based on DSM oriented nine syndrome scales in the CBCL. These scales were anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule breaking behaviour, aggressive behaviour and other problems. The test-retest reliability for problem scale was 0.95. The content validity, criterion related validity and construct validity were well established.[1] The CBCL was used in this study to identify the externalizing and internalizing problems of

dyslexic children.

Procedure: The data collection was done among the primary schools of Kannur, Kozhikode, Wayanad and Malappuram districts of Kerala. The contact number and location of each school was noted from the 'school statistics'. The head teachers were contacted and explained the details of data collection with them. Those who expressed their willingness for data collection arranged an interview with the children and their parents in a convenient time. At school, the class teachers of 3rd and 4th classes screened the children who had problems with reading. The 'informed consent' collected from the parents of screened children and Seguin Form Board administered with them. Children who had IQ above 70 with reading problems were then administered with Specific Learning Disability Diagnostic Test (Reading Disability Test). Those who diagnosed with reading disability then assessed with Child Behaviour Check List (CBCL). The personal information of the children was collected from their parents using Personal Data Schedule.

Statistical Analysis: The data was analyzed using descriptive statistics. The frequencies and means were used for analysis. Analysis of Variance (ANOVA) was used to find out the within group difference of CBCL syndrome scales among the different ordinal birth orders.

RESULTS

The mean and standard deviations of the variables in the syndrome scale of CBCL were given in the Table No.2. The birth order was expressed as first born, second born and later born and above. There were 42 (34.4%) participants as first born, 75 (61.5%) participants as second born and 5 (4.1%) participants as third born and above.

The Table 1. explain the means and standard deviations of different syndrome scales of first order born, second order born and later order born children in the studied population. The total mean and total standard deviations of the syndrome scales were also given.

Table No.1. Mean and Standard Deviations of Syndrome Scales

Sl No	Variables		N	Mean	Standard Deviation
1	Anxious/Depressed	First	42	1.119	1.38286
		Second	75	1.693	2.88038
		Third & Above	5	2.000	2.44949
		Total	122	1.508	2.45032
2	Withdrawn/Depressed	First	42	0.714	1.31197
		Second	75	0.733	1.39820
		Third & Above	5	1.400	2.19089
		Total	122	0.754	1.39841
3	Somatic Complaints	First	42	0.6905	1.58481
		Second	75	0.9067	1.88288
		Third & Above	5	0.6000	1.34164
		Total	122	0.8197	1.75818
4	Social Problems	First	42	1.2619	1.39790
		Second	75	1.7600	2.70055
		Third & Above	5	1.8000	2.16795
		Total	122	1.5902	2.30971

Cont ... **Table No.1. Mean and Standard Deviations of Syndrome Scales**

5	Thought Problems	First	42	0.4762	1.41831
		Second	75	0.8533	2.34056
		Third & Above	5	0.6000	1.34164
		Total	122	0.7131	2.03067
6	Attention Problems	First	42	2.8571	1.95774
		Second	75	3.1200	2.60955
		Third & Above	5	4.8000	4.96991
		Total	122	3.0984	2.53377
7	Rule Breaking Behaviour	First	42	0.5952	0.98920
		Second	75	0.9200	1.55754
		Third & Above	5	0.2000	0.44721
		Total	122	0.7787	1.36371
8	Aggressive Behaviour	First	42	3.0000	3.04439
		Second	75	2.8933	3.15618
		Third & Above	5	2.6000	2.40832
		Total	122	2.9180	3.07103
9	Other Problems	First	42	1.4762	1.51799
		Second	75	1.9333	2.10105
		Third & Above	5	2.2000	3.34664
		Total	122	1.7869	1.97601

The result of ANOVA was given in the Table No.2. The comparison of mean values of ordinal birth order and CBCL syndrome scales done. Three birth order positions were compared with nine syndrome scales. The F-ratio is found as follows, Anxious/Depressed (0.842), Withdrawn/Depressed (0.555), Somatic Complaints (0.241), Social Problems (0.644), Thought Problems (0.468), Attention Problems (1.328), Rule-Breaking Behaviour (1.238), Aggressive Behaviour (0.043) and Other Problems (0.832).

Table No.2: Results of ANOVA Ordinal Birth Order and Syndrome Scales

SlNo	**Variable**	**Sum of Squares**		**Mean of Squares**		**F-ratio**
		Between Group	**Within Group**	**Between Group**	**Within Group**	
1	Anxious/Depressed	10.140	716.351	5.07	6.02	0.842
2	Withdrawn/Depressed	2.185	234.438	1.092	1.970	0.555
3	Somatic Complaints	1.510	372.523	0.755	3.130	0.241

Cont... **Table No.2: Results of ANOVA Ordinal Birth Order and Syndrome Scales**

4	Social Problems	6.909	638.599	3.455	5.366	0.644
5	Thought Problems	3.896	495.063	1.948	4.160	0.468
6	Attention Problems	16.957	759.863	8.478	6.385	1.328
7	Rule-Breaking Behaviour	4.586	220.439	2.293	1.852	1.238
8	Aggressive Behaviour	0.834	1140.347	0.417	9.583	0.043
9	Other Problems	6.516	465.943	3.258	3.915	0.832

Discussion

The study was conducted among dyslexic children with their age ranges from 8 years to 10 years. The children suffering from dyslexia and other disabilities have greater prone to exhibit various forms of behavioural problems. Several factors such age, gender and birth order were reported to influence the onset of behavioural/emotional problems. The data showed that, the participants with third and above ordinal position had higher mean scores on anxious/depressed, withdrawn/depressed, social problems, attention problems and other problems. The participants with second birth order position had higher mean scores on somatic complaints, thought problems and rule breaking behaviour. Aggressive behaviour is high among participants with first birth order positions.

Result of analysis of variance presented in the Table No.2. for the 9 syndrome scales. The F-ratios were not found any significant difference between first order born, second order born and third and above order born children. The study found that, the ordinal birth order positions did not exert any influence on the behavioural and emotional problems of the given sample of participants. There were differences in opinion about the influence of birth order on psychological variables. Some studies accepted the hypothesis that birth order influences psychological variables, while some others reject. Sharma & Smriti [(13)] reported that, there were differences in psychological well-being among various birth orders they studied. Ordinal position the child holds within the sibling ranking of a family is related to intellectual functioning, personality, behaviour and development of psychopathology.[(11)]

While the present study undoubtedly found that, the birth order positions could not influence any psychological variables such as behavioural and emotional problems among dyslexic children. Dyslexia is itself a disability and development of psychopathology is very common among these individuals. Dyslexia and other learning disabilities may lower the self-esteem of the affected individual which may result in the development of behavioural/emotional problems.[(6)(5)(14)] But with the current study, the ordinal birth order could not make any change in behavioural and emotional problems of the given participants.

Conclusion

The children participated in the study were between the ages of 8 years to 10 years old who are suffering from dyslexia. There were three birth order positions described among these children. The second born children were larger in number compared to first born and third born kids. The study concluded that the behavioural/emotional problems of children suffering from dyslexia were left unchanged with various birth order positions.

Ethical Clearance: Ethical clearance obtained from the Doctoral Committee, Kannur University.

Conflicts of Interest: None declared.

Financial Support and Sponsorship: Self financed research work.

References

1. Achenbach TM & Rescorla LA*: Manual for ASEBA School Age Forms and Profiles.*UK: Research Centre for Children, Youth and Family; 2001
2. Alex J, Kumar VS: *Specific Learning Disability Diagnostic Tool for Malayalam Medium Children. PhD Thesis.* Kannur: Kannur University; 2012
3. Arnold EM, Goldstein DB, Walsh AK, Reboussin BA, Daniel SS, Hickman E, Wood F B: Severity of Behavioural and Emotional Problems among Poor and Typical Readers. *Journal of Abnormal Child Psychology.* 2005; *Vol.33, No.2, pp 205-217.*
4. Eckstein D, Aycock KJ, Sperber MA, McDonald

J, Wiesner V, Watts RE, Ginsburg P: A Review of 200 Birth Order Studies: Life Characteristics. *The Journal of Individual Psychology.*2010; *Vol.66, No.4. Austin: University of Texas.*

5. Glazzard JC: The Impact of Dyslexia on Pupil's Self-Esteem. *British Journal of Learning Support. UK: Blackwell Publishers;* 2010
6. Humphrey N: *Self-Concept and Self-Esteem in Developmental Dyslexia: Implication of Theory and Practice.* UK: Bolton Institute of Higher Education; *2012*
7. Kazdin AE: *Encyclopaedia of Psychology. Vol.1.* USA: Oxford University Press; 2000.
8. Khan M, Malik F: Maternal Stress and Behavioural-Emotional Problems in Children with Dyslexia. *Journal of Pakistan Psychiatric Society;* 2007, *Vol.5, No.3.*
9. Lawson DW, Mace R: Sibling Configuration and Childhood Growth in Contemporary British Families. *International Journal of Epidemiology;* 2008. *Vol.3, pp 1408-1421.*
10. Madhavan T, Kalyan M, Naidu S, Peshwarla R, NarayanJ: *Mental Retardation. A Manual for Psychologists.* Secunderabad: National Institute for Mentally Handicapped; 1969
11. Risal A, Tharoor H: Birth Order and Psychopathology. *Journal of Family Medicine and Primary Care;* 2012, *Vol.1, Issue.2.*
12. Sahoo MK, Biswas H, Padhy S K: Psychological Co-morbidity in Children with Specific Learning Disorder. *Journal of Family Medicine and Primary Care;* 2015, *4(1): 21-25.*
13. Sharma G, Srimathi NL: Do Psychological Well-being Characteristics Vary with Birth Order? *Journal of Humanities and Social Sciences;* 2014, *Vol.19, Issue.9, Version.1, pp 45-54.*
14. Sheila B: Self-esteem Groups for Secondary Pupils with Dyslexia. *Educational Psychology in Practice;* 2004, *Vol.20, No.1.*
15. Shulman BH, Mosak HH: Birth Order and Ordinal Positions: Two Alderian Views; 1977
16. Sreedevi G, George AG, Sriveni D, Rangaswamy K: Learning Disability and Behaviour Problems among School Going Children. *Journal of Disability Studies;* 2015, *1(1). 4-9.*
17. Sulloway FJ. *Birth Order, Sibling Competition and Human Behaviour.* Berkeley: University of California; 2001.
18. Zajonc RB, Sulloway FJ: The Confluence Model: Birth Order as a Within Family or Between Family Dynamics. *PSPB;* 2007, *Vol.33, No.9.pp 1187-1194.*

Awareness of Diabetes Mellitus and Glycemic control amongst patients with Type 2 Diabetes

Ujwal L Yeole[1], Mariya P Jiandani[2], Hashmeet Kaur Bakshi[3], Shailaja Kale[4]

[1]Associate Professor and Principal, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, [2]Associate Professor, PT School and Center, Seth GS Medical College and KEM Hospital, Parel, Mumbai, [3]Student 4th year BPT, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, [4]Consultant Diabetologist, Dr. Shailaja Kale's Diabetes and Speciality Clinics, Pune

Abstract

Background: The patient's awareness about diabetes, its complications, role of lifestyle modifications can establish patient specific goals. This study was done to determine the level of awareness regarding Diabetes mellitus, its complications and Glycemic control.

Methods: A survey was carried out on 245 diabetic patients visiting Medicine OPDs at affiliated hospitals in Pune to determine the level of awareness of Diabetes Mellitus and Glycemic control amongst patients with Type 2 Diabetes. A predesigned and validated questionnaire was administered which was further modified post pilot study.

Results: Total 200 patients with mean age of 53±6.66 years (84 males and 116 females), mean duration of diabetes 8.20±8.057 years and mean HbA1C 7.11±0.95 % were interviewed for the level of awareness of Diabetes Mellitus and Glycemic control. Around 62% people perceived diabetes to be a life lasting disorder whereas 24% considered it to be a life threatening and a non-treatable disorder. Almost 77% completely agreed that Glycemic control is important with 71% completely agreed that daily exercise with a particular exercise regime and lifestyle modification proves advantageous. Around 63% completely agreed that a proper diet plan should be followed by diabetics and they should not skip meals.

Conclusion: Majority of diabetes patients had awareness about diabetes, its complications, role of exercises and diet in glycemic control.

Key words: *Awareness, Glycemic control, Type 2 Diabetes, Exercise, Diet, Lifestyle Modification.*

Introduction

Diabetes mellitus is a complex, chronic illness which requires continuous medical care along with multifactorial risk reduction strategies beyond glycemic control.[1] Diabetes mellitus (DM) has emerged as a major public health challenge around the world. The greatest burden of diabetes mellitus has been faced by the low and middle income countries. With rapid economic development, elevated standard of living, dietary shifts, lifestyle alterations, and aging , diabetes mellitus has become an important public health problem worldwide. It is estimated to be the third most challenging disease threatening public health after malignant tumors and cardiocerebral vascular diseases.[2]

In 2011 the Diabetes Atlas of the International Diabetes Federation (IDF) estimated the global DM prevalence in the age group 20–79 years at 8.3%, which translates into 366.2 million people suffering from DM in 2011. By 2030, the number of people living with diabetes mellitus is projected to reach 551.9 million.[3] Recent global study stated that 60% of diabetics worldwide come from Asia because it is the world's most populous region.[4]

Excessive caloric intake and physical inactivity are well recognised environmental factors which predispose type 2 diabetes. Obesity and sedentary lifestyle are risk factors that play important roles in escalating the prevalence of developing Type 2 diabetes mellitus. In

both men and women , increased physical activity is associated with a reduced risk of diabetes and even a moderate activity is protective against Type 2 diabetes mellitus.[3]

By creating awareness amongst patients about diabetes, its complications, medication, lifestyle modification and diet plan patient specific goals like effectiveness of medication and decrease in likelihood of adverse events in diabetic patients can be established.[1] The management of diabetes mellitus largely depends on the affected person's ability to pursue self-care in daily living. The awareness, treatment and control of diabetes mellitus can effectively reflect on the social status of diabetes conditions.[2]

As lack of awareness about diabetes and inadequate control of glycemia are among the major factors for the prevalence of diabetes; this study was carried out with an objective of creating the awareness among the diabetic population to ensure better management , better prognosis and prevention of complications in the diabetic population.

Method

This study was carried out as a part of screening phase of a research project registered under [CTRI/2018/01/011193] approved by institutional ethical committee with the approval number: [IEC II/338/18].

An Exploratory cross sectional survey was carried out on diabetic patients visiting Medicine OPDs at affiliated hospitals in Pune to determine the level of awareness of Diabetes Mellitus and Glycemic control amongst patients with Type 2 Diabetes. Patients visiting diabetic clinics were approached (total 245) amongst which 228 agreed for participation in the survey.

The patients within age of 35-60 years, both male and females and patients diagnosed with Type 2 diabetes since more than one year were included in the study and patients with Type 1 and gestational diabetes were excluded from the study. Total 28 patients did not fit in the criteria so were excluded. A final survey was carried out on 200 diabetic individuals. The patients who agreed for participation in the survey were further interviewed using a predesigned questionnaire by trained interviewer.

Experts in the field were consulted and a predesigned questionnaire was administered which was further modified post pilot study. Prior to participation patients were instructed and explained about the aims, objectives, method of study and informed Consent was obtained from the participants.

The questionnaire was categorized into two components. The first component of the questionnaire included questions evaluating awareness regarding Diabetes Mellitus as a condition and its complications, in which they were given the flexibility to respond more than one option based on their diabetic knowledge about the condition. The second component included questions evaluating awareness regarding Glycemic control where the patients had to choose only one option on Likert scale. The patients were interviewed and the results were formulated.

Data management and statistical analysis:

The collected data was tabulated and analysed using Microsoft Excel 2010 and InStat [DATASET1.ISD] software.

Results

Total 200 patients with mean age of 53±6.66 years (84 males and 116 females) were interviewed for the level of awareness of Diabetes Mellitus and Glycemic control. The average BMI was 26.11±5.66 kg/m^2 in males and 26.6±5.26 kg/m^2 in females. The mean duration of diabetes of the males was 9.88±9.56 years and that of females was 7.077±6.31 years. The mean HbA1C of the male patients was 7.35±1.047 % and those of the female patients was 6.98±1.37%. Table 1 depicts component evaluating awareness regarding Glycemic control.

Discussion

Diabetes mellitus is a metabolic disorder of multiple aetiology characterized by chronic hyperglycemia with disturbances of carbohydrates, fats and protein metabolism resulting from defects in insulin secretion, insulin action or both.[3] The causes of Type 2 diabetes are central adiposity, lack of physical activity and excessive caloric intake, mental stress and genetic susceptibility [3]. In this study around 58% patients said the cause of Type 2 diabetes is mental stress whereas very few said it is due to eating lots of sugar and other factors like excessive bodyweight and genetic inheritance.

There are multiple misconcepts regarding Diabetes as a condition, its causes, the methods for achieving good glycemic control. In this study around 62% of

the diabetic patients perceived diabetes as a life lasting disorder and 24% mentioned it as a non treatable and a life threatening condition. Almost 67% said that insulin helps to control glycemic levels. [3] In this study it was seen that 77% completely agreed that glycemic control is important. Only 29% were aware that no dietary modifications are required with insulin is a misconception. Ali Reza Soltanian et al in their study concluded that lack of awareness can lead to development of diabetes and increase the cost of treatment.[5]

There are various concepts regarding insulin administration, the site of it's administration and also about target blood sugar levels. This study showed hardly 50% of the people were aware about Target BSL for good glycemic control. 51% were aware that insulin should be administrated on the proper body sites but only 30% mentioned that the site should be changed at regular intervals.

While evaluating the knowledge about symptoms of hypoglycaemia and hyperglycaemia it was observed that majority of the patients were aware of symptoms of hypoglycaemia and measures to be adopted for its management. Symptoms of hypoglycaemia include palpitation, sweating, nausea, hunger, headache, fatigue, mental dullness, blurring or clouding of vision and unconsciousness .[3] This study states that 63% were aware that the symptoms of reduced BSL is weakness/ fatigue but only 24% were aware that light headedness is also a symptom of hypoglycaemia and the method of managing it is eating sweets/chocolates was known by 72% of the people but only 18% knew that eating food is also a method of managing it. The clinical features of increased blood sugar levels include polyphagia, polydipsia, polyuria, unexplained weight loss despite of normal appetite, recurrent bacterial infections, recurrent urinary tract infections [6]. In this study , 66% people were aware that the symptom of increased BSL is increased thirst but only 20% were aware that loss of weight despite of normal appetite is also a symptom.

There are studies which stated that the complications of Type 2 diabetes include Ischaemic Heart Disease, Renal failure, Stroke, Heart failure, Peripheral neuropathy, Foot Ulcers, Retinopathy, Myocardial infarction, Major amputations .[2] A study stated that Type 2 diabetes have autonomic symptoms and may further result into autonomic dysfunctions due to damage to autonomic nerve fibres that result in abnormalities in HR control and vascular dynamics that is commonly seen disease like DM.[7] In this study there were only 20% who were aware of the fact that uncontrolled diabetes leads to peripheral neuropathy as a complication whereas more than 50% people were aware that renal failure, cardiovascular problems and retinopathy can also be caused due to uncontrolled diabetes. The major contributory factors for the high prevalence of diabetes and its complications are inadequate control of glycaemia , hypertension , delayed diagnosis of diabetes and lack of awareness about diabetes among the majority of the public.[3]

Physical activity is considered to be an important component of weight management programme. Regular exercise and aerobic fitness improve insulin sensitivity and glycemic control, decrease the risk of developing diabetes and reduces overall mortality in patients with Type 2 Diabetes.

This study states that 63% completely agreed that a proper diet plan should be followed by diabetics and they should not skip meals when busy. Which is in review with the study stated done by Sylria Hhey and Osama Homdy that diet rich in wholegrains, fruits, vegetables, legumes, with moderate in alcohol consumption and low in refined grains, red meat and sugar sweetened beverages have been shown to reduce risk of diabetes and improve glycemic control in patients with diabetes.[8]

A cornerstone of diabetes management is formed by life-style modification which involves giving up of certain pleasures of unhealthy life-styles which include lack of physical activity and irregular eating in order to prevent and / or delay diabetic complications and to achieve a desirable glycemic control.[3] In this study, 71% completely agreed that there are various advantages of daily exercise and lifestyle modification in diabetes. 69% completely agreed that a particular exercise regime should be followed by diabetics 5 days a week for at least 30 minutes. Previous studies that stated the incidence of diabetes is reduced by lifestyle intervention and also that lifestyle interventions are particularly effective to delay or prevent the development of complications substantially reducing the individual and public health burden of diabetes. It also mentioned that lifestyle interventions were more effective than metformin.[8]

Most of participants (65%) completely agreed importance of routine follow up with physician better diabetes management. 79% completely agreed that diabetes medicines should be taken regularly as given by physician. R. Brian Haynes, et al in their study

stated low adherence to prescribed medical regimens is a ubiquitous problem. To reap the benefits of medical therapies, better, more effective, and more efficient interventions for helping people to follow regimens are needed.[9]

Effective diabetes mellitus education, with consequent improvements in knowledge, attitudes and skills, leads to better control of the disease, and is widely accepted to be an integral part of comprehensive diabetes mellitus care and management.[7] During the period of undiagnosed diabetes, risks for micro- and macrovascular complications are elevated and it has been proposed that treating hyperglycemia to prevent complications is more effective than treating these complications after they have developed.[10]

The data collected empirically shows that the level of awareness of patients about diabetes, its complications and management in the diabetic population in Pune in India was good. There are multiple misconcepts regarding Diabetes as a condition, its causes, knowledge about symptoms of hypoglycaemia and hyperglycaemia, the methods for achieving good glycemic control.

This study evaluated the awareness of diabetes knowledge and glycemic control.

The level of literacy of the patients, also may impact the Glycemic control in Diabetic patients. Future studies can be done to evaluate the association of

Further study can be done to compare the awareness between type 1 and type 2 patients and also a comparison study of awareness between patients in rural and urban populations can be done.

Conclusion

Majority of diabetes patients are well aware about diabetes, the possible complications of diabetes and the role of exercises and diet control in glycemic control.

Acknowledgement: The authors would like to acknowledge Dr Shreepad Bhat, Diabetologist at Affiliated Hospital for his kind support throughout conducting this survey.

Financial Support and sponsorships: NIL

Conflicts of Interest: There are no conflicts of interests.

TABLE 1: Component evaluating awareness regarding Glycemic control

	Completely disagree	Somewhat disagree	Neither agree nor disagree	Somewhat Agree	Completely agree
1. Daily exercise and lifestyle modifications is beneficial.	0%	02%	05%	22%	71%
2. A particular exercise regime should be followed.	0%	02%	03%	26%	69%
3. Follow up with your physician even in absence of any fresh complain is important.	04%	01%	05%	21%	69%
4. Diabetes Medicines should be taken regularly.	0%	01%	02%	18%	79%
5.Diabetes medicine can be stopped after feeling better.	59%	09%	07%	09%	21%
6.Glycemic control is important	02%	01%	05%	15%	77%
7. Regular BSL checkup is important for Glycemic control	03%	03%	07%	26%	61%
8. Should have a proper diet plan, a Dietician should be consulted	0%	03%	06%	28%	63%
9.Diabetics should not skip meals	11%	03%	05%	18%	63%
10.Diabetics cannot eat fruits.	53%	15%	09%	12%	11%

References

1. Rahman UZ, Irshad M, Khan I, Khan AF, Baig A, Gaohar QY. A survey of awareness regarding diabetes and its management among patients with diabetes in Peshawar, Pakistan. J Post Med Inst 2014; 28(4): 372-7.
2. Wang C, Yu Y, Zhang X, Li Y, Kou C, Li B, et al. Awareness, Treatment, Control of Diabetes Mellitus and the Risk Factors: Survey Results from Northeast China. PLoS ONE 2014; 9(7):e103594.
3. Munjal Y, Sharma SK. API Textbook of Medicine, Tenth edition, Jaypee Brothers 2015:457-42.
4. Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, et al. Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India Diabetes Study (Phase I): Indian Council of Medical Research India Diabetes 4. Indian J Endocrinol Metab 2018, 18(3): 379-85.
5. Knowler WC, Barrett-Connor E, Fowler SE, Hamman RF, Lachin JM, Walker EA, et al. Reduction in incidence of type 2 diabetes with lifestyle intervention or metformin. N Engl J Med 2002, 346:393-03.
6. Pawar P, Yeole U, Ruparel D, Panse R, Gharote G, Kulkarni, S. Effect of inspiratory muscle training on autonomic symptoms in patients with type 2 diabetes. IJAMSCR 2018. 6(4).
7. Ley SH, Hamdy O, Mohan V, Frank BH. Prevention and management of type 2 diabetes: dietary components and nutritional strategies, The Lancet 2014; 383.
8. Haynes, R.B., Heather, P., Amit, X.G.Helping Patients follow up prescribes treatment", Journal of the American Medical Association 2002; 2880-83.
9. Alonso-Moran E, Oreuta JF, Esteban FIJ, Axpe JMA, Gonzalez MLM, Polanco NT, et al. The prevalence of diabetes-related complications and multimorbidity in the population with type 2 diabetes mellitus in the Basque Country, BMC Public Health 2014; 14:1059.

Effect of Dynamic Postural Control Activities on Balance in Amateur Indian Taekwondo Players

Ujwal Yeole[1], Rachna Shah[2]

[1]Associate Professor and Principal, [2]Intern, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune

Abstract

Background: Taekwondo is a technique of unarmed self-defense that involves skillful application of techniques which include punching, jumping, kicks, blocks and dodges. Beside speed, response to the opponent's actions along with good balance appear to be key elements for victory. Hence a good balance is required for excellent performance with minimal injuries

Method: A total of 60 players were selected based on inclusion and exclusion criteria. The aim and objectives of the study were explained to them and their written consent was taken. Balance was assessed using single legged stance test and community balance and mobility scale. The players were divided into two groups of 30 players each. A four week intervention program consisting of dynamic postural control activities was given to the players in group Athrice a week for four consecutive weeks and those in group B received conventional exercises including stretching and drilling. The pre and post values were recorded on 1st and 12th day respectively and the data obtained was statistically analyzed.

Results: The average CBM scale score before intervention were 74/96 in group A and 72/96 in group B. These were improved to an average of 91.2/96 and 80.32/96 in group A and group B respectively after intervention showing a value of $p<0.0001$. Also, significant improvement is seen in single legged stance test scores in group A as compared to group B.

Conclusion: Dynamic postural control activities are effective in improving the balance thereby improving the performance in amateur Indian Taekwondo players.

Keywords: *Dynamic postural control activities, Taekwondo athletes, Community balance and mobility scale, Single legged stance test.*

Introduction

The word "Taekwondo" is derived from the Korean word **"**Tae" means "to Kick" or "Smash with the feet," Kwon" implies "punching" or "destroying with the hand or fist," and "Do" means "way" or "method." Taekwondo thus, is the technique of unarmed combat for self-defense that involves the skillful application of techniques that include punching; jumping kicks, blocks, dodges, parrying actions with hands and feet. Taekwondo is considered to be the oldest of all martial art concepts which translates as 'the ways of hands and feet' consisting of a number of ancient martial arts unified into one sport. Taekwondo is a combative sport that was developed in 1940s and 1950s by Korean martial artists with experience in martial arts such as karate, Chinese martial arts, and indigenous Korean martial arts traditions such as Taekkyon, Subak, and Gwonbeop. However, it was introduced in India in 1974 by Puran Andrew Gurang after studying Taekwondo under Korean Grand Master Lee Pyung Pal[1].

The history of taekwondo dates back over 2,000 years, but the sport has come to light after it made its debut at Sydney Olympics in 2000 and Indian Taekwondo athletes made their debut in 1985 at National Games, New Delhi. Since then Indian Taekwondo players have

Corresponding Author:
Dr. Ujwal Yeole
Department of Physiotherapy,
Tilak Maharashtra Vidyapeeth,
Gultekdi, Pune 37
Email id: drujwalyeole@gmail.com

been participating in various international games like Asian Games, Olympics, and Commonwealth Games. However, India won its first taekwondo gold in 12th South Asian games in 2019.

Technically, taekwondo is a kind of self-defense that involves the skillful application of techniques that include punching; jumping kicks, blocks, dodges, parrying actions with hands and feet. Thus, performance in taekwondo may be determined by a competitor's technical, tactical, psychological, physical and physiological characteristics. From a physical conditioning perspective, the goal of taekwondo training is to prepare competitors to effectively manage both the physical activity and the physiological demands of combat. The physical activity and physiological requirements of taekwondo competition require athletes to be competent in several aspects of fitness, including aerobic and anaerobic power, muscular strength, muscular power, flexibility, speed and agility[2].

Also, balance (static and dynamic) along with flexibility plays an important role in protecting players from injuries and play technically with good tactics. During the last years the type of successful techniques condensed toward direct strait kicks, which can be applied within a shorter time interval compared with more complicated kicks. Therefore, it seems success greatly depends on the execution time of a technique.

Taekwondo training is therefore structured to target these specific performance mediators. From a physical conditioning perspective, the goal of taekwondo training is to prepare competitors to effectively manage both the physical activity and the physiological demands of combat. The physical activity and physiological requirements of taekwondo competition require athletes to be competent in several aspects of fitness, including aerobic and anaerobic power, muscular strength, muscular power, flexibility, speed and agility. Thus, it is important that physical therapist and sports coaches make objective studies about players balance and set a training to target those aspects.

For improving balance, agility, strength and flexibility in players, it is important to assess the present data first. And this can only be achieved using proper outcome measures. Studies suggest use of the single leg stance test is recommended for assessment of static balance in players playing various sports as it has a good reliability for assessing players. Also, the community balance and mobility scale is used for assessing young people with good mobility. It has components that cover both static and dynamic balance assessments[3].

Today, taekwondo is world's most favorable martial arts sports. In India, many school going children are indulged into the sports and many of them consider it as just a recreational activity to keep them fit. However, many students train well and wish to participate in the sports at international levels. Recently, in 2018 Asian Games, 8 Indian athletes participated in Taekwondo whereas in 2014 Asian Games 11 athletes participated in taekwondo where maximum number of players were 12 athletes each from China, South Korea and Nepal. Inspite of such a good participation, Indian players have never won any medals at the Asian Games. This may be due to lack in a proper training protocol. Hence, it is important that the coaches and sports therapists collect objective information about players physical, mental, and physiological status so that better training programs could be established. Moreover, there is very limited study available on the same in Indian taekwondo players. Hence the need.

Method

An experimental study was done on 60 subjects. The study was done by recruiting players from taekwondo clubs across Pune. The study had a duration of 6 months. Both male and female amateur Taekwondo players between 8 – 18 years of age and under 45kg weight were included in the study. Players playing for more than one year[4] were also included. Players using orthotic/ prosthetic devices along with those players who are involved in other sports along with taekwondo and who are not regular with training sessions[5] were excluded. The data was collected primarily by approaching various Taekwondo clubs across Pune and training the players thrice a week for four consecutive weeks. Materials required included data collection sheet, consent forms, notepad, medicine ball (2kg), foam stability pad, measuring tape, Swiss ball (75cm), kettle bell(2kg), stepper, stop watch, whistle, and theraband.

A synopsis was submitted and permission was taken from Institutional Ethical Clearance Committee of Tilak Maharashtra Vidyapeeth, Department of Physiotherapy. Various Taekwondo clubs were approached across Pune and their permission was obtained prior study. The aims and objectives of research were explained to the players and those willing to participate were included in

the study based on inclusion and exclusion criteria after their written consent was obtained. A total of 76 players were assessed, of which 60 were selected according to the inclusion and exclusion criteria. The players were assessed for static and dynamic balance using Single Leg Stance Test (SLST) and Community Balance and Mobility scale. This scale has 13 components like unilateral stance, tandem pivot, lateral foot scooting, hopping forward, lateral dodging, running with controlled stop, etc. and each of these components has its scoring out of 5 each. The players were then divided into two groups of 30 athletes each – group A and group B. Group A was given intervention for dynamic postural control activities while group B was given conventional exercises that included stretching and drilling. The sessions for both the groups were carried out for 30 minutes. The dynamic postural control activities included total 7 forms of exercises using swiss ball, theraband, kettle bell, medicine ball, foam stability pad, and stepper. The participants were instructed to hold particular postures using forone minute each and this cycle was repeated thrice per session. The pre and post intervention values for Single Legged Stance Test and Community Balance and Mobility Scale were recorded on 1st and 12th day respectively and data was collected. Data obtained was statistically analyzed.

Data management and statistical analysis:

The data collected was tabulated and analyzed using Microsoft Excel 2010 and InStat [DATASET1.ISD] software.

Results

The Community Balance & Mobility Scale score of players improved from 74.46 + 9.1 to 91.23 + 4.74 with $p<0.0001$ in group A as compared from Group B which improved from 72.25 + 8.4 to 80.32 + 6.7 with $p=0.01$**(Table 1, Figure 1)**. The Single Legged Stance Time of players improved from 20.77+15.69sec and 23.99+15.79sec to 43.18+3.30sec and 43.04+3.68sec on right and left side respectively with $p<0.001$ in Group A as compared to Group B players whose time improved from 22.74+10.67sec and 21.87+11.12sec to 31.54+10.45sec and 30.72+10.63sec on right and left side respectively with $p<0.01$ with eyes open**(Table 1, Figure 2)**. This score improved from 4.97+3.63sec and 5.21+3.89sec to 13.81+2.21sec and 13.27+2.18sec on right and left sides respectively with $p<0.001$ in Group A as compared to Group B whose time improved from 4.23+3.12sec and 4.33+3.45sec to 8.14+2.14sec and 9.12+4.12sec on right and left side respectively with $p<0.01$ with eyes closed **(Table 1, Figure 2)**.

Also the components of Community Balance and Mobility Scale such as lateral dodging, hopping forward, running with controlled stop, 180 degree tandem pivot and later foot scooting showed improvement from 2.75 to 4.13/5, 2.66 to 4.44/5, 2.34 to 4.75/5, 3.01 to 4.56/5 and 2.45 to 4.87/5 respectively.

TABLE 1: Details of players Pre and Post Intervention

Outcome Measures			Group A (interventional group) Mean + SD	Group B (control group) Mean + SD	p value
Demographic Data		Gender	Males = 17, Females = 13	Males = 22, Females = 8	
		AGE (years)	12.9 + 2.59	13.4 + 2.75	p = 0.47
		HEIGHT (cm)	145.06 + 13.19	152 + 8.19	p = 0.1
		WEIGHT (kg)	37.51 + 6.52	39.31 + 5.20	p = 0.40
		BMI (kg/m2)	17.78 + 3.42	19.14 + 2.14	p = 0.06
		Years of Practice	2.74 + 2.26	2.18 + 2.43	p = 0.35
Community Balance & Mobility scale (overall)		Pre	74.46 + 9.1	72.25 + 8.4	p = 0.33
		Post	91.23 + 4.74	80.32 + 6.7	
		P value	p<0.0001	p = 0.01	

Cont... **TABLE 1: Details of players Pre and Post Intervention**

Single Legged Stance Test (Eyes Open)	Right	Pre	20.77+15.69	22.74+10.67	p = 0.57
		Post	43.18+3.30	31.54+10.45	
		P value	p<0.001	p = 0.01	
	Left	Pre	23.99+15.79	21.87+11.12	p = 0.55
		Post	43.04+3.68	30.72+10.63	
		P value	p<0.001	p<0.01	
Single Legged Stance Test (Eyes Closed)	Right	Pre	4.97+3.63	4.23+3.12	p = 0.4
		Post	13.81+2.21	8.14+2.14	
		P value	p<0.001	p = 0.01	
	Left	Pre	5.21+3.89	4.33+3.45	p = 0.35
		Post	13.27+2.18	9.12+4.12	
		P value	p<0.001	p<0.01	

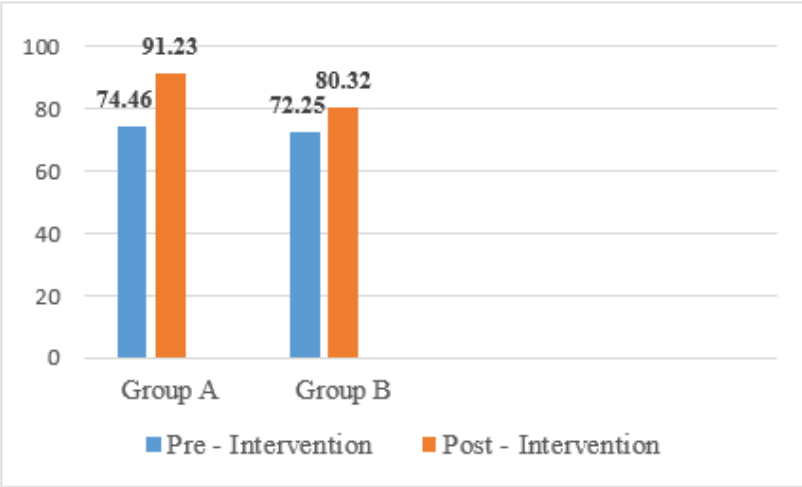


FIGURE 1: Comparison of CBM scale scores Pre and Post Interventions.

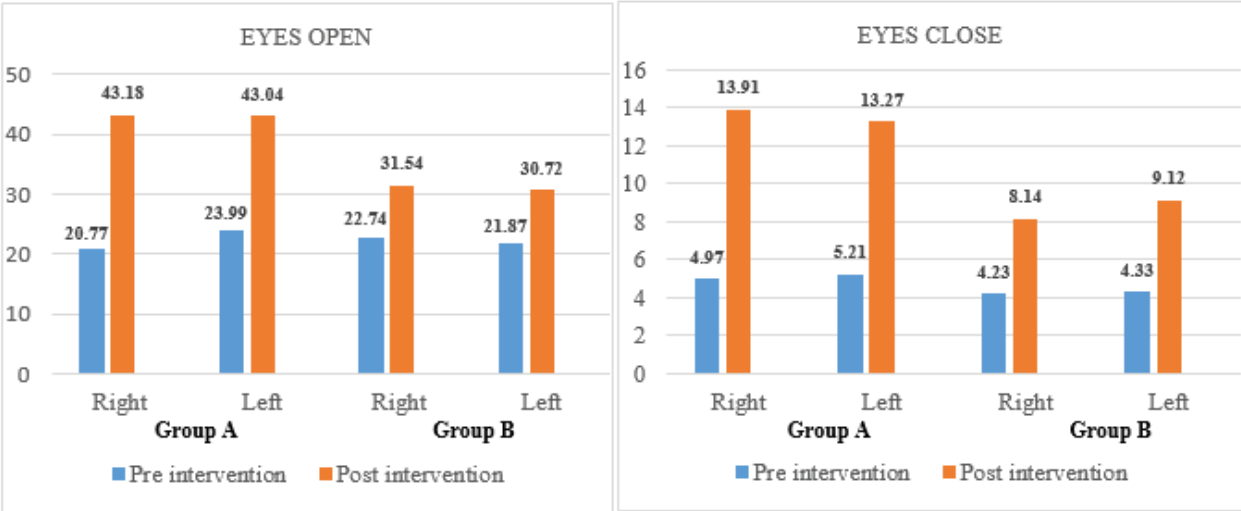


FIGURE 2: Comparison of Single Legged Stance (Eyes Open and Eyes Close) Time Pre and Post Interventions.

Discussion

This study was undertaken to find out effect of dynamic postural control activities on balance in Indian amateur Taekwondo athletes. The players underwent 4 weeks exercise program where a set of dynamic postural control activities were given. Their balance was assessed using Single Legged Stance Test and Community Balance and Mobility Scale. The pre and post intervention values were recorded and the data obtained was statistically analyzed. Overall the dynamic postural control activities showed significant improvement on in both Single Legged Stance Test and Community Balance and Mobility Scale in amateur Indian Taekwondo Athletes.

This study finds that there may be enhancement in ability of sensorimotor system to overcome sensorimotor constraints. Improvement in balance would have been because of these activities cause increase of muscular strength, joints range of motion, neural control of movements. These activities impose overload over the information that is transferred through the three sensory systems of the central nervous mechanism (visual, vestibular and somatosensory). Our findings are supported by a previous study which evaluated the effect of balance training on dynamic postural control in male elderly individuals and concluded that changes in range of motion, muscle strength or length can improve dynamic postural control of individuals[6].

The players showed impaired scores in specific components of Community Balance and Mobility scale those included lateral foot scooting, 180 degree tandem pivot, lateral dodging, running with controlled stop, and hopping forward etc. All these components showed improvement post intervention. This is attributed to increased sensory input that assist in regulation of postural tone and postural muscle activation which is seen with these activities. This finding is supported by an article which states that all sensory inputs contribute to maintenance of posture[7].

The dynamic postural control activities used in this study included squatting, swissball activities, theraband exercises and kettle bell exercise. In our study, the players were told to squat and hold the 2kg medicine ball and maintain the posture for 1min. Squatting is a full body exercise that uses lower limb muscles like quadriceps, hamstrings, and gastro-soleus. Also, this exercise creates an anabolic environment which promotes body-wide muscle building. Since, the posture was held for specific duration, it may have helped to improve upper and lower body muscle strength and also in building and stabilizing the core[8].

In the second activity, the players were told to balance themselves on the swiss ball in half standing position with one hand raised and opposite thigh lifted off the ball. Hence, it must have forced the person to support their own weight and maintain neutral position of spine. Also, maintenance of this posture engages the key stabilizers i.e. abdominal and back muscles, so called core muscles. Swiss ball training used in this study may also target the low – twitched postural muscles[9].

The kettle bell exercise was done by allowing the players to hold the kettle bell in one hand by flexing the spine to 90 degree and extending the hip and knees of one leg and maintaining the entire posture on one leg for 1min. This challenges the COG to be maintained within a small BOS. This activity causes highest activation of the upper erector spinae. The other effect of kettlebell exercise may also be attributed to increased proprioception, increased neuromuscular coordination and improved control of dynamic control and hence reduced risk of falls[10].

Thus, dynamic postural control activities prove to be significantly effective in improving balance in Taekwondo players. Our study could not use large sample size. Further the study could also be done by using advanced equipments to assess static and dynamic balance and also intervention programs to target other performance mediators like strength may be studied.

Conclusion

The study concludes that dynamic postural control activities are effective in improving balance in amateur Taekwondo players.

Acknowledgement: The authors of this study would like to acknowledge Shikinejima and UK's taekwondo academy for their timely support in conducting the study.

Financial Support and Sponsorships: NIL

Conflicts of Interest: There are no conflicts of interests.

Ethical Clearance: A synopsis was submitted and permission was taken from Institutional Ethical Committee of Tilak Maharashtra Vidyapeeth, Department of Physiotherapy.

References

1. Matsushigue KA, Hartmann K, Franchini E. Taekwondo: Physiological responses and match analysis. The Journal of Strength & Conditioning Research. 2009 Jul 1;23(4):1112-7.
2. Bridge CA, da Silva Santos JF, Chaabene H Pieter W, Franchini, E. Physical and physiological profiles of taekwondo athletes. Sports Medicine. 2014 Jun 1;44(6):713-33.
3. Kouvelioti V, Kellis E, Kofotolis N, Amiridis I. Reliability of single-leg and double-leg balance tests in subjects with anterior cruciate ligament reconstruction and controls. Research in Sports Medicine. 2015 Apr 3;23(2):151-66.
4. Beis K, Tsaklis P, Pieter W, Abatzides G. Taekwondo competition injuries in Greek young and adult athletes. European journal of sports traumatology and related research: official journal of the EFOST, European Federation of National Associations of Orthopedic Sports Traumatology. 2001;23(3):130-6.
5. Jones CJ, Rikli RE, Max J, Noffal G. The reliability and validity of a chair sit-and-reach test as a measure of hamstring flexibility in older adults. Research quarterly for exercise and sport. 1998 Dec 1;69(4):338-43.
6. Hadi H, Ghaderi JA. Effect of balance training on dynamic postural control in male elderly able bodied individuals. Euro. J. Exp. Bio. 2013;3(5):7-10.
7. O'Sullivan SB, Schmitz TJ, Fulk G. Physical rehabilitation. FA Davis; 2019 Jan 25.
8. Hibbs AE, Thompson KG, French, D., Wringley A, Spears I. Optimizing performance by improving core stability and core strength. Sports medicine. 2008 Dec 1 ;38(12):995-1008.
9. Stanton R, Reaburn PR, Humphries B. The effect of short-term Swiss ball training on core stability and running economy. The Journal of Strength & Conditioning Research. 2004 Aug 1;18(3):522-8.
10. Andersen V, Fimland MS, Gunnarskog A, Jungård GA, Slåttland RA, Vraalsen ØF, Saeterbakken AH. Core muscle activation in one-armed and two-armed kettlebell swing. The Journal of Strength & Conditioning Research. 2016 May 1;30(5):1196-204.

A Study on the Relationship between Emotional Intelligence and Perception of Home Environment among Adolescents with Respect to Nature of School Management and Gender

Vandana Vijayan[1], K. Govind[2], Ramaa Raju[3]

[1]ResearchScholar, Dept.of Psychology, [2]Associate Professor, Dept. of Psychology, Annamalai University, Annamalai Nagar, TamilNadu, India, [3]Professor & HOD, Dept. of Psychology, Jyoti Nivas College (Autonomous), Bangalore,Karnataka, India

Abstract

In today's world, the life styles of people have totally changed as a result of changes in their physical and socio-cultural environment which in turn is influenced by the advent of information technology. An adolescents life is adversely affected by his/her Emotional Intelligence as it lowers his/her ability to function effectively. The study has been conducted to investigate the relationship between levels of Emotional Intelligence and Perception of Home Environment among Adolescents. It also examines the relationship between the Emotional Intelligence and Home Environment of the Adolescents. The study was made on a random sample of 450Adolescents in Bangalore district of Karnataka State. The tools used in the study were the Mangals emotional intelligence inventory (2000) and Home Environment inventory developed by Dr. Karuna Shanker Mishra (2004). The study reveals the fact that the level of Emotional Intelligenceand Perception of Home Environment are positively correlated.

Key Words: *Emotional, Intelligence, Environment, Adolescents, School Management and Gender.*

Introduction

The modern world, which is said to be a world of achievement, is also a world of intelligence. This though does not signify academic acumen but encompasses within it various forms of intelligence ranging from academic acumen to emotional intelligence. Emotional intelligence is the awareness of a feeling of tension either physical or emotional or both and could be caused as a result of physiological, psychological and environmental demands[1]. It is an established fact that the performance of an adolescents mainly depends upon his psychological state of mind. As emotional intelligence affects the physical and psychological wellbeing of the adolescents, it definitely influences his efficiency and performances.

Corresponding Author:
Vandana Vijayan
Research Scholar, Department of Psychology,
Annamalai University, Mobile: 9886736891
Email id: vandananair28@gmail.com

Emotional Intelligence

Intelligence is a popular word used in day to day life. Different psychologists have tried to define intelligence right from the beginning of this century. Intelligence is an internal component. Human beings cannot neglect the role of emotions in their daily life. According to Cary Cherniss [2] Emotional intelligence has as much to do with knowing when and how to express emotion as it does with controlling it. Emotional Intelligence (EI) refers to the ability to perceive, control and evaluate emotions[3]. Some researchers suggest that emotional intelligence can be learned and strengthened, while others claim it is an inborn characteristic. In modern times, the term Emotional Intelligence has been popularized[4].Since 1990, [5] the leading researchers on emotional intelligence. In their influential article "Emotional Intelligence," they defined emotional intelligence as "the ability to monitor one's own and others' feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions.". It is also understood as an array of non-cognitive capabilities, competencies and skills that influence one's ability to succeed in

coping with environmental demands and pressure. According to Goleman [4], emotional intelligence has five elements: self-awareness, self-regulation, motivation, empathy, and social skills. Emotional Intelligence is the capabilities, competencies and skills that influence one's ability to succeed in coping with environmental demands and pressures that directly affect a person's overall psychological well-being; a type of social intelligence that involves the ability to monitor one's own and others' emotions, to discriminate among them, and to use the information to guide thoughts and actions.[5]

Home Environment

The new oxford illustrated Dictionary defined home as a "dwelling place, fixed residence of family or household member of family collectively". The Home means the body of people who live in one house or under one roof, including parents, children, domestic help etc. Home is the ground consisting of parents and their children whether living together or not. Webster's New Reference Library (1984) defines environment as the combinations of external or extrinsic conditions that affect the growth and development of an organization. The new Lexican Websters Dictionary the English language (1988) states that "environment means the surroundings especially the material and spiritual influences which affect the growth development and existence of a living being". Environment consists of the sum total of the stimulation that the individual receives from conception until death. It covers all those circumstances which assert their influence on the individual since conception till the end [6,7].

Objectives of the study

- To study the level of Emotional Intelligence among Adolescents.
- To study the level of Perception of Home Environment among Adolescents.
- To study the difference in Emotional Intelligence levels among adolescents studying in government aided and privately run schools.
- To study the difference in Emotional Intelligence levels among adolescents based on their gender.
- To study the difference in Perception of Home Environment among adolescents studying in government aided and privately run schools.
- To study the difference in Perception of Home Environment among adolescents based on their gender.
- To study the relationship between the Emotional Intelligence and Perception of Home Environment among Adolescents

Hypothesis of the study

- The level of Emotional Intelligence of Adolescents is high.
- There is no significant difference in Emotional Intelligence levels among adolescents studying in government aided and privately run schools.
- There is no significant difference in Emotional Intelligence levels among male and female adolescents.
- There is no significant difference in Perception of Home Environment among adolescents studying in government aided and privately run schools.
- There is no significant difference in Perception of Home Environment among male and female adolescents.
- There is no significant relationship between Emotional Intelligence and Perception of Home Environment among Adolescents

Methodology

The investigator, in consultation with her guide, felt that the normative survey method would be the most appropriate method to study the relationship between Emotional Intelligence and Perception of Home Environment.

Sample

In this study, random sampling was used as it was thought to be the most convenient one and is representative of the total sample. A total number of 450 Adolescents participated in the study.

Tool used

Mangal emotional intelligence inventory (2000) and Home Environment inventory developed by Dr. Karuna Shanker Mishra 1983. 8

Statistical Techniques used

For the present study, the following statistical techniques were used:

1. 't' test
2. Pearson product moment correlation.

Result and Discussion

Table-1: Correlation Co-Efficient (r) Emotional Intelligence Scores and Perception of Home Environment

Variables	**'r' value**	**Remarks**
Emotional Intelligence	.112*	S
Home Environment		

S=Significant at 0.05 level.

It is seen from table – 1 that the correlation co -efficient value for Emotional Intelligence and Perception of Home Environment among Adolescents is positive and significant at 0.05 level. The above table shows that Emotional Intelligence and Perception of Home Environment are significant and positively correlated. It indicates that Adolescents who show high levels of Emotional Intelligence also tend to have a more positive Perception of their Home Environment.

Table – 2: Pair – wise comparison of Type of Management and Gender with respect to Emotional Intelligence and Home Environment

Variable		**Sample**	**N**	**Mean**	**S.D.**	**t- value**	**P- value**	**LS**
Emotional Intelligence	Type of management	Government aided	151	66.54	12.02	2.129	<0.05	Significant
		Private	299	69.40	15.51			
	Gender	Male	209	65.54	11.359	2.361	<0.05	Significant
		Female	241	69.58	14.345			
Home Environment	Type of management	Government aided	151	196.54	21.497	2.026	<0.05	Significant
		Private	299	209.39	31.136			
	Gender	Male	209	201.57	25.904	3.303	<0.05	Significant
		Female	241	209.35	26.595			

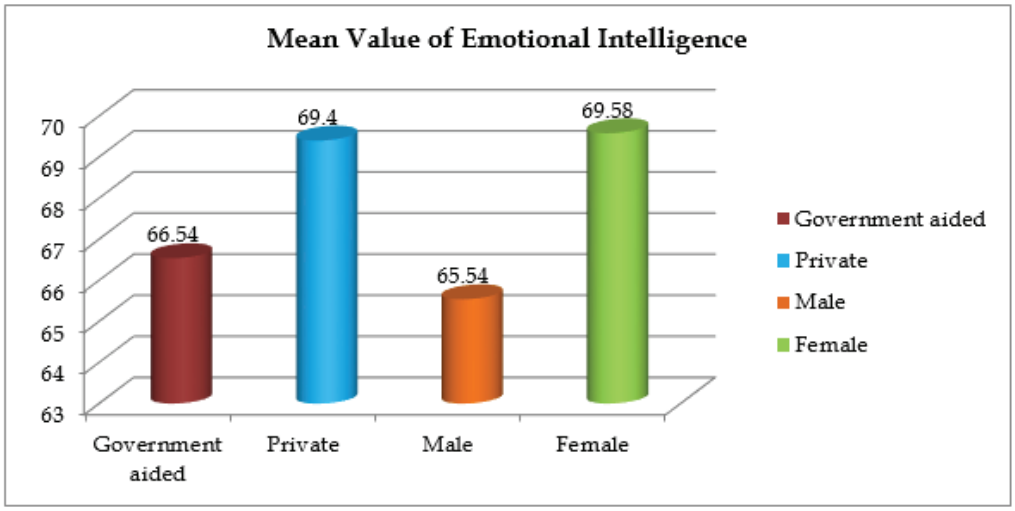


Figure - 1

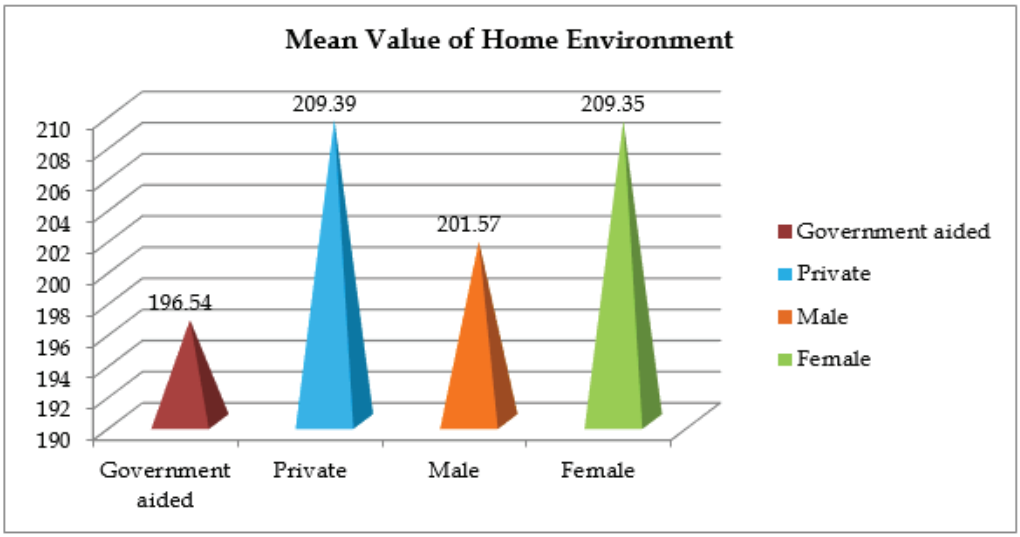


Figure - 2

Major Finding

The calculated ''t' value for emotional intelligence is found to be (2.129 and 2.361), which is significant at 0.05 level. Hence, it is inferred that adolescents studying in government aided and privately run schools as well as male and female Adolescents differ significantly in their levels of Emotional Intelligence. Further the calculated ''t' value for the home environment inventory is found to be (2.026 and 3.303), which is significant at 0.05 level. Hence, it is inferred that adolescents studying in government aided and privately run schools as well as male and female Adolescents differ significantly in their Perception of Home Environment.

Conclusions

On the basis of the results obtained, in the present study, the following conclusions were drawn:

- Adolescents studying in government aided and privately run schools differ significantly in their Emotional Intelligence.
- The male and female Adolescents differ significantly in their levels of Emotional Intelligence.
- Adolescents studying in government aided and privately run schools differ significantly in their Perception of Home Environment.
- The male and female Adolescents differ

significantly in their Perception of Home Environment.

- The results indicate that Emotional Intelligence and Perception of Home Environment are positively correlated and significant.

- The results indicate that if Adolescents show high levels of Emotional Intelligence their Perception of Home Environment too will be positive.

Ethical Clearance – Not required because, data collected through questionnaire.

Source of Funding - Self

Conflict of Interest - Nil

References

1. Ayodha, P. Emotional problems in secondary school children and its relation to life events and scholastic achievement. Journal of Community Guidance Research, (2007) 24: 347-355.
2. Cary Cherniss. Emotional intelligence: what is it and why it matters http://www.eiconsortium.org – (2000).
3. Pushpa, M. Emotional Intelligence and Social Maturity of Student Teachers at Elementary Level. International Journal of Education and Psychological Research, (2015) 4(1).
4. Goleman, D. Emotional Intelligence: Why it can matter more than IQ? NewYork, Bantam Books. (1995).
5. Salovey and Mayor Emotional Intelligence http://ei.yale.edu/wp-content (1990)
6. Raj,M.(1996). Encyclopedia dictionary of psychology and Education: New Delhi, Anmol Publications Rao, N. (2011).
7. Yadav, S. Emotional Intelligence and Values of Adolescents Studying in Govt. and Non Govt. Schools. Journal of Educational and Psychological Research, (2012) 2,2 .
8. Karuna Shankar Misra Manual for Home Environment Inventory, Ankur Psychological Agency, Lucknow, (1983).

Comparative Analysis of Haematinic Effect of Dhatryarista with Standard Ferrous Sulphate in Tannic Acid Induced Iron Deficiency Anaemia in Albino Wistar Rats

Srivastava V[1] , Sarkar S[2], Pattanayak C[3], Mishra M[4], Jena J[3]

[1]Assistant Professor, Department of Pharmacology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, [2]Assistant Professor School of Tropical Medicine, Kolkata, [3]Professor, Department of Pharmacology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha, [4]Associate professor, Department of Pharmacology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha

Abstract

Background: Iron deficiency anemia affects more than 1.2 billions individuals worldwide.Iron deficiency is caused by physiologically increased iron requirements in children, adolescents, young and pregnant women, by reduced iron intake, or by pathological defective absorption or chronic blood loss.Treatment modalities include both oral and parenteral therapies.**Objectives:**a)To study the improvement in haemoglobin after giving dhatryarista in IDA.b) To compare the effect of Dhatryarista (in different concentrations) with standard oral formulation Ferrous sulphate in terms of haemoglobin.**Materials and methods:**The study was conducted for the period of two months in department of Pharmacology KIMS,bhubaneswar. Total 24 Albino wistar rats were taken and divided into 4 groups containing 6 rats each.Anaemia was induced by adding tannic acid in diet of 24 rats by 21days.After induction of anaemia, Group II, Group III and Group IV rats were given standard drug(Ferrous sulphate),Dhatryarista sample 1 and Dhatryarista sample 2 respectively, alongwith normal diet for next 30 days. Blood samples were taken in day 1, day 21 and day 53.**Results:**All the values are expressed as a Mean±SEM(standard error of mean).Significant decrease in haemoglobin were observed, when compared between day 1 and day 21,while significant increase in haemoglobin was observed after 30 days of administration of test and standard drug.**Conclusion:**The administration of tannic acid to rats caused anaemia characterized by reducing hematological parameters.The oral administration of Dhatryarista in the dose of 4.32ml/kg/day P.O and 8.64ml/kg/day P.O significantly increased haemoglobin level.The results demonstrated that higher doses of the plant extract didnot show any signs of acute toxicity in animals.

Key words- *Iron deficiency anaemia, Dhatryarista, Ferrous sulphate, Amalaki, Haemoglobin*

Introduction

Iron deficiency anaemia or *Panduroga* is defined as *Pitta* dominant *Tridoshaja* disease where *Vivarnata* of *Twaka* (discolouration of skin) is mainly *Pandu* (pallor/yellowish-whitish) due to *Alpa Rakta* (reduced blood) or *Vidushya Rakta* (vitiated blood). Anaemia is defined as qualitative and quantitative reduction of circulating RBC and/or the percentage of haemoglobin concentration in relation to standard age and sex. Iron deficiency anaemia is a common type of anaemia in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body's tissues. As the name implies, iron deficiency anaemia is due to insufficient iron. In women of childbearing age, the most common cause of iron deficiency anaemia is a loss of iron in the blood due to heavy menstruation or pregnancy. A poor diet or certain intestinal diseases that affect how the body absorbs iron can also cause iron deficiency anaemia.

Corresponding author:
Vartika Srivastava- MBBS, MD, Assistant Professor, Department of Pharmacology, Kalinga Institute of Medical Sciences, Bhubaneswar, Odisha
Email ID- vartika.srivastava@kims.ac.in

The state of IDA is being managed with the supplementation of external iron containing drugs for which several types of modern medicines are available in the market. These modern iron formulations contain one or the other types of iron salts such as, ferrous fumarate, ferrous sulfate, ferrous glycine sulfate, ferric ammonium citrate, ferric hydroxide polymaltose complex, iron choline citrate, iron dextran, ferrous calcium citrate, iron sorbitol citrate, colloidal iron hydroxide, ferrous gluconate, ferric hydroxide, and ferrous succinate. It has been further reported that the long-term treatment of IDA with these drugs is associated with constipation, heart burn, nausea, gastric discomfort and diarrhea.

Dhatryarishta, a non iron formulation, is indicated in *Pandu roga* by *Acharya Charaka* . As most of the Ayurvedic formulations are found effective against IDA, their usage should be fostered at all level in addition to modern allopathic medicines. This study focuses about the haematinic effect of Dhatryarista as compared to allopathic medicines available. It contains four major ingredients- amalaki, pippali, honey and sugar. Amalaki (Emblica officinalis Gaertn) has been described in Phalasava and Sarkara as a separate Asava yoni by Acharya Charaka . Asava yoni itself denotes the fermenting base for Asava-Arishta. Dhatryarishta is indicated in the context of Panduroga in Charaka Samhita Chikitsasthan.The same reference is available in Chakradatta, Bhaishajya Ratnavali, and Sahastrayogam in Arishtaprakaran.

Objectives

- To study the improvement in haemoglobin after giving dhatryarista in IDA.
- To compare the effect of Dhatryarista (in different concentrations) with standard oral formulation Ferrous sulphate in terms of haemoglobin.

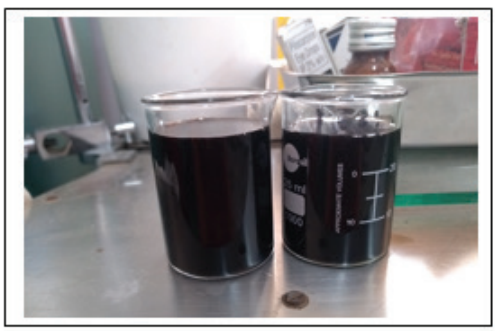
Materials and Method

The study was conducted in the animal house, located in department of pharmacology after getting approval from Institutional Animal ethics committee of KIMS, Bhubaneswar. The study period was two months (60days).

Dhatri Swarasa (Amalaki Juice), Madhu (Honey)-one-eighth of Swarasa, Krishna(Pippali) half Kudava (96 g), and Sarkara (Sugar) are the four ingredients of Dhatryarishta as per classic method.

Amalaki

Pippali



Preparation of Dhatryarista sample

Preparation of Dhatryarista sample

The normal human dose trial compounds i.e Dhatryarista is 48ml/day for an adult (Jyothi et al, RGUHS)[17]. The dose of drug is fixed by extrapolating the human dose to rats on body surface area ratio as per the table of Pagets and Barnes (1969) which will be 4.32 ml/kg body weight.

Rat dose per kg body wt= 0.018× Human dose× 5= 0.018 × 48ml × 5= 4.32 ml/kg

A. Animals required:

a. Species/common name: Wistar albino rats

b. Age/ weight: adult/ 100-200gm

c. Gender- Male

d. Number to be used- 24

e. Source of animal- Institutional Animal house, Kalinga Institute of Medical Sciences, KIIT university, Bhubaneswar, Odisha

Twenty four adult albino rats of either sex weighing 100–200 g were used for this study. The animals were allowed to acclimatize in the research laboratory for 1 week before the commencement of the study. The animals had been maintained under standard conditions (room temperature 25°C±3, humidity 35–60%, and light and dark period 12/12 h). All animals were fed with food and water ad libitum. All the animal testing were done under the approval of Institutional Animal Ethical Committee (IAEC) of KIMS, Bhubanesawar.

B. Induction of anaemia

Induction of anaemia was done was done by adding tannic acid to the basal diet of the rats. The rats were fed on the basal diet containing tannic acid for 3 weeks. 20g tannic acid/kg was added to the basal diet at the expense of the whole diet[18], which was given to all 24 rats belonging to Group I to Group IV. After 21 days, iron deficiency anaemia was induced in those rats. From day 22, Group II rats were started on standard treatment available which is ferrous sulphate, Group III were given Dhatryarista sample 1 (4.32ml/kg P.O) and Group IV were given Dhatryarista sample 2 (8.64ml/kg P.O), alongwith normal diet, for next 30 days. The blood samples were collected on day 1, day 21 and day 53.

C. Grouping of animals

Table 1: shows grouping of the animals with respective treatment group. Ferrous sulphate and two concentrations of Dhatryarista were started from day 22 after induction of anaemia in groups II, III and IV respectively.

Grouping	No of animals	Drug
Group I	6	Control - Basal diet + Tannic acid (normal diet started after day 22)
Group II	6	Ferrous sulphate (Normal diet + FeSo4 40mg/kg P.O)
Group III	6	Test group 1 (Normal diet + Sample 1-4.32ml/kg P.O)
Group IV	6	Test group 2 (Normal diet + sample 2- 8.64 ml/kg P.O)

D. Toxicity Studies

There was no mortality observed with oral administration of Dhatryarista even at the higher dose 8.64ml/kg P.O. Doubling the dose had no toxic effect on the normal behaviour of the rats. Hence, 1ml and 2ml dose per day were selected and administered.

E. Statistical analysis

All the values are expressed as a Mean ± SEM (standard error of mean). The data were analyzed by one way ANOVA and post hoc methods. using socscistatistics.com. A level of $P < 0.05$ was considered as statistically significant. A level of significance was noted and interpreted accordingly.

Observation and Results

The whole study was conducted in 24 healthy albino rats. These rats, divided from Group I to Group IV with six rats in each group, were given basal diet including tannic acid (20g/kg) for next 21 days for the induction of anaemia. From day 22, Group II rats were started on standard treatment available which is ferrous sulphate, Group III were given Dhatryarista sample 1 (4.32ml/kg P.O) and Group IV were given Dhatryarista sample 2 (8.64ml/kg P.O), along with normal diet, for next 30 days.

Blood samples were taken on day 1 and then on day 21 (after induction) and then on day 53 for checking the efficacy of the drugs provided to rats. Blood was withdrawn from retro-orbital vein of rats. Samples were added to a tube containing ethylenediaminetetraacetic acid after 4 weeks of treatment. The haemoglobin was determined at day 53rd , using an automatic blood cell counter.

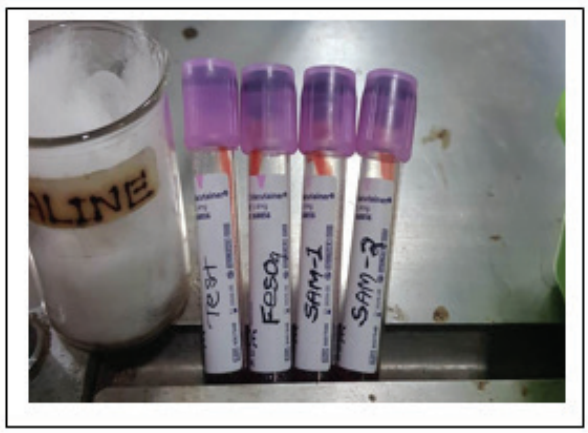


Table 2: Hb level of rats before and after induction and after 30 days of treatment. Values are expressed as mean±SD, one way ANOVA and post hoc was done, * and # shows P<0.05- statistically significant, ** and ## shows P<0.005 - statistically very significant, * indicates increase while # indicates decrease. significant difference between group IV and II.

Grouping	Day 1 Hb%	Day 21 Hb%	Day 53 Hb%
Group I	13.64 ± 0.31	8.78 ± 0.55##	9.22 ± 0.45
Group II	13.23 ± 0.71	9.28 ± 0.43##	12.74 ± 0.28**
Group III	13.44 ± 0.68	8.54 ± 0.52##	13.24 ± 0.43**
Group IV	13.25 ± 0.46	9.13 ± 0.34##	14.92 ± 0.54**^

After adding tannic acid to the diet, there was a significant decrease in haemoglobin on day 21. On applying statistics, it was observed that a significant decrease in haemoglobin were observed, when compared between day 1 and day 21 (#P<0.05- statistically significant, ##P<0.005 - statistically very significant), while significant increase in haemoglobin was observed after 30 days of administration of test and standard drug, when compared between day 21 and day 53(*P<0.05- statistically significant, **P<0.005 - statistically very significant) . The results showed that the rats of the Group II–IV have almost completely recovered at the end of two months. (Table 2). We applied Tukey HSD post hoc analysis and observed that there was significant difference between haemoglobin levels in groups II, III, IV as compared to group I on day 53, while no significant difference was observed within comparison of groups II & III as well as group III and IV. But a significant difference was noted on comparison of Group II and IV , considering that the haemoglobin levels of rats getting higher dose of Dhatryarista were more as compared to the standard drug ferrous sulphate. This implies that doubling the dose of dhatryarista produces beneficial effect instead of toxic effect.

Discussion

Iron deficiency is the most common form of nutritional deficiency. The size and number of red blood cells are reduced. There is a spectrum of iron deficiency ranging from iron depletion, which causes no physiological impairments, to iron-deficiency anemia, which affects the functioning of several organ systems. The terms anemia, iron deficiency, and iron-deficiency anemia are often used interchangeably, but are not equivalent. Anemia can only be diagnosed as irondeficiency anemia when there is additional evidence of iron deficiency. A diagnosis of iron-deficiency anemia can be made if haemoglobin concentration or hematocrit value increases after a course of therapeutic iron supplementation (Centers for Disease Control and Prevention, 1998).

Tannins are a group of compounds belonging to the phenolic class of secondary metabolites in plants. These compounds, in particular tannic acid, exhibit a wide variety of activity and physiological functions[19]. A number of adverse nutritional effects have been attributed to tannins. It has been demonstrated that feeding growing animals diets containing these compounds brings about several physiological and biochemical effects. These effects are reflected by growth inhibition, negative nitrogen balances, reduced intestinal absorption of sugars and amino acids, reduced immune response and increased liver and protein catabolism[20]. Also, foods with high tannin content inhibit iron absorption from meals[21].

Dhatryarista is a derived from amalaki which had been in use as an herbal prepartion for treatment of IDA. Amalaki was taken in 12 kg amount, *Sarkara* was added at 10% of the weight of Amalaki, that is, 1.2 kg, and honey was added one-eighth of the *Swarasa* obtained from *Amalaki*, and 48 g of *Pippali Churna* as *Prakshepa* was added (one-twenty-fifth of *Sarkara*).

Amalaki is an Amla rasa pradhana and can increase Raktha and hence in Rakthalpatha, Amla preeti is seen. It also being a rich source of Vit.C helps in absorption of iron. Hence it is used in anaemia[22] . *Amalaki* is worshipped as an auspicious fruit since ancient time and respected as a symbol of good health. The festival Amala Navami is celebrated at the begining of winter season of Hindu calender, where Amalaki tree is socially and religiously propagated among people and cultivated for promotion of good health. When the fruit is dried, the main ingredient, water, is mostly eliminated, and the remaining constituents are present in considerably larger proportions. The pulpy portion of fruit, dried and freed from the nut contains gallic acid, sugar, albumin, moisture, gum, crude cellulose. The edible fruit tissue contains protein concentration 3-fold and ascorbic acid concentration 160-fold compared to that of the apple.A research showed that 8.75 mg of natural vitamin C complex from *Amalaki* is equivalent to 100mg of the most commonly used synthetic vitamin C. *Amalaki* possesses the highest level of heat and storage stable vitamin C known to man. Phyllembin from fruit pulp is identified as ethyl gallate[23]. It has mild depressant action of CNS and spasmolytic action. The fruit also contains considerably higher concentration of most minerals and amino acids than apples.

Pipali fruits contain 1% volatile oil, resin, a waxy alkaloid, a terpenoid substance and alkaloids piperine and piperlongumine. Two new piperidine alkaloids namely pipermonaline and piperundecalidine were isolated from fruit.Dried spikes are acrid, stomachic, carminative, tonic, laxative, digestive, emollient, mild thermogenic and antiseptic. They are useful in anorexia, dyspepsia, vomiting, flatulence, colic, diarrhea, gastric

disorders and insomnia[24].

Madhu is used as an important dravya in many Ayurvedic formulations, wherein it has its own manifold pharmacological activities. It is also the most commonly used adjuvant as it acts as a suitable vehicle due to its '*Yogavahi'* (catalytic) property. Honey contains dextrose and fructose which are known as invert sugars (50-90%) and water. It also contains 0.1 - 100% of sucrose and small quantities of other carbohydrates, volatile oil, pigments and plant parts especially pollen grains. It also contains vitamin B & C. Acid constituents are Formic, Acetic, Malic, Citric, and Succinic acids. It also contains an enzyme named Invertase.It is laxative, demulcent and emollient. It possesses nutritive properties. The fatty acids present in honey stimulate peristalsis and digestion. It has beneficial effect on the digestion and appetite of those weak stomach and loose bowels. It decreases flatulence and increases general metabolism.

In present study, different doses of dhatryarista were administered in rats along with standard drug ferrous sulphate. Human equivalent dose is 48ml/day. In rats, required dose is 4.32ml/day but in this study , we are giving the higher dose so as to observe any kind of toxicity. We included 30 rats in this experiment which were divided as 6 rats in 5 groups. Blood samples were collected at Day 1 for measuring the baseline parameters. Group I rats were kept on normal basal diet while Groups II, III, IV, and V were put on basal diet including tannic acid for next 21 days. On Day 21, again blood samples were collected. From day 22, ferrous sulphate and Dhatryarista sample 1 & 2 were started in groups III, IV and V respectively for nest 30 days. Blood samples were again collected on day 53. It was seen that the recovery was progressive such that after 4 weeks of continuous treatment, the haemoglobin concentration was higher in the treated groups than in the control groups. It was also observed that the recovery of the treated groups was dose related with the highest dose of 8.64 ml/kg affecting the highest change.

Animals are similar to humans in terms of reduction of haemoglobin, which is indicative of anaemia[25]. In IDA, all the parameters are markedly reduced especially haemoglobin. Dhatryarista has shown to increase the red cell indices in drug sample groups without causing any signs of toxixity.

Conclusion

The administration of tannic acid to rats caused anaemia characterized by reducing hematological parameters. The oral administration of Dhatryarista in the dose of 4.32ml/kg/day P.O and 8.64ml/kg/day P.O significantly increased haemoglobin level. And also, the results demonstrated that higher doses of the plant extract didnot show any signs of acute toxicity in animals. This result supports the traditional use of dhatryarista in the treatment of anemia.

Acknowledgement: We are thankful to the staff and technicians of department of Pharmacology who were constantly involved with us in this project.

Conflict of Interest: Nil

Funding: Nil

References

1. Sen SK. Essentials of Clinical Diagnosis. 7th ed. Calcutta: The standard Book House; 1994. p. 14.
2. Acharya VaidyaJadavaji Trikamji., editor. Chakrapanidatta's Commentary.Varanasi: Chaukhambha Sanskrit Sansthan; Reprint; 2004. Charaka's Charaka Samhita; p. 134. Su. 25/49.
3. Acharya VaidyaJadavaji Trikamji., editor. Chakrapanidatta's Commentary.Varanasi: Chaukhambha Sanskrit Sansthan; Reprint; 2004. Charaka's Charaka Samhita; p. 531. Chi.16/111-3.
4. Chaukhambha Sanskrit Sansthan. 49-51. Vol. 8. Varanasi: Panduroga Chikitsa Prakarana; Reprint; 2005. Chakrapanidatta's Chakradatta by Indradev Tripathi; p. 83.
5. Bhaishajya Ratnavali Sri Govindas's. In: Chaukhambha Sanskrit Sansthan. sixth edition. 120-1. Shastri Kaviraj Sri Ambikadatta., editor. Vol. 12. Varanasi: PandurogaChikitsaPrakarana; 2002. p. 275
6. Chaukhambha Sanskrit Prathisthan. Delhi: Arishta Prakaran; Reprint; 2007. Sahastrayogam by Dr. Ramnivas Sharma and Dr. Surendra Sharma; p. 167.
7. Jyothi KB 2010 A Clinical Study On The Efficacy Of Dhatryarishta In Pandu W.S.R To Iron Deficiency Anemi; Rajiv Gandhi University of health sciences
8. Kaosar A, Kazuki S, Satoshi I, Hiroshi H. 2004. Effect of ingesting tannic acid on the absorption of iron, but not of zinc, copper and manganese by rats. Biosci. Biotechnol, Biochem., (68)3: 584-592.
9. Carbonaro M, Grant G, Pustai A. 2001. Evalution

of polyphenol bioavailability in rat small intestine. Eur. J. Nutr., 40 (2): 84-90.

10. Marzo F, Urdaneta E, Santidrian S. 2002. Liver proteolytic activity in tannic acid-fed birds. Poultry Sci., 81: 92-94.
11. South PK, Miller DD. 1998. Iron binding by tannic acid: Effects of selected ligands. Food Chem., 63(2): 167-172.
12. Ram Karan Sharma, Vaidya Bhagavan Dash. Charaka Samhita translation. Varanasi; Chaukamba Sanskrit Series; 2002
13. Ayurveda for Promotion of Health." Journal of Ayurveda, vol. 3. Jan-March 1985.
14. The useful plants of India; with notices of their chief medicinal value in commerce, medicine and the arts.
15. Ashaolu JO, Ukwenya VO, Okonoboh AB, Ghazal OK, Jimoh AA. Effect of monosodium glutamate on hematological parameters in wistar rats. Int J Med Med Sci 2011;3:219-22.

Klippel-Trenaunay Syndrome: A Clinical Case Report

Vikramjot Singh[1], Gauri Chauhan[2], A.K Bhardwaj[3], Gurdeep Singh Dhanja[4]

[1]Junior Resident, [2]Assistant Professor, [3]Professor And Head, [4]Professor, *MAHARISHI Markendeshwar Institute of Medical Sciences, MMDU, Mullana Ambala, Haryana*

Abstract

KTS is a rare congenital disorder. We present a 14 year old boy with the characteristics corresponding to the same i.e. venous varicosities, capillary malformation and limb hypertrophy. The patient also had other bony deformities like pectus carinatum, thoracolumbar scoliosis and campylodactyly. Such lumbar and digit deformities have been reported earlier also in patients with KTS. Patient was managed by a multidisciplinary approach, although a good follow up was not assured by the parents.

Keywords : *KTS, varicosities, limb hypertrophy, scoliosis, campylodactyly, Pectus carinatum.*

Introduction

Klippel-Trenaunay Syndrome (KTS), a syndrome of capillary-lymphatic-venous malformation associated with soft tissue and skeletal hypertrophy. It is a rare congenital disorder with a very low incidence of about 1:100,000. It has no predilection for gender, race, or geographical area and occurs sporadically [(1)]. It manifests as a triad of cutaneous capillary malformations, venous varicosities, and hypertrophy of the osseous and/or soft tissue of the extremities [(2-6)]. Vascular malformations are always present and usually (but not always) affect only one extremity, particularly the lower extremities [(7)].

Case Report

A 14 years old male presented with complaint of intermittent, low-grade fever from past 1 month which was not associated with chills or rigors. History of left lower limb painful swelling which progresses while doing daily activities and regresses while lying down or after elevation of the legs and also abnormal shape of chest which is progressing with age. The developmental growth was normal at each age range. There was no history of similar kind of illness in the family. On examination, the vitals of the patient were stable. The blood pressure of upper limbs and lower limbs were compared which did not show any variation. In anthropometric examination; weight, height and body mass index of the patient were 29.1 kg (-3.53 z), 144 cm (-2.38 z) and 14.0 kg/m^2 (-3.34 z) respectively. The arm span was 163 cm (figure 1) and arm span to height ratio was 1.13 and the upper segment to lower segment ratio was 0.8. The deformities seen were Pectus Carinatum (figure 2), Thoracolumbar scoliosis and Camptodactyly in little finger of both hands (left > right) (figure 3). Also there was increase in size/ diameter/mass of the left lower limb. His right leg was 6 cm longer than the left leg. There were painful venous varicosities on left lower limbs with gross tortousity of veins (figure 4). Visible pulsations were seen over the entire pericardium. However, apex beat was heard in 5ht intercostal space in mid clavicular line. On auscultation, heart sound were normal with no murmur. Neurological examination was intact. There was no respiratory or abdominal abnormalities. On Radiological investigations, thoracolumbar scoliosis with cardiomegaly on anterio-posterior and lateral chest x-rays (figure 5 and 6). Ultrasound of left leg showed extensive varicosities with many of them thrombosed with ectasia of venous channels more so in mid and lower leg with ectasia of superficial femoral vein in distal thigh. A definitive diagnosis with genetic testing and extensive family history and examination was not possible due to financial constrains and a poor follow up by the patient.

Corresponding Author:
Dr Gauri Chauhan
Assistant Professor, Depatment Of Pediatrics
Maharishi Markendeshwar Institute Of Medical Sciences, Mmdu, Mullana, Ambala, Haryana-133207,
Contact Number: 8396923736
Email Id: Pgfinalgauri@Gmail.com

Discussion

KTWS is a combination of cutaneous angiomatosis, varicose veins, and enlargement of soft tissue first described in 1900. The KTWS occurs mostly sporadically, affecting males and females in equal numbers in about 1/100,000 people [8].

Limb hypertrophy is often present at birth or during infancy and continues to grow until the child stops growing, although it may continue to progress over time. The hypertrophy is a result of soft tissue and/or bony overgrowth or lymphatic and venous malformations [9, 10]. Although any part of the body can be involved, the most commonly affected sites are the lower extremities [11].

This patient has camptodactyly. Various other limb anomalies including macrodactyly, syndactyly, clinodactyly, ectrodactyly, and congenital hip dislocation have been reported in association with KTS [10].

The exact cause and mechanism of scoliosis in the patient in this study is unknown. It may be secondary to limb length discrepancy (about 6 cm), striking pelvic obliquity and long-term claudication.

A color Doppler ultrasound should be performed for prenatal diagnosis of limb hypertrophy and to assess the underlying cause of any cystic lesion. Most patients present with the complete clinical triad, with port wine stains and vascular malformations first appearing at birth and varicose veins usually appearing during infancy and progressing in adolescence [9]. Although such couldn't be assumed in our case.

KTS can cause significant morbidity from the vascular anomalies including deep venous thrombosis, bleeding, pulmonary embolism, stasis dermatitis, cellulitis, and limb enlargement that may require amputation. Patients also suffer from scoliosis and gait abnormalities related to limb hypertrophy. Therefore, KTS must be suspected, recognized, and appropriately managed in all infants with capillary malformations involving one or more extremity at birth [11].

In an adolescent, vitamin D deficiency and iron-deficiency anemia are quite uncommon. In a study by Jiliang Zhai et al,[12] serum ferritin level were found extremely low in a patient of Klippel-Trenaunay Syndrome and a severe form of iron deficiency anemia was noticed in the patient. Elevated D-Dimer were probably due to extensive venous malformations. Previous studies found that patients with large venous malformations has chronic low-grade consumptive coagulopathy [13]. Mazoyer [14] proposed that the coagulopathy among patients with venous malformations was a result of localized intravascular coagulation.

There is currently no cure or definitive treatment for KTS. However, management should be multidisciplinary and aim to reduce the symptoms and complications of the disease. For instance, compression stockings can be used for varicose veins, and heel inserts can be used and are usually sufficient for leg length discrepancies of 1.5 cm or less, although surgical closure of the growth plate at the knee is sometimes needed to equalize the leg length [15].

Conclusion

Here we present a case of KTS with a unique constellation of signs: unilateral limb involvement and campylodactyly. This case not only serves as a review of the atypical features of the syndrome, but also highlights that patients must be followed up on a regular basis by a multidisciplinary team and more research is required for proper diagnosis and treatment guidelines.

Figure 1: Arm span of the patient was 163 cms.

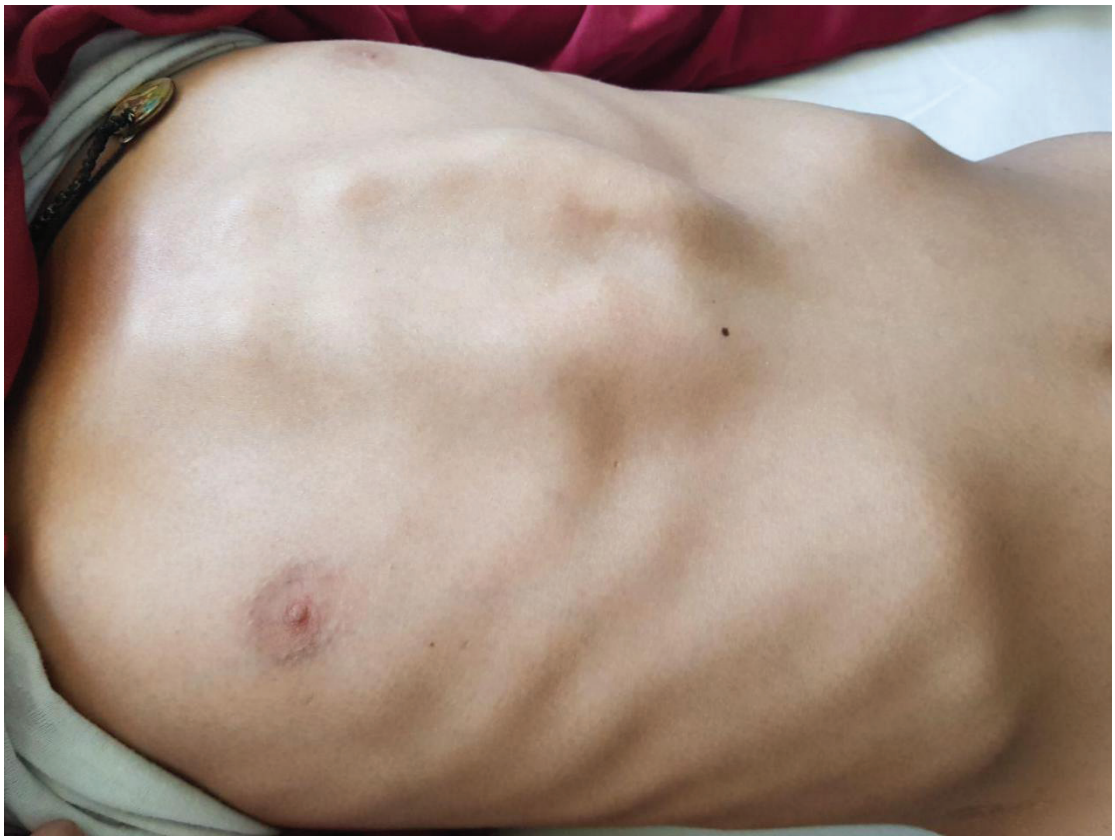


Figure 2: Pectus Carinatum can be seen in this with protrusion of the sternum.

Figure 3: Camptodactyly can be seen in little fingers bilaterally (Left> Right)

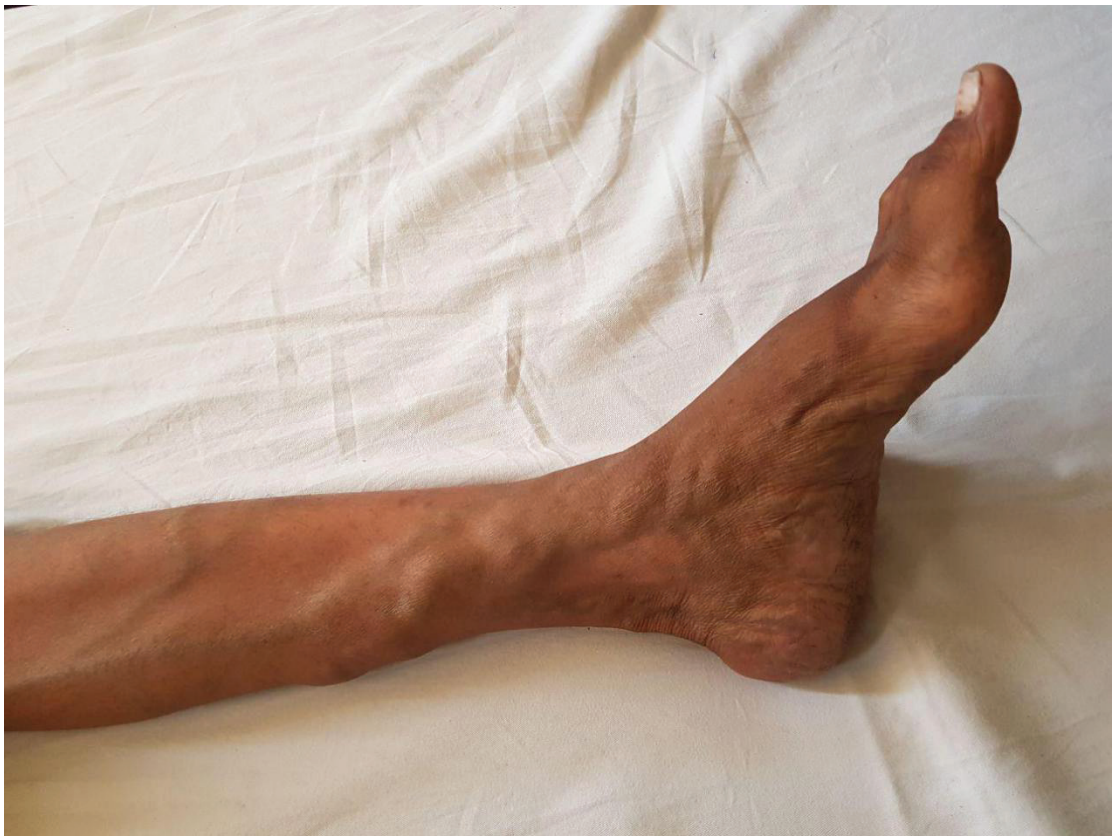


Figure 4: Visible Venous varicosities in lower limbs with grossly tortous veins

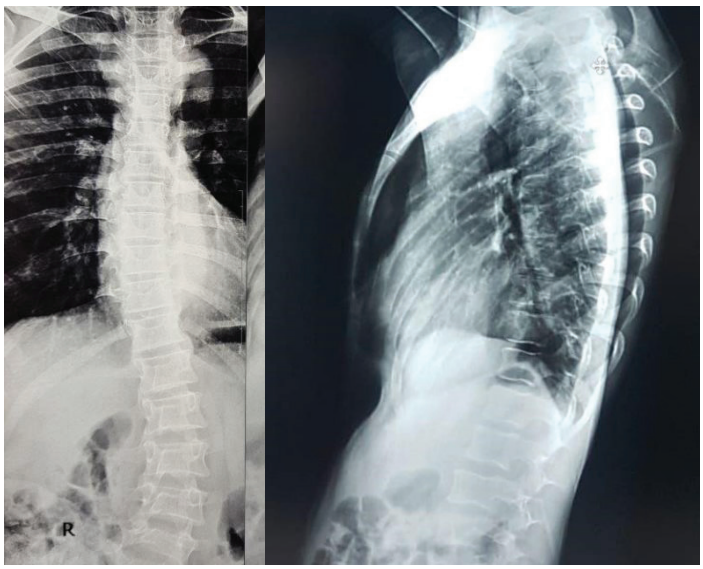


Figure 5&6: Xray chest (Anterioposterior and Lateral view) showing Thoracolumbar scoliosis with cardiomegaly

Bibliography

1. Lacerda Lda S, Alves UD, Zanier JF, Machado DC, Camilo GB, Lopes AJ. Differential diagnoses of overgrowth syndromes: the most important clinical and radiological disease manifestations. Radiology research and practice. 2014;2014:947451.
2. Oda K, Morimoto D, Kim K, Yui K, Kitamura T, Morita A. Spinal Cavernous Angioma Associated with Klippel-Trenaunay-Weber Syndrome: Case Report and Literature Review. World neurosurgery. 2018;109:333-337.

3. Wang SK, Drucker NA, Gupta AK, Marshalleck FE, Dalsing MC. Diagnosis and management of the venous malformations of Klippel-Trenaunay syndrome. J Vasc Surg Venous Lymphat Disord. 2017;5(4):587-595.
4. Sung HM, Chung HY, Lee SJ, et al. Clinical Experience of the Klippel-Trenaunay Syndrome. Archives of plastic surgery. 2015;42(5):552-558
5. Gloviczki P, Driscoll DJ. Klippel-Trenaunay syndrome: current management. Phlebology. 2007;22(6):291-298.
6. Zhai J, Zhong M-E, Shen J, Tan H, Li Z. Kyphoscoliosis with Klippel-Trenaunay syndrome: a case report and literature review. BMC Musculoskeletal Disorders. 2019;20(1):10
7. Garzon MC, Huang JT, Enjolras O, Frieden IJ. Vascular malformations. Part II: associated syndromes. J Am Acad Dermatol. 2007;56(4):541–64.
8. Ogden CW, Jackson JE. The Klippel-Trenaunay syndrome associated with renal artery aneurysm. Br J Urol 1993;71:617-8
9. Garzon MC, Huang JT, Enjolras O, Frieden IJ. Vascular malformations. Part II: associated syndromes. J Am Acad Dermatol. 2007;56(4):541–64.
10. Redondo P, Bastarrika G, Aguado L, Martinez-Cuesta A, Sierra A, Cabrera J, Alonso-Burgos A. Foot or hand malformations related to deep venous system anomalies of the lower limb in Klippel-Trenaunay syndrome. J Am Acad Dermatol. 2009;61(4):621–8.
11. Kihiczak GG, Meine JG, Schwartz RA, Janniger CK. Klippel-Trenaunay syndrome: a multisystem disorder possibly resulting from a pathogenic gene for vascular and tissue overgrowth. Int J Dermatol. 2006;45(8):883–90.
12. Zhai J, Zhong ME, Shen J, Tan H, Li Z. Kyphoscoliosis with Klippel-Trenaunay syndrome: a case report and literature review. BMC musculoskeletal disorders. 2019 Dec;20(1):10.
13. Huiras EE, Barnes CJ, Eichenfield LF, Pelech AN, Drolet BA. Pulmonary thromboembolism associated with Klippel-Trenaunay syndrome. Pediatrics. 2005;116(4):e596–600.
14. Mazoyer EEO, Laurian C, Houdart E, Drouet L. Coagulation abnormalities associated with extensive venous malformations of the limbs: differentiation from Kasabach-Merritt syndrome. Clin Lab Haematol. 2002;24:243–51
15. Al-Najjar RM, Fonseca R. An atypical case of Klippel-Trenaunay syndrome presenting with crossed-bilateral limb hypertrophy and postaxial polydactyly: a case report. BMC Pediatr. 2019 Apr;19(1):95

Effect of Physical Therapy with Music Therapy on Gait, Balance and Quality of Life In Parkinson's Disease

Virali Shah[1], Ujwal Yeole[2], Saurabhi S Purandare[3], Khushbu R Vishwakarma[3]

[1]Assistant professor, [2]Associate Professor and Principal, [3]Intern BPT, [4]Intern BPT, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune, Maharashtra India

Abstract

Background: Parkinson's disease is a chronic, progressive and neurodegenerative disorder. A range of motor and non-motor symptoms may cause postural instability and impaired functional mobility often leading to falls and decrease quality of life. Physical therapy with Music therapy may be promising intervention to improve gait and related activities in Parkinson's disease. **Methodology:** Permission was taken from institutional ethical committee. An experimental study was conducted on 30 individual selected on the basis of inclusion and exclusion criteria. Randomized allocation of the participants was done into experimental (Physical therapy with music therapy) and control (Conventional physical therapy) groups. Participants were evaluated pre and post intervention for gait using Dynamic gait index (DGI), balance using Time up and go (TUG) and quality of Life using Parkinson's disease quality of life 39 (PDQ 39) questionnaire. A six weeks intervention program was given to the patients for four times per week. **Result:** Data was analyzed using Shapiro-wilk test accordingly parametric or non- parametric test were performed. Between groups comparisons showed extremely significant ($p<0.001$) improvement on DGI (4±1.363), TUG test (2±0.92) and PDQ 39 questionnaire (45.07±10.62) in experimental group as compare to DGI (2.33±1.496), TUG test (0.933±0.70) and PDQ 39 questionnaire (42.53±10.56) in control group. **Conclusion:** The study concluded that physical therapy with Music therapy is effective in improving gait, balance and quality of Life in patients with Parkinson's disease

Keywords: *Parkinson's disease (PD), Physical therapy with music therapy, Quality of life (QOL), balance, Gait.*

Introduction

Parkinson's disease has been known since biblical times but the symptoms was formally described by James Parkinson and termed 'the shaking palsy.[1] Parkinson's disease is chronic, progressive and degenerative disorder of nervous system characterized by large number of motor and non-motor features. It is characterized by the cardinal features of rigidity, bradykinesia, tremor and postural instability.[2] Parkinson's disease is a second most common neuro degenerative disorder; that affects more than 1.5% of the population above the age group of 60 years and 5% above the age group of 80 years. Based on this in India, approximately 0.32 million individual suffering from PD.[3,4].

The causes of the Parkinson's disease are either genetic or environmental or may be both factors influence the disease.[2] The potential risk factors are age, gender, head injury, area of residence, occupation, pesticide exposure, exposure to metals and genetic predisposition. The term parkinsonism is used to describe a group of disorder with primary disturbance in dopamine system of basal ganglia (BG).[2,5]

Primary motor symptoms of Parkinson's disease are rigidity, bradykinesia, tremor and postural instability. Non motor symptoms include mood disorder, orthostatic hypertension, bowel and bladder problems, integumentary changes, difficulty in speaking & swallowing and

Corresponding Author
Dr.Virali Shah
Department of physiotherapy,
Tilak Maharashtra Vidyapeeth, Pune 411037,
Maharashtra , India.
Email id- viralimagiyashah@gmail.com
Contact no.-9638958783

cognitive problems etc.[2] A range of motor and non-motor symptoms have severe consequences may cause postural instability and impaired functional mobility often leading to falls and decrease quality of life.[6]

Modern management of Parkinson's disease aims to obtain symptoms control, to reduce clinical disability and to improve quality of life. Music acts as a specific stimulus to obtain motor and emotional responses by combining movement and stimulation of different sensory pathways.[7] According to research study Music therapy improves the cognitive function, reduce psychological and behavioral disturbances related to neurological disorder that promote functional recovery and quality of life of patients.[3] So we explored Music therapy as a method for inclusion in Parkinson's disease rehabilitation programs and studying their effect on gait, balance and quality of life.

Method

An Experimental study was carried out on 30 Parkinson's disease patients taken from various neuro rehabilitation centers. Patients were selected according to the inclusion and exclusion criteria. Inclusion criteria's were patients diagnosed with idiopathic Parkinson's disease, both male and female, have to be responsive to levodopa therapy or other dopaminergic treatment, Age limit: 40 to 80 years, Modified Hoehn and Yahr stage 2, 2.5 and 3, Berg Balance score

>20. Patient were excluded based on the following criteria such as patient having secondary parkinsonism, severe sensory deficits, disease affecting movement (other than Parkinson's disease), patients having any mental health issue due to which assessment of patient becomes difficult, any recent history of musculoskeletal or cardiac disorder, any recent surgical history. The participants were assessed using DGI, TUG test and PDQ 39 questioner for gait, balance and QOL respectively before the intervention program and were divided into Experimental and Control Group by random allocation using envelope method.

Procedure

Ethical clearance was taken from Institutional Ethical Committee and Participants were selected according to inclusion and exclusion criteria. the aims, objectives and method of study was explained to the participants and written consent was filled. Both of the groups received treatment for duration of 60 minutes with appropriate rest period as required. Number of treatment sessions was 4 times/week for 6 weeks.

Experimental group: Physical therapy with Music therapy.

Each session consist of warm up period, workout session and cool down period. Warm period were included choral singing and bilateral upper extremity movement in sitting. Workout session were included passive stretching of major muscle group and strength training; while these exercises melodic instrumental music was played. Marching music was played during standing and marching activity. During gait training Waltz rhythmic music was played. Modify tap dance music was played during balance training. Cool down period was included breathing exercise with om music and fine motor movement on rocking chair. Exercises were given according to the need of patients. Rest period were also given to the patient if they required.

Control group: Conventional Physical therapy.

Each Session consist of warm up period, workout session and cool down period. Warm period were included active free movements in sitting, and bilateral upper extremity pattern to facilitate trunk rotation in sitting. Workout session were included passive stretching of major muscle group, strength training, active range of motion exercises, and wand exercises. Standing and marching activity, balance and gait training. Cool down period was included breathing exercise and fine motor movement on rocking chair. Exercises were given according to the requirement of patients. Rest period were also given to the patient if they require.

Result

Table 1: Baseline Demographic Data

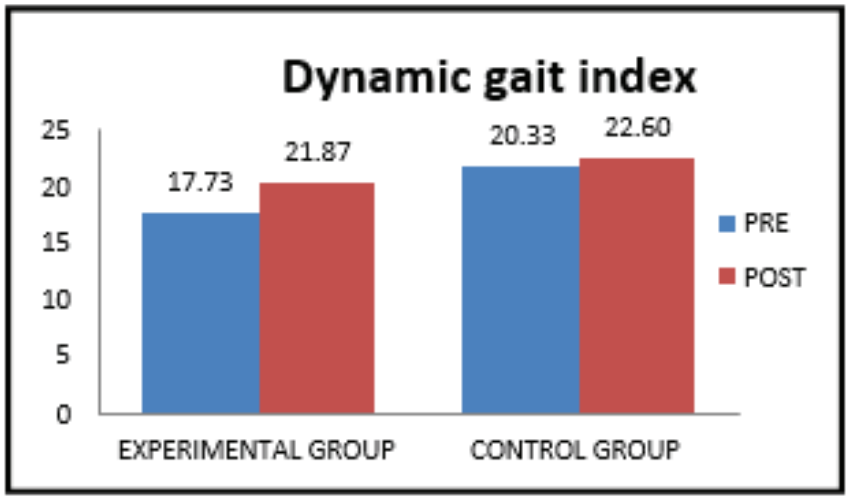
Demographic Data	**Experimental group Mean± SD**	**Control group Mean± SD**	**P value**
Age (years)	66.98±5.40	68.78±4.76	0.39
Male	11(73%)	12(80%)	0.32
Female	4(27%)	3(20%)	0.67
Parkinson's diagnosed since (years)	2±1.51	3±1.58	0.34

Table 2: Comparison of all outcome measures within and between experimental group and control group

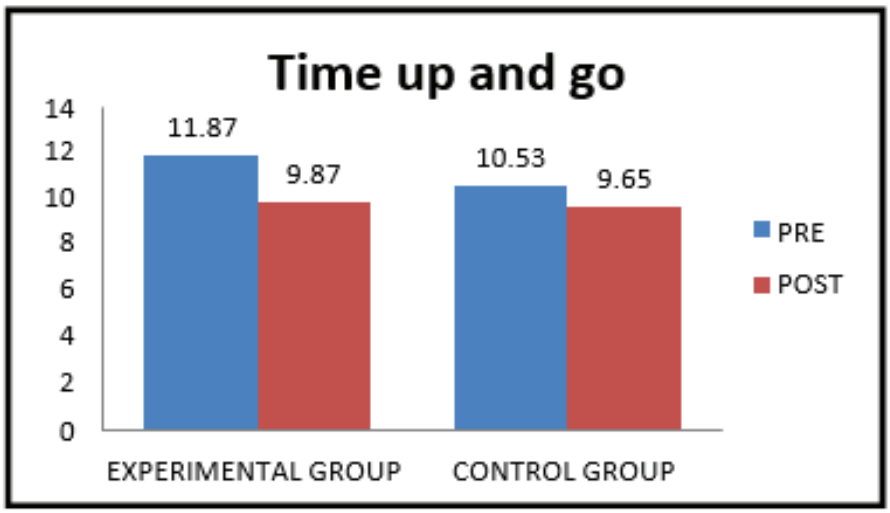
Outcome Measures		Experimental group Mean± SD	Control group Mean± SD	P value
Dynamic gait index	Pre	17.73±3.23	20.33±4.25	0.37
	Post	21.87±3.81	22.6±3.43	
	P value	0.0001	0.0001	
	Pre and post difference	4±1.36	2.33±1.49	0.003
Time up and go (second)	Pre	11.87±1.40	10.53±1.40	0.27
	Post	9.86±1.64	9.6±1.59	
	P value	0.0001	0.0001	
	Pre and post difference	2±0.92	0.93±0.70	0.001
PDQ 39	Pre	137.7±10.94	136.7±10.98	0.67
	Post	92.67±6.69	94.13±7.17	
	P value	0.0001	0.0001	
	Pre and post difference	45.07±10.62	42.53±10.56	0.005

Paired t- test was used for pre-test and post-test analysis.

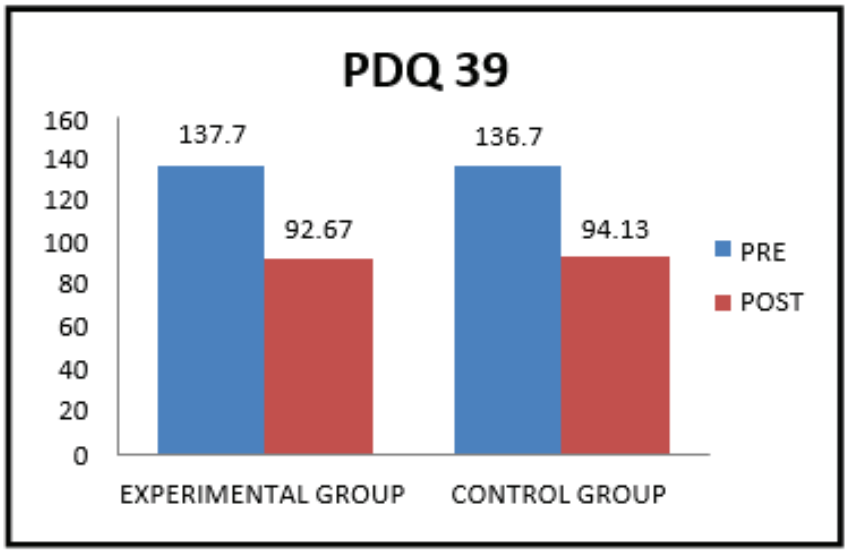
Unpaired t-test was used for comparison of pretest and posttest differences in all outcome measures between experimental and control group



Graph 1: Comparison between pre and posttest values of DGI in experimental and control group



Graph 2: Comparison of pre and posttest values of Time up and go score in experimental group and control group



Graph 3: Comparison of pre and posttest values of PDQ 39 questionnaire in experimental and control group

Discussion

The aim of the research was to study the effect Physical therapy with music therapy on gait balance and quality of life in patients with Parkinson's disease. Parkinson's disease (PD) is a second most common degenerative disorder of nervous system characterized by large number of motor and non-motor symptoms may have severe consequences for functioning of patients, affecting their activities of daily living and quality of life.[4]

Graph 1 and 2 show there is more significant improvement on dynamic gait index and time up and go test in individual who were undergoing physical therapy with music therapy as compare to conventional physical therapy. A similar study was carried out by Claudio P. et al in 2000, to study active music therapy in PD on emotional status, gait, balance and QOL, concluded that music improves emotional status, rhythmic limb movements, gait and freezing in patients with PD.[5]

It is difficult to determine the underlying mechanisms for improvements in gait and dynamic balance which reduces risk of fall in PD patients. Musical rhythm acts as template for organization of series of active movements, as well as reduces cognitive issues that affect motor performance and emotional state.[8] It naturally combines cognitive movement strategies, cueing techniques, balance exercises and physical activity while focusing on the enjoyment of moving on music instead of the current mobility limitations of the patient. Motor facilitation in response to music therapy may be based on emotional reactions momentarily activating the cortical basal ganglia motor loop, the circuit which is primarily affected in PD.[7] Music helps in movement facilitation, coordination and synchronization of active movement, improving emotional and mood state, that reduces clinical symptoms and improve their gait and balance.[6]

In our study Graph 3 show there is more significant improvement on PDQ 39 questionnaire in experimental group as compare to control group. It shows more significant improvement in quality of life in individuals who were undergoing Physical therapy with Music with therapy as compare to conventional physical therapy. Another analogous study was performed by M.J. de Dreua et al in 2008, who concluded that Music with movement therapy helps patients to Imagine and engaging in multiple activities which helps in improving motor symptoms in patients with Parkinson's disease. Mindful active ROM exercises program help in improving abilities of individuals and in improving QOL of Parkinson's disease.[6]

A possible explanation for this result may be Physical therapy serve as reinforcement of the

motor program, but this type of intervention is usually lacking in the motivational and emotional spheres.[9] So it has little influence on mood and emotional state. These psychosocial variables such as emotional state or psychosocial stress, strongly influence abnormalities in gait, posture and other motor performance, which affect their functional, emotional and social aspect of patient's life.[10] Music such as rhythm, pitch & timbre has been shown to relax and reduce anxiety, modifying release of stress hormones, improve cardiac function and respiratory pattern. It also promotes socialization, involvement with the environment, expression of feeling, awareness and responsiveness.[7] Hence music act as specific stimuli to increase motivation, reduce psychosocial stress and improve mood state which ultimately improve their QOL.

Conclusion

The study concluded that physical therapy with music therapy is effective in improving Gait, Balance and Quality of Life in patients with Parkinson's disease.

Conflict of Interest : There is no conflict of interest

Source of Funding : No Funding

References

1. G. Nicholson ACP, G. M. Hall. Parkinson's disease and anaesthesia. British Journal of Anaesthesia 2002;89(6):904.
2. Susan B. O'Sullivan, Thomas J. Schmitz , George D. Fulk, Parkinson's disease, physical rehabilitation ,pg. no807.
3. G. S. Kadakol SSK, G. M. Wali, Pramod B. Gai. Molecular analysis of α-synuclein gene in Parkinson's disease in North Karnataka, India. 2014;62(2):149-152.
4. Tamara Pringsheim NJ, Alexandra Frolkis ,Thomas D.L. Steeves The prevalence of Parkinson's disease: A systematic review and meta-analysis. International Parkinson Movement Disorder Society. 2014;29(13):1583-1590.
5. Tanner CM. Environmental Factors and Parkinson's. Parkinson's Disease Foundation A

Division of the Parkinson's Foundation 2017.

6. M.J. de Dreua, A.S.D. van der Wilka A meta-analysis of the effects of music-based movement therapy on walking ability, balance and quality of life Parkinsonism and Related Disorders 18S1 (2012) S114–S119.
7. Claudio Pacchetti, Md Active Music Therapy in Parkinson's Disease: An Integrative Method for Motor and Emotional Rehabilitation Psychosomatic Medicine 62:386–393 (2000)
8. Raglio A, Attardo L, Gontero G, Rollino S, Groppo E, Granieri E. Effects of music and music therapy on mood in neurological patients. *World J Psychiatr* 2015; 5(1): 68-78]
9. TS Voss, JJ Elm,, CL Wielinski, Aminoff, ,D Bandyopadhyay, KL Chou, LR Sudarsky, BC Tilley Fall Frequency and Risk Assessment in Early Parkinson's Disease.
10. Wood BH et al in year 2002 Journal of neurology, neurosurgery & psychiatry 72 (6), 721– 725, 2002.

Role of DLCO in differentiation or subtyping of obstructive lung disease beyond spirometry and CT scan.

Vishvdeep Saini[1], Sameer Singhal[2], Sukhjinder Pal Singh[3], Achchhar Singh[4], Aditi Gupta[5]

[1]Junior Resident, [2]Professor, [3]Senior Resident, [4]Associate Professor,[5]Assistant Professor, Department of Respiratory Medicine, MMIMSR, M.M Deemed to be University, Mullana, Ambala, Haryana, India

Abstract

Introduction: Spirometry helps us to differentiate between obstructive and restrictive disease, body plethysmography tells about lung volumes and DLCO about diffusion defect. Determining which tests to do depends on the clinical question to be answered i.e. whether test is being done to diagnose a disease or for evaluation for lung surgery or some other reason.

Material & Methods: 46 patients coming to department of respiratory medicine, who were diagnosed with obstructive lung disease by PFT as per GOLD guidelineswere considered for the study. Chest X-ray and CT chest were also done.Then DLCO was performed in every patient. Single breath hold method was used in the study.The report of the DLCO was interpreted according tothe American Thoracic Society/European Respiratory Society statement on PFT interpretation.

Results: Male preponderance was seen in study cases with 65.2% males to 34.8% females. Mean age of the study group was 54.39 years with most cases (18) from 31-50 years of age group. Most common diagnosis was COPD emphysema (22) followed by chronic bronchitis (12), bronchial asthma (10) and bronchiectasis (2). Among obstructive lung diseases, B. asthma had the highest mean DLCO percentage predicted of 102.20 ± 14.36 followed by COPD-Bronchitis (76.33±5.57), COPD–Emphysema (37.80±13.41) and bronchiectasis (62±4.48).

Conclusion: DLCO can be helpful beyond spirometry in classification of obstructive lung diseases. DLCO values in COPD Emphysema variant are decreased, COPD bronchitis variant remains normal or slightly reduced and asthma either normal or increased. So, DLCO can help in differentiation or sub categorization of obstructive disease more than spirometry.

Key Words: *DLCO, Obstructive diseases, Lung function test, COPD, Emphysema, Bronchial Asthma.*

Introduction

Carbon monoxide diffusing capacity is the least understood pulmonary function test in clinical practice worldwide, even among experienced pulmonologists. There are lot of different tests used for evaluation of lung functions. These tests may be performed individually or in combination with other tests.Pulmonary function test report includes spirometry, diffusing capacity, lung volumes and airway resistance(R_{aw}) measurements in a commonly used format. Spirometry help us to differentiate between obstructive and restrictive disease, body plethysmography tells about lung volumes and DLCO about diffusion defect. Determining which tests to do depends on the clinical question to be answered i.e. whether test is being done to diagnose a disease or for evaluation for lung surgery or some other reason. Measuring the diffusing capacity of lungs for carbon monoxide is 2nd most important pulmonary function test that is done after spirometry.

The single breath test of carbon monoxide (CO) uptake has a long history, from its birth (Kroghand Krogh, 1909)[1] to the first publication by Ogilvie et aldescribing a standardized technique for the diffusingcapacity measurement (DLCO) in 1957.[2] The DLCO was devised originally as a physiological tool to test the notion that the lung, like the swim bladder of some deep-sea fish, could secrete oxygen against the normal tension gradient provided by inspired air by Bohr in 1900 although this

notion is now long abandoned.

As a clinical test DLCO was introduced in 1915 by Marie Krogh, but the measurement never caught on because methods of measuring carbon monoxide were so cumbersome.[3]But now a day's single breath technique is in common use. DLCO measures the transfer of a diffusion-limited gas (CO) across the alveolocapillary membranes.

DLCO is increased in the circumstanceswhen pulmonary capillaries are recruited, as occurs during exercise**,** during a Mueller (reverse Valsalva) manoeuvre**,** pulmonary hemorrhage**,** polycythemia,obesity, asthma etc. DLCO is decreased in cases of **l**ung resection, pulmonary emphysema affects capillary or alveolar bed, pulmonary vascular disease including PAH and chronic venous thromboembolism**,** interstitial lung diseases**,** anemia**,** drugs induced fibrosis e.g. bleomycin, amiodarone**,** pulmonary lymphangitic carcinomatosis

Material and Method

23 patients coming to department of respiratory medicine of MMIMSR, who were diagnosed with obstructive lung disease by PFT, Chest X-ray or CT chest, were considered for the study. At baseline, patient's medical history was recorded and thorough physical examination was done. The medical history chiefly included history of symptoms related to respiratory system, namely shortness of breath, cough, weight loss, fatigue, expectoration and any other symptom related to other systems. Obstructive disease was categorized as post-bronchodilator FEV1/FVC <0.70 for COPD and post bronchodilator change in FEV1 by >12% and 200ml in case of Bronchial asthma.Chronic bronchitisis defined clinically as the presence of a chronic productive cough for 3 months during each of 2 consecutive years after excluding other causes of cough. Then DLCO was performed in every patient. Single breath hold method was used in the study.The report of the DLCO was interpreted according tothe American Thoracic Society/European Respiratory Society statement on PFT interpretation and is as follows – normal - >80% predicted DLCO, mild reduction - 79% to 60% of predicted DLCO, moderate reduction - 59% to 40% of predicted DLCO, severe reduction - < 40% of predicted DLCO.

In this present study we aimed to find out the importance of DLCO in differentiation of obstructive disease beyond spirometry and CT evidence as some of the COPD patients may also show post-bronchodilator reversibility.

Results

Male preponderance was seen in study cases with 65.2% males to 34.8% females. Mean age of the study group was 54.39 years with most cases (18) from 31-50 years of age group**.** Most common diagnosis was COPD emphysema (22) followed by chronic bronchitis (12), bronchial asthma (10) and bronchiectasis (2). 14 (30.4%) patients were smokers, 12 (26.1%) were non-smokers and 20 (43.5%) patients were ex-smokers. Among obstructive lung diseases, B. asthma had the highest mean DLCO percentage predicted of 102.20± 14.36 followed by COPD-Bronchitis (76.33±5.57), COPD–Emphysema (37.80±13.41) and bronchiectasis (62±4.48).

Table 1. Distribution of study cases as per Diagnosis

Diagnosis	**N**	**%**
Chronic Obstructive Pulmonary Disease – Emphysema	22	47.82%
Chronic Obstructive Pulmonary Disease – Bronchitis	12	26.08%
Bronchial Asthma	10	21.73%
Bronchiectasis	2	04.34%
TOTAL	46	100%

Table 2– DLCO value in Obstructive lung disease

	N	Mean	SD
B. Asthma	10	102.2	14.32
COPD – E	22	37.80	13.41
COPD – B	12	76.33	5.57
Bronchiectasis	2	62	4.48
Total	46	62.39	29.44

Discussion

DL_{CO} measurement is very reliable and sensitive. DL_{CO} is determined by the amount of blood recruited in thealveolar capillary bed and the alveolo-capillary surfaceavailable for diffusion.

The decrease in DL_{CO} is probably more closely related to the loss of lung volume, alveolar surface area, or capillary bed than to the thickening of the alveolocapillarymembranes. DLCO also decreases when there is loss of lung tissue or replacement of normal parenchyma by space-occupying lesions such as tumours. DLCO may also be decreased in pulmonary oedema as in congestive heart failure. Surgical lung resection for cancer or other reasons also reduce DLCO except in LVRS and bullectomy because the resected areas generally have little to no blood flow.

In acute and chronic obstructive lung disease also DLCO may be decreased. But other obstructive diseases (e.g., chronic bronchitis, asthma) may not reduce DLCO unless they result in markedly abnormal patterns.Some asthmatic patients may have an increased DLCO, but the cause is not completely understood.

Obstructive lung diseases in our study included B. Asthma, Chronic obstructive pulmonary disease-emphysema and bronchitis variants and bronchiectasis. The mean value of DLCO in obstructive lung diseases was 62.39 ± 29.44. In specific diseases, B. asthma had the highest mean DLCO percentage predicted of 102.20 ± 14.36. Saydain G[4] et al did a study on clinical significance of elevated DLCO in 245 patients who had elevated DLCO values. He found that most patients with elevated DLCO had the diagnosis of obesity, asthma or both. Our study also showed COPD- bronchitis patients had the mean DLCO of 76.33 ± 5.57 while COPD-emphysema patients had a mean predicted DLCO value of 37.80 ± 13.41. There were only two bronchiectasis patients in the study and the mean DLCO value was 62±4.48.

To summarize, DLCO is a very good tool for early identification of lung diseases. It can be used to differentiate between COPD and asthma as percentage predicted DLCO is usually decreased in emphysematous patients while it may be normal or increased in asthmatic patients. Bronchitis patients may also show normal or slightly decreased DLCO values.

Conclusion

DLCO can be helpful beyond spirometry in classification of obstructive lung diseases. DLCO values in COPD Emphysema variant are decreased, COPD bronchitis variant remains normal or slightly reduced and asthma either normal or increased. So DLCO can help in differentiation or sub categorization of obstructive disease more than spirometry.

Conflict of Interest- None.

Source of Funding- Self.

Ethical Clearance: Ethical clearance was obtained from the Institutional Ethics Committee (IEC), Maharishi Markandeswar (deemed to be university) Mullana, Ambala.

References

1. Krogh A, Krogh M. 1909. Rate of diffusion into lungs of man. Skand. Arch. Physiol. 1909;23: 236-47.
2. Ogilvie CM, Forster RE, Blakemore WS, Morton JW. A standardized breath holding technique for the clinical measurement of the diffusing capacity of the lung for carbon monoxide. The Journal of clinical investigation. 1957;36(1):1-7.
3. Krogh M. 1915. The diffusion of gases through the lungs of man. J. Physiol. Lond. 1915; 49:271-96.
4. Saydain G, Beck KC, Decker PA, Cowl CT, Scanlon PD. Clinical significance of elevated diffusing capacity. Chest. 2004;125(2):446-52.

Development and Validation of a Gujarati Questionnaire for Evaluating Levels of Awareness, Acceptance, Socio-Economic Stress & Expectations from Physiotherapy Services in Parents of Children with Cerebral Palsy

Vivek Harsukhbhai Ramanandi[1,2], Mukund Motibhai Prabhakar[3]

[1]Ph. D. Scholar, Faculty of Medicine, Gujarat University, Ahmedabad, [2]Assistant Professor, SPB Physiotherapy College, Veer Narmad South Gujarat University, Surat, [3]Ph. D. Guide, Faculty of Medicine, Gujarat University, Ahmedabad

Abstract

Parents of children with cerebral palsy experience anxiety, depression, guilt and low self-esteem, frustration, low matrimonial and personal satisfaction etc. While planning interventions for the child with cerebral palsy, physiotherapist should consider physical and psychological health of caregivers, influence of social support, family functioning etc. This study gives an overview of the procedure for development and validation of a Gujarati questionnaire to evaluate levels of awareness, acceptance, stress & expectations from physiotherapy services through two-stage process. At the 1st stage domain determination, item generation and instrument formation was done. In the 2nd stage, face and content validation was done using consensus method by a group of 10 experts. As a result, questionnaire having 9 dimensions and 84 items with acceptable levels of validity was developed.

Keywords: *Cerebral palsy, parenting, parents, caregivers, physical therapy, questionnaire.*

Introduction

Parents having a child with cerebral palsy cope with their child's functional limitations along with their specific needs [1]. Parents who have children with CP are faced with many difficulties including issues with the personal relations, social problems, economic problems, personal physical problems, issues involving the sick child's care and education [2]. They frequently experience anxiety, depression, guilt and low self-esteem, frustration, low matrimonial and personal satisfaction due to feelings of inadequacy for not being able to have a normal child, and also have impaired sexual lives [3,4].

While a physiotherapist plans interventions for the child with CP, he should also consider parental awareness about various aspects; acceptance of the situation by parents, family and society; levels of stress due to parenting; experiences and expectations from physiotherapy services. To study such complex constructs, researchers require valid and reliable instrument [5].

CanChild Center for Childhood Disability Research has developed a conceptual framework of family-centered service and has defined it as follows:

"Family-centered service is made up of a set of values, attitudes, and approaches to services for children with special needs and their families. It recognizes that each family is unique; that the family is the constant in the child's life; and that they are the experts on the child's abilities and needs. The family works together with service providers to make informed decisions about the services and supports the child and family receive. In family-centered service, the strengths and needs of all family members are considered [6]". Lack of standard questionnaires or instruments to review and promote family-centeredness in paediatric rehabilitation has lead

Corresponding Author:
Vivek Harsukhbhai Ramanandi
SPB Physiotherapy College, Ugat-Bhesan Road, Mora Bhagal, Surat-395005, Gujarat (India).
+91-7878585656, vivekramanandi@gmail.com

to a serious limitation in service provision capacities of country [7].

In the light of previous findings relevant to rehabilitation for CP in India, researchers have recommended that physiotherapists should focus on reviewing the difficulties of parents and provide education, guidance and support to them. This enables parents to cope better with the condition, thereby resulting in improved outcomes associated with treatment[2,4,8-10].

While reviewing available literature, it was found that only few instruments in English can provide comprehensive information about stress, acceptance, beliefs, expectations, utilization etc. [8,11-14]. Studies in India and Gujarat showed that, no valid and comprehensive questionnaire is yet available in Gujarati to help study these aspects.

When a new questionnaire is designed, measurement and report of its content validity have fundamental importance [15].It provides information on the representativeness and clarity of items and help improve a questionnaire through achieving recommendations from an expert panel[16,17]. Therefore, validity evidence should be obtained on each study for which a questionnaire is used [18].

Materials and Method

This exploratory mixed method research (qualitative-quantitative) study was carried out to design and validate the questionnaire measuring levels of awareness, acceptance, socio-economic stress & expectations from physiotherapy services in parents of children with CP.

Stage 1: Questionnaire Design

Process of questionnaire design follows 3 steps, including content domain determination, item generation and questionnaire construction [19,20].

Qualitative data was collected from the interviews with 21 parents of children with CP. Following the guidelines of Tilden et al. (1990) the data from interview was used as a resource to generate questionnaire items [21]. For item generation, Ridenour and Newman's deductive- inductive technique was applied [22]. In third step, questionnaire was constructed by refining and organizing items in a suitable format and sequence so that the finalized items are in a usable form [23].

Stage2: Judgment

This step included confirmation by a panel of experts, indicating that questionnaire items and the entire questionnaire have content validity. For this purpose, a panel with 10 experts having mean research or work experience of 23.1 + 8.47 years was appointed.

Experts were requested to provide their viewpoints on the relevance, clarity and comprehensiveness of the items [15,23]. In first round of judgement, few items were modified whereas some were eliminated based on the opinion of content experts about grammar, appropriate and correct words, correct and proper order of words and appropriate scoring [24]. For quantification purpose Content Validity Ratio (CVR) was used, where the experts were requested to score each item from 1 to 3, with a 3-degree range of "not necessary, useful but not essential, essential", and specify whether an item is necessary in a set of items or not. Values of CVR vary between 1 and -1. For this study 10 experts were included, therefore item with CVR value bigger than 0.62 was accepted [25].

Another widely reported approach for content validity for questionnaire development study is the content validity index (CVI) [23,26,27]. The expert panel members (n=10) were requested for to rate questionnaire items in terms of relevance and clarity on a 4-point ordinal scale [26]. A table like the one shown below (Table 1) was added to the cover letter to guide experts for scoring method. For relevance, CVI was calculated both for item level and the scale-level.

Table 1. The table added to the cover letter to guide experts for scoring method

Relevance	Clarity
1 – Not relevant	1 – Not clear
2 – Item needs some revision	2 – Item needs some revision
3 – Relevant but need minor revision	3 – Clear but need minor revision
4 – Very relevant	4 – Very clear

The I-CVI expresses the proportion of agreement on the relevance of each item, which is between 0 and 1 [18,23]. Minimum 80% agreement among experts was

considered for the items to be appropriate for selection in the questionnaire [26]. Kappa statistic was undertaken to provide adjustment for chance agreement [28].The scale-level content validity index (S-CVI) is defined as "the proportion of items on an questionnaire that achieved a rating of 3 or 4 by the content experts" [29]. S-CVI was calculated using universal agreement method i.e. S-CVI/UA, as well as averages method i.e. S-CVI/Ave.

Determining face validity of a questionnaire

Face validity is related to the appearance and apparent attractiveness of a questionnaire, which may affect the questionnaire acceptability by respondents [19]. To determine face validity 10 parents of children with CP (lay experts) was requested to judge on the importance, simplicity and understandability of items[27]. They were asked to grade importance of all items on a 5-point Likert scale i.e. very important, important, relatively important, slightly important, and unimportant. The items were revised to make them more meaningful and understandable as per the suggestions from respondents.

Final questionnaire was constructed at the end of this designing and validation process. The final version of questionnaire included 9 sections and 84 questions.

Results

Results of Stage 1

Qualitative content analysis of the data collected through semi-structured in-depth interview of 21 parents of children with CP was done. The results led to identification of content domain within 4 dimensions and 16 sub-dimensions (Table 2).

Table 2. The Content Domains identified during qualitative content analysis

Sr. No.	Domain	Sub-domain
1	Awareness in the parents	1. Cerebral palsy: causes & prognosis 2. 2.Available treatment options 3. Role & importance of pt 4. Support & aid
2	Problems experienced by parents	1. Social problems 2. Physical problems 3. Psychological problems 4. Financial problems 5. Other problems
3	Acceptance of the child	1. By parents 2. By family 3. By society
4	Expectations of the parents	1. Availability of rehab services 2. Quality of rehab services 3. Response to rehab measures 4. Other support services

During the process 117 questions were generated from the data derived out of the interviews. 22 questions were added from relevant literature and related questionnaires. 41 questions were removed due to duplication and overlapping of concept. At the end of item generation process, preliminary questionnaire was developed having 98 items within 9 sections. The sections and the variables covered by them are enlisted below:

Section 0: Interview related variables

Section 1: Child related variables

Section 2: Child's difficulties and associated variables

Section 3: Caregiver related variables

Section 4: Child's family related variables

Section 5: Caregiver's awareness and associated variables

Section 6: Child's acceptance and associated variables

Section 7: Parental stress and associated variables

Section 8: Expectations from Physiotherapy and associated variables

Results of stage 2:

Results for estimation of Content Validity

In the second stage the panel of 10 content experts were requested to judge the content of questionnaire qualitatively and quantitatively using prescribed formats in three rounds.

In the first round of judgment, 10 items having CVR lower than 0.62 were eliminated. The remaining items were modified according to the recommendations of panel members.

In the second round, the proportion of agreement among panel members on the relevance and clarity of 88 remaining items of the first round of judgment was calculated. In this round, among the 88 questionnaire items, 5 items with a CVI score lower than 0.70 were eliminated. 7 items with a CVI between 0.70 and 0.79 were modified (according to the recommendation of panel members and research group forums). According to experts' suggestions, an item about advice regarding the neonatal follow up was added in this round. After modification, the questionnaire containing 84 items was sent to the panel members for the third time to judge on the relevance, clarity and comprehensiveness.

The probability of chance agreement was first calculated for each item and then kappa (K) was computed by using the numerical values of Pc and I-CVI. All 84 items had K values >0.74 and were accepted for face validation.

Results for estimation of Face validity

A panel of 10 parents of children with CP (lay experts) was requested to judge face validity of all 84 questions. According to their opinions, to make some items more understandable, objective examples were included. For instance,

"બાળકની ફિઝીયોથેરાપી અને અન્ય સારવાર માટે આશરે કુલ માસિક ખર્ચ કેટલો થાય છે?"

was changed to,

"બાળકની ફિઝીયોથેરાપી અને અન્ય સારવાર માટે આશરે કુલ માસિક ખર્ચ કેટલો થાય છે? (દા.ત. વાહનમાં આવવા-જવાનો, નાસ્તો-પાણી, કેસ ફી, સારવાર ફી, દવાઓ વગેરે.)"

All 84 items were found satisfactory and accepted for the final questionnaire. Finally, at the end of the content validity and face validity process, our questionnaire was prepared with 9 sections and 84 items for the next steps and doing the rest of psychometric testing.

Discussion

Present paper demonstrates quantitative indices for content validity of a new questionnaire and outlines the process of design and psychometric analysis of Gujarati questionnaire for evaluating levels of awareness, acceptance, socio-economic stress & expectations from physiotherapy services in parents of children with CP.

It should be said that validation is a lengthy and complicated process involving many people including experts and subjects from the population of interest. The first-step of validation, the content validity, should be studied in extensive manner. Meanwhile, this study showed that although content validity is a subjective process, it is possible to objectify it through various statistical procedures. The further analyses of psychometrics should be directed towards reliability evaluation (through internal consistency and test-retest), construct validity (through factor analysis) and criterion-related validity [27].

Clinicians and researchers should realize if the questionnaires they use for their studies are suitable for the construct, population under study, and socio-cultural background in which the study is carried out, or there is a need for new or modified questionnaires. Training on content validity study helps students, researchers, and clinical staffs better understand, use and criticize research questionnaires with a more accurate approach.

Main limitation of this study is, as experts' feedback is subjective, the study is subjected to bias that may exist among the experts.

Conclusion

This was a systematic content validity study conducted through two stage process. In the first stage, questionnaire design was carried out and in the second stage; judgment on questionnaire items was performed. Such process should lead the development of a valid and reliable questionnaire in terms of content. In general, this content validity study revealed that this questionnaire enjoys a satisfactory level of content validity.

Acknowledgment: The researchers appreciate parents and experts who have strongly helped in development and validation process. Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript.

Source of Funding: No funding received.

References

1. Bamford J, Sandercock P, Dennis M, Burn J, Warlow C. A prospective study of acute cerebrovascular disease in the community: the Oxfordshire Community Stroke Project--1981-86. 2. Incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage. *Journal of Neurology, Neurosurgery & Psychiatry.* 1990;53(1):16-22.
2. Ramanandi VH PD, Prabhakar MM. Experiences sharing through the interviews from twenty one parents of children with cerebral palsy in Gujarat region of India. *International Journal of Advanced Research.* 20-05-2019 2019;7(5):8.
3. Raina P, O'Donnell M, Rosenbaum P, et al. The health and well-being of caregivers of children with cerebral palsy. *Pediatrics.* Jun 2005;115(6):e626-636.
4. Ramanandi VH JM, Panchal DN. A qualitative study to conceptualize levels of awareness, acceptance and expectations in parents of children with cerebral palsy in Gujarat, India. *International Journal of Contemporary Pediatrics.* 2018;5(2):6.
5. Rubio DM, Berg-Weger M, Tebb SS, Lee ES, Rauch S. Objectifying content validity: Conducting a content validity study in social work research. *Social work research.* 2003;27(2):94-104.
6. Law M, Hanna S, King G, et al. Factors affecting family-centred service delivery for children with disabilities. *Child: care, health and development.* 2003;29(5):357-366.
7. Brehaut JC, Kohen DE, Raina P, et al. The health of primary caregivers of children with cerebral palsy: how does it compare with that of other Canadian caregivers? *Pediatrics.* Aug 2004;114(2):e182-191.
8. Vivek H Ramanandi TRP, Juhi Kalpesh Panchal,, Prabhakar MM. Impact of Parenting a Child with Cerebral Palsy on the Quality of Life of Parents: A Systematic Review of Literature. *Disability, CBR and Inclusive Development.* 2019;30(1):37.
9. Nimbalkar S, Raithatha S, Shah R, Panchal DA. A qualitative study of psychosocial problems among parents of children with cerebral palsy attending two tertiary care hospitals in western India. *ISRN family medicine.* 2014;2014.
10. Khanna AK, Prabhakaran A, Patel P, Ganjiwale JD, Nimbalkar SM. Social, Psychological and Financial Burden on Caregivers of Children with Chronic Illness: A Cross-sectional Study. *Indian J Pediatr.* Nov 2015;82(11):1006-1011.
11. Novak I, Mcintyre S, Morgan C, et al. A systematic review of interventions for children with cerebral palsy: state of the evidence. *Developmental Medicine & Child Neurology.* 2013;55(10):885-910.
12. Bottcher L. Children with spastic cerebral palsy, their cognitive functioning, and social participation: a review. *Child Neuropsychology.* 2010;16(3):209-228.
13. King S, Teplicky R, King G, Rosenbaum P. Family-centered service for children with cerebral palsy and their families: a review of the literature. Paper presented at: Seminars in pediatric neurology2004.
14. Ribeiro MF, Porto CC, Vandenberghe L. [Parental stress in families of children with cerebral palsy:

an integrative review]. *Cien Saude Colet.* Jun 2013;18(6):1705-1715.

15. Yaghmaie F. Content validity and its estimation. *Journal of Medical Education.* 2003;3(1).
16. Anastasi A. Psychological Testing 5th Ed New York. *NY: Macmillan.* 1988.
17. Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in nursing & health.* 2007;30(4):459-467.
18. Waltz CF, Strickland OL, Lenz ER. *Measurement in nursing and health research.* Springer publishing company; 2010.
19. Nunnally JC. *Psychometric theory 3E.* Tata McGraw-Hill Education; 1994.
20. Carmines E. Zeller, RA. Reliability and validity assessment. *Quantitative applications in the social sciences series. Beverly Hills: Sage Publications.* 1979.
21. Tilden VP, Nelson CA, May BA. Use of qualitative methods to enhance content validity. *Nursing Research.* 1990.
22. Benz CR, Ridenour CS, Newman I. *Mixed methods research: Exploring the interactive continuum.* SIU Press; 2008.
23. Lynn MR. Determination and quantification of content validity. *Nursing research.* 1986.
24. Safikhani S, Sundaram M, Bao Y, Mulani P, Revicki DA. Qualitative assessment of the content validity of the Dermatology Life Quality Index in patients with moderate to severe psoriasis. *Journal of Dermatological Treatment.* 2013;24(1):50-59.
25. Lawshe CH. A quantitative approach to content validity 1. *Personnel psychology.* 1975;28(4):563-575.
26. Davis LL. Instrument review: Getting the most from a panel of experts. *Applied nursing research.* 1992;5(4):194-197.
27. Grant JS, Davis LL. Selection and use of content experts for instrument development. *Research in nursing & health.* 1997;20(3):269-274.
28. Wynd CA, Schmidt B, Schaefer MA. Two quantitative approaches for estimating content validity. *Western Journal of Nursing Research.* 2003;25(5):508-518.
29. Beck CT, Gable RK. Ensuring content validity: An illustration of the process. *Journal of nursing measurement.* 2001;9(2):201-215.
30. Lacasse Y, Godbout C, Series F. Health-related quality of life in obstructive sleep apnoea. *European Respiratory Journal.* 2002;19(3):499-503.
31. Cicchetti DV, Sparrow SA. Developing criteria for establishing interrater reliability of specific items: applications to assessment of adaptive behavior. *American journal of mental deficiency.* 1981.

Comparative Study of Low Pressure Pneumoperitoneum versus Standard Pressure Pneumoperitoneum in Laparoscopic Cholecystectomy

Rashid Murtaza[1], Madhubala Gaur[2], Atul Shishodia[2]

[1]Assistant Professor, [2]Professor, [2]Assistant Professor, Saraswathi Institute of Medical Sciences, Hapur, U.P.

Abstract

Aim: - To evaluate the advantages and disadvantages of low pressure (8mmHg) in comparison to standard pressure pneumoperitoneum (12mmHg) in laparoscopic cholecystectomy.

Setting & Design: - Prospective study from April 2017 to March 2018 in the Department of General Surgery, Saraswathi Institute of Medical Sciences, Hapur.

Methods & Material: - A prospective randomized controlled trial incorporating 80 patients with symptomatic uncomplicated cholelithiasis who underwent laparoscopic cholecystectomy using a four port technique. All patients were divided randomly in two groups: 40 patients underwent LPLC (Low Pressure Laparoscopic Cholecystecomy) and another 40 patients underwent SPLC (Standard Pressure Laparoscopic Cholecystectomy). Factors included in statistical analysis were per-operative pulse, blood pressure, operative time, post-operative pain including shoulder tip pain, complication rate, conversion rate to SPLC, conversion rate to open cholecystectomy, postoperative hospital stay.

Statistical analysis: It was done using Chi-square test & Student t test.

Results: - No statistically significant difference was found in hemodynamic changes, postoperative pain including shoulder tip pain, mean operative time, mean hospital stay in both groups. Conversion from LPLC to SPLC was done in 4 cases. No case was converted to open cholecystectomy.

Conclusions: - Laparoscopic cholecystectomy can be safely performed at low pressure (8 mmHg) pneumoperitoneum.

Key Words: - *Cholelithiasis, pneumoperitoneum, LPLC, SPLC.*

Introduction

Commonest methods to create working space in the abdomen during laparoscopic cholecystectomy is pneumoperitoneum.[1] During laparoscopic surgery the pneumoperitoneum and the patient position induce pathophysiological changes that complicate anesthetic management. Pulmonary & hemodynamic changes are related to pneumoperitoneum pressure which is not a linear relationship. At low pressure (0-10mmHg), relatively few changes occur in a normovolemic healthy adult. Pneumoperitoneum with pressure range 12-14mmHg over prolonged periods is associated with adverse effects such as decreased pulmonary compliance , altered blood gas parameters, impaired functioning of circulatory system, raised liver enzymes, renal dysfunction and increased intraabdominal pressure.[3,4,5,6,7]

Aims & Objective: - To evaluate the advantages and disadvantages of low pressure (8mmHg) in comparison to standard pressure pneumoperitoneum (12mmHg) in laparoscopic cholecystectomy.

Design and Duration: - Prospective study from April 2017 to March 2018.

Setting: - Department of Surgery, Saraswathi Institute of Medical Sciences, Hapur.

Patients: - All patients with symptomatic uncomplicated cholelithiasis undergoing laparoscopic cholecystectomy.

Methodology: - Proper preoperative workup of all symptomatic patients of cholelithiasis of both sexes and age between 18 to 70 years was done. Patients with chronic liver disease, those unfit for surgery, age below 18 years, pregnancy, lactation, coagulopathy, CA Gall Bladder, Empyema Gall Bladder, Acute cholecystitis, previous abdominal surgery were excluded from were excluded from study. Total 80 patients were included in study. Written informed consent was taken from all patients. Approval for this study by local ethical committee was taken. All patients were divided randomly in two groups: A and B, equal in size (n=40).Four port laparoscopic cholecystectomy was performed by experienced laparoscopic surgeon's team. Group A patients underwent low pressure (8 mmHg) pneumoperitoneum laparoscopic cholecystectomy (LPLC). Group B patients underwent standard pressure (12 mmHg) laparoscopic cholecystectomy (SPLC). Intraoperative monitoring of heart rate & blood pressure was done noninvasively. Factors included in statistical analysis were per-operative pulse rate, blood pressure, operative time, post- operative pain including shoulder tip pain, complication rate, conversion rate to SPLC, conversion rate to OC, postoperative hospital stay.

Data Analysis: - Statistical analysis was done using Chi-square test & Student t test (unpaired). P- Value <0.05 was considered statistically significant.

Result

Total 80 patients underwent LC. Age group was 20 to 65 years.

70 patients were females and 10 patients were males. Group A included 40 patients who underwent LPLC. Group B included 40 patients who underwent SPLC. Tachycardia, hypertension after creation of pneumoperitoneum in both group was present but it was not statistically significant. ($P < 0.05$). Mean operative time was longer in LPLC as compared to SPLC but difference was not statistically significant. Conversion from LPLC to SPLC was done in 4 cases. Not a single case was converted in to open cholecystectomy. Postoperative pain including shoulder tip pain was same in both groups. Mean hospital stay was 2.46 days in LPLC vs. 2.26 days in SPLC. Laparoscopic cholecystectomy can be safely performed at low pressure (8 mmHg) pneumoperitoneum. Operative time is more if pressure is kept low.

Table - 1 : Comparative outcome between group A and group B of various parameters

S. No.	Parameters	GROUP A (LPLC) Patients	GROUP B (SPLC) Patients
1.	Mean Pulse Rate (beats per minute)	98	92
2.	Mean Blood Pressure (mmHg)	128.4/74.4	130.4/78.4
3.	Mean Operative Time (minutes)	58	48
4.	Mean Hospital Stay (days)	2.46	2.26
5.	Shoulder Tip Pain	2	2
6.	Gall Bladder Perforation	2	1
7.	Conversion to Open Cholecystectomy	0	0
8.	Conversion to SPLC	4	-
9.	Complication Rate	0	0

Table 1 shows a comparative outcome of different parameters, between two groups, the difference between mean pulse rate (beats per minute) is of 6 beats only. The difference between SBP and DBP between two groups is minimal. The mean operative time difference (in minutes) is of 10 minutes only. Shoulder tip pain in both group is same. The difference between gall bladder perforation is of 1 only. The conversion was not needed in both the groups patients. Conversion of LPLC patient to SPLC was 4. No significant complication were seen in both the groups.

Discussion

The main aim of minimally access surgery is to reduce post- operative pain, post-operative hospital stay and other morbidities. Causes of post-operative pain following laparoscopic cholecystectomy are port site tissue injury, gall bladder bed, peritoneal & diaphragmatic stretch due to pnuemoperitoneum, stimulation of sympathetic nervous system by hypercarbia, Chemical irritation of peritoneum by CO_2 & resultant carbonic acid formation.[6,7] Many studies have reported that the incidence & intensity of postoperative pain including shoulder tip pain was less in low pressure pneumoperitoneum group as compared to standard pressure pneumoperitoneum groups. [8,910,11,12.] Also low pressure pneumoperitoneum results in lesser hemsodynamic changes as compared to standard pressure pneumoperitoneum in many studies.[9,10,11.] In our study there is no statistically significant difference in haemodynamics in both groups. Conversion from SPLC to LPLC was done in four cases in our study. Main reason for this was bleeding & adhesions requiring adequate exposure which was not possible in LPLC as suction of CO_2 along with blood resulting in decreased space demanded intra-abdominal pressure 14 mmHg.

Conclusion

Low pressure pneumoperitoneum with adequate exposure should be recommended in Laparoscopic cholecystectomy in uncomplicated GSD. Operative time is more if pressure is kept low. Advantage of low pressure pneumoperitoneum is decreased post-operative pain including shoulder tip pain.

Acknowledgement: - None.

Conflict of Interest:-None.

Source of Funding:- Self.

Ethical Clearance:- Taken from ethical committee.

References

1. Uen YH, Chen Y, Kuo C, Wen KC, Koay LB. Randomized trial of low pressure carbon dioxide elicited pneumoperitoneum versus abdominal wall lifting for laparoscopic cholecystectomy. J Chin Med Assoc. 2007; 70:324-30.
2. Koc M, Ertan T, Tez M, Kocpinar MA, Kilic M, Gocmen E etal. Randomized prospective comparison of post-operative pain in low versus high pressure pneumoperitoeum. ANZ J Surg. 2005; 75:693-6.
3. Esmat ME, Elsebae MM, Nasr MM, Elsebaie SB. Combined low pressure pneumoperitoeum and intraperitoneal infusion of normal saline for reducing shoulder tip pain following laparoscopic cholecystectomy. World J Surg. 2006; 30:1967-73.
4. Hasukiae S. Post-operative changes in liver function tests; randomized comparison of low & high pressure laparoscopic cholecystectomy. Surg Endosc. 2005; 19:1451-5.
5. Joris J, Cigarini l, Legrand M, Jacquet N, De Groote D, Franchimont P, et al. Metabolic and respiratory changes after cholecystectomy performed via laparotomy or laparoscopy. Br J Anaesth. 1992; 63:341-5.
6. Barka A, Jabbour S, Hammond R et al. End tidal Carbon dioxide tension during laparoscopic cholecystectomy. Anaesthesia. 1994; 49: 403-6.
7. Vezakis A,Davides D, Gibson JS,Moore MR, Shah H, Larvin M, et al. Randomized comparision between laparoscopic cholecystectomy and gasless laparoscopic cholecystectomy. Surg Endosc. 1999; 13: 890-3.
8. Wallance DH, Serpell MG, Baxter JN, O'Dwyer P J. Randomized trial of different insufflation pressures for laparoscopic cholecystectomy. Br J Surg. 1997; 84: 455-8.
9. Perrakis E, Vezakis A, Velimexis G, Scavanis G, Deverkiss, Antoniades J, et al. Randomized comparision between different insufflation pressure for laparoscopic cholecystectomy. Surg. Laparo Endosc Percutan Tech. 2003; 13: 245-9.
10. Dexter SP, Vucevic M, Gibson J, Mc Mahon MJ. Haemodynamic consequences of high & low

pressure capnoperitoneum during laparoscopic cholecystectomy. Surg Endsc. 1999; 13: 376-81.

11. Sarli L, Cost R, Sansebastiano G, Trivelli M, Roncoroni L, Prospective randomized trial of low pressure pneumoperitoneum for the reduction of shoulder tip pain following laparoscopy. Br. J Surg. 2000;87:1161-5

Prevalence and Risk Factors of Intimate Partner Violence among Indian Women: A Secondary Data Analysis of NFHS-4

Tessy Thomas[1], Vasudeva Guddattu[2], Madhusudan M[3]

[1]Lecturer in Biostatistics, Department of Community Medicine, DM WIMS Medical College, Naseera Nagar, Wayanad, India, [2]Associate Professor, Department of Data Science, Manipal University, Manipal, [3]Assistant Professor, Department of Community Medicine, DM WIMS Medical College, Naseera Nagar, Wayanad, India

Abstract

Background: During the last few decades, violence towards women in general, and intimate partner violence (IPV) in particular, is increasingly being acknowledged as a violation of basic human rights and it is recognized as the consequential barricade of the empowerment of women. **Objectives:** To determine the prevalence and risk factors associated with IPV. **Methodology:** This study used a nationally representative data collected through NFHS-4 (2015-2016). In total 66013 ever married women aged 15-49 were analysed. Multiple logistic regression model was used to quantify the factors associated with IPV. **Result**: The prevalence of women ever confronting IPV in India was 29.5 per cent. It was also found that less severe violence was most prevalent accounting for 27.5% whereas severe violence was 8.2 percent. Prevalence of IPV was higher among women who were uneducated, in the middle age group, who had older partners, from rural background; those with uneducated partners, who themselves and their partners drink alcohol, who are unemployed themselves and have unemployed partners, poorest compared to richest, who justify wife beating compared to who do not, who had witnessed their father beating their mother compared to who did not and all these factors were found to be statistically significant. **Conclusion:** Prevalence of IPV in India is considerably lower compared to other developing countries. Factors like alcohol consumption of partner, education level of respondents as well as partners, past exposure to violence, justified wife beating and wealth index which are linked to IPV which need to be tackled to bring down the prevalence of IPV.

Key-words: *Intimate partner violence, NFHS, India, risk factor, women*

Introduction

Intimate Partner Violence, commonly known as Domestic Violence or Spousal Abuse, knows no geographical, ethnic or cultural boundaries.[1] Intimate partner violence has not only been seen as an infringement of basic human rights, but it also accounts for the health burdens, intergenerational effects, and demographic consequences of such violence.[2] The World Health Organization (WHO) defines Intimate partner violence (IPV) as "behaviours within an intimate relationship that cause physical, psychological or sexual harm to those in the relationship, including acts of physical aggression, sexual coercion, psychological abuse and controlling behaviours".[3] It can also be found in same–sex partnerships even when women can be the perpetrators, but women are the most common victims of such male perpetuated IPV.[4] The Intimate partner violence focused in this study will be on the abuse against women by males, which is common incident nowadays. Gender inequality is another issue existing in the society and violence against women can be considered as a consequence as well as a cause of it.

Corresponding Author:
Dr Madhusudan M
Address: Assistant Professor, Department of Community Medicine, DM WIMS Medical College, Naseera Nagar, Wayanad, India,
Phone numbers: 7892680415
E-mail address: madhusudan_kims12@rediffmail.com

Worldwide 35% of women have experienced either physical and/or sexual intimate partner violence or non-partner sexual violence.[4] In addition, there may be other forms of violence to which they are vulnerable to. Out of this, intimate partner violence is the most common. Globally, about 1 in 3 women who have been in a relationship have experienced physical and/ or sexual violence by their intimate partner.[4] Across the globe, 34% of all female homicides are committed by male intimate partners. [4] Violence against women has also been recognized as an important health problem publicly, outstanding to its substantial outcome for women's physical, mental and reproductive health. [4- 7, 9, 10] It is also known from the studies that detrimental effects of abuse continue long after violence has stopped. [8] More importantly, it affects country's economy through medical cost, loss of labor hours and increased disability. [2]

There are many risk factors that are consistently identified across many regions for IPV. Factors like young age, low level of education, personality disorders, sexual abuse during childhood, harmful use of alcohol and drug increased the man's likelihood of committing violence against his partner.[3,5,7,12,] On the other hand, there are also many context specific factors; for instance, some of the factors identified in the rural settings may not be factor in the urban settings.[12] Additionally, relationship factors like male dominance in the family, age at marriage, man having multiple partners and spousal education gap are also associated with IPV. [8,11,13] Poverty, low social and economic status of women, lack of legal sanctions against IPV within marriage is also associated with IPV. [6, 7, 14, 15]

Hence, in this background the present study was undertaken to find out the prevalence of Intimate partner violence in India and the socio demographic and lifestyle factors associated with it. By providing an insight about the risk factors associated with IPV, it can help the policy makers, researchers and NGO's in solving the global issue.

Subjects and Method

Secondary analysis of existing data was done in this study using the data obtained from National Family Health Survey (NFHS-4 2015-16). Government of India has proposed the NFHS to maintain a dependable quality data on inhabitants and their well-being. It is a nationwide, multi-round survey conducted in a representative sample of households throughout India. A total of 6,99,686 ever-married women (age group 15 -49) were considered for the interview from 29 states of India.[2] Apart from the demographic and various health related topics, NFHS -4 also addressed the issue of domestic violence against women. As a part of it, a module of questions was included in women's questionnaire related to domestic violence. Information on various forms of violence viz., physical violence, sexual violence was included. Because of security issues only one woman from a household was considered. With all restrictions 66,103 was the resulting sample for the domestic violence module. Domestic violence module obtained information about various forms of violence. [2]

This study focuses only on two forms of violence: physical violence and sexual violence.

Dependent variables

Intimate partner violence: experiencing any form of less severe violence, severe violence or sexual violence from their partner/husband in their lifetime.

Less Severe Violence: being slapped or having something thrown at you that could hurt you, being pushed or shoved, twisted your arm or pulled your hair, being kicked, punched or dragged.

Severe violence: being beaten up, choked or burnt on purpose, or being threatened or having a weapon used against you.

Sexual violence: Physically force you to have sexual intercourse with him even when you did not want to; physically force you to perform any other sexual acts you did not want to; force you with threats or in any other way to perform sexual acts you did not want to.

Independent variables

The questionnaire had questions pertaining to various risk factors of IPV viz., Demographic characteristics, lifestyle factors and variables of economic empowerment. Respondents were asked as to whether violence by husband is justified in each of these cases; she goes out without telling him, she neglects the children, she argues with him, she refuses to have sex with him, she burns the food. The responses for each of these questions were merged and was dichotomized into 'do not justify wife beating' and 'wife beating is

justified'.

Statistical Analysis

Statistical analysis was done by using SPSS version 16.0 and EZR software. Prevalence and 95% Confidence interval was obtained. To identify risk factors associated with intimate partner violence, multiple logistic regression was performed. Enter method was used for variable selection.

Results

Prevalence of Intimate partner violence (IPV):

Table 1: Life time prevalence of IPV

Form of violence	Prevalence n (%)	95% CI for prevalence
Less severe violence	18,434(27.9)	(27.6 ,28.3)
Severe violence	5,386(8.2)	(8.0,8.4)
Sexual violence	4,372(6.0)	(6.4,6.8)
Intimate partner violence	19,459(29.5)	(29.1,29.8)

*More than one form violence is experienced by a person as prevalence of overall IPV is higher

Less severe violence is the most prevalent type of violence among Indian women and sexual violence the least prevalent one (table 1)

It was observed that prevalence of IPV was higher among women who were from rural area (13703, 30.9%) compared to urban (4502, 24.5%),women in the middle age group (11612, 30%) compared to younger age group (6593,27.5%) , women who drink alcohol (776,44.1%) compared to who do not drink (17429,28.6%), women whose partners drink alcohol (9160,47.2%) compared to who do not (9045,20.9%) and all these associations were found to be statistically significant (P<0.001 for all) Also, IPV was highest among women with partner aged between 40-49 years (5363,29.8%) and lowest among partners aged less than 29 years , highest in no education group (7845,38.2%)and lowest in higher education group (>10th standard) (767,12.9%), highest among women with uneducated partners (4587,39.6%) and least among those with highly educated partners (1342,16.1%), highest among women with more number of children(>3) (9146,35.4%) and least among those with no children (1025,19%), highest among Hindus(14444 ,30.7%) and lowest among Christians (1039 ,24.2%) and all these associations were found to be statistically significant (P<0.001 for all) . However, rural area (odds ratio =0.8, P value <0.001), partners age greater than 30 (30-39 years, odds ratio= 0.91, P value <0.001; 40-49 years ,odds ratio =0.82, P value <0.001; above 50years, odds ratio =0.76, P value <0.001)and respondents' age(middle age, odds ratio =0.99, P value <0.001), alcohol consumption (odds ratio=0.93, P value <0.001) turned out to be protective factors in the presence of other regressor variables in multiple logistic regression.

Table 2: Prevalence (95% CI) of IPV by Variables of Economic Empowerment

Variables of Economic Empowerment						
Respondents occupation	Not working	43666	11207(25.7%)	(25.29,26.11)	0.97(0.83,1.13)	<0.001
	Unskilled labor	14253	5711(40.1%)	(39.30,40.90)	1.12(0.97, 1.30)	
	Skilled labor	3001	970(32.3%)	(30.63,33.97)	1.10(0.93, 1.29)	
	White collar	1796	317(17.7%)	(15.93,19.47)	1	
Partners occupation	Not working	3148	932(29.6%)	(28.01,31.19)	1.13(1.01, 1.26)	<0.001
	Unskilled labor	39603	12870(32.5%)	(32.04,32.96)	1.09(1.01, 1.18)	
	Skilled labor	13338	3195(24%)	(23.28,24.72)	1.01(0.93, 1.10)	
	White collar	6627	1208(18.2%)	(17.27,19.13)	1	
Wealth index	Poor and poorest	25314	9607(38%)	(37.40,38.60)	1.45(1.37,1.54)	<0.001
	Middle	13057	3740(28.6%)	(27.82,29.38)	1.18(1.12, 1.25)	
	Rich and Richest	24345	4858(20%)	(19.50,20.50)	1	

*First two quintiles and last two quintiles of wealth index were combined

*First two quintiles and last two quintiles of wealth index were combined

Table 3: Prevalence of IPV by Attitude towards Violence and their Past Exposure of Violence

Attitude Towards Violence and their Past Exposure of Violence						
Wife beating justifies	No	35603	7698(21.6%)	(21.17,22.03)	1	<0.001
	Yes	27113	10507(38.8%)	(38.22,39.38)	1.32(1.267,1.36)	
Did her father ever beat her mother	No	48124	10816 (22.5%)	(22.13,22.87)	1	<0.001
	Yes	14592	7389(50.6%)	(49.79,51.41)	2.79 (2.79, 2.93)	

From table 2 and 3, it was also observed that prevalence of IPV was higher among women who were unemployed themselves and had unemployed partners, poor compared to rich, who justified wife beating compared to who do not, who had witnessed their father beating their mother compared to who do not.

Discussion

The current study, discloses that 29.5% per cent women ever experienced IPV. Chauhan et al. reported prevalence of any form of violence 33.5%. [16] The higher prevalence may be due to the fact that they have included emotional violence also in the definition of IPV, which accounted for 12.5%. The WHO Multi-country study on women's health and domestic violence against women shows that prevalence of IPV between 15% in Japan to approximately 70% in Ethiopia and Peru. [5] It was observed that prevalence of IPV is more in developing countries than developed countries.

The study clearly brings out that education is a protective factor for women. This is consistent with findings of other studies.[11] Education gives women the ability to collect and absorb information, manipulate and control the modern world, secure and protect themselves from any form of violence. [17] The present study shows that Prevalence of IPV was associated with number of children in the family. It may be due to the fact that, families with more number of children experience economic insecurity because of insufficient resources to cater for large family which may increase the stress and frustration leading to violence.

It was found that the poor women were facing greater threat of IPV than rich women. This result supports the findings of WHO that the disproportionality in wealth is a major factor for violence against women.[19] One of the significant factors associated with IPV was found to be the consumption of alcohol by the husband. Several other studies also support this finding. [14, 20-22] It may be due to the fact that excessive alcoholic consumption can reduce the self-control of individuals. From the study it was perceived that women who justified wife beating were more likely to experience IPV than their counterparts who did not. Koenig MA et al., also support this finding. [23] The current study reports that women who reported that their mother had been beaten by their mother's partner are more likely to experience IPV compared to their counterparts who did not have such a history. One of the reasons for this may be that a child witnessing violent behaviour i.e. mother getting beaten by father starts to accept such behaviour and rationalize that it is typical in marital life. This is supported by the study by Makayoto LA et al. [24]. Religion and partners occupation was also found to be significant in the study consistent with result of other studies. [11, 18]

Limitations

Predominantly, the data used is secondary. Moreover, it is large scale demographic survey which may be prone to some kind of biases at the collection base eg., women who are selected for domestic violence may underreport behaviours that are considered to be socially unacceptable. In addition to that, direction of association is also a problem as nature of the study is cross sectional.

Conclusion

India has significantly lower prevalence of IPV compared to other developing countries. Factors like alcohol consumption of partners', education level of respondents' as well as partners', past experience of violence at home, justification of wife beating by respondents and wealth index were found to be associated with IPV. These risk factors need to be tackled to bring down the prevalence of IPV.

Conflicting Interest: Nil

Source of Funding: Nil

Ethical Clearance: Consent was obtained from NFHS for the utilization of the data for this study

References

1) Uwayo D. Factors Contributing to Intimate Partner Violence and the Effectiveness of Services Available to Help Victims in Kisumu, Kenya [dissertation] .Kisumu, Keniya : School for International Training Kenya: Urbanization, Health and Human Rights Spring; 2014.

2) IIPS. National Family Health Survey (NFHS-4), 2015–16: India. Mumbai: International Institute for Population Sciences. 2017.

3) Heise L, Moreno G C. Violence by intimate partners. In: Krug EG et al., editors . World report on violence and health. Geneva, World Health Organization. 2002; 87– 121.

4) Moreno GC, Pallitto C, Devries K, Stockl H, Watts C, Abrahams N. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. World Health Organization. 2013.

5) World Health Organization/London School of Hygiene and Tropical Medicine. Preventing intimate partner and sexual violence against women: taking action and generating evidence. Geneva, World Health Organization. 2010

6) Stockman JK, Hayashi H, Campbell JC. Intimate partner violence and its health impact on ethnic minority women. Journal of Women's Health. 2015; 24:62-79.

7) Abramsky T, Watts CH, Garcia-Moreno C, Devries K, Kiss L, Ellsberg M, Jansen HA, Heise L. What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. BMC public health. 2011; 11:109.

8) Ko Ling Chan. Sexual violence against women and children in Chinese societies. Trauma, Violence & Abuse .2009; 10:69–85.

9) Moreno GC, Jansen HAFM, Ellsberg M, Heise L, Watts C. WHO Multi-country study on Women's Health and Domestic Violence against Women Initial results on prevalence, health outcomes and women's responses. Geneva: World Health Organization. 2005.

10) Campbell JC. Health consequences of intimate partner violence. Lancet. 2002; 359:1331–36.

11) Rapp D, Zoch B, Khan MM, Pollmann T, Krämer A. Association between gap in spousal education and domestic violence in India and Bangladesh. BMC public health. 2012; 12:467.

12) Jansen HA, Nguyen TV, Hoang TA. Exploring risk factors associated with intimate partner violence in Vietnam: results from a cross-sectional national survey. International journal of public health. 2016; 61:923-34.

13) Begum S, Donta B, Nair S, Prakasam CP. Socio-demographic factors associated with domestic violence in urban slums, Mumbai, Maharashtra, India. Indian journal of medical research. 2015; 14:783.

14) Coker AL, Smith PH, McKeown RE, King MJ. Frequency and correlates of intimate partner violence by type: physical, sexual, and psychological battering. American journal of public health. 2000; 90:553.

15) Xu X, Zhu F, O'Campo P, Koenig MA, Mock V, Campbell J. Prevalence of and risk factors for intimate partner violence in China. American journal of public health. 2005; 95(1):78-85.

16) Chauhan P, Shridevi K, Katkuri S. Domestic violence and related factors among ever married females in a rural area of southern India. International Journal of Community Medicine and Public Health. 2018; 5:3847-52.

17) Bhat RA. Role of Education in the Empowerment of Women in India. Journal of Education and Practice. 2015;6: 188-91.

18) Dalal K. Does economic empowerment protect women from intimate partner violence?. Journal of injury and violence research. 2011; 1; 3-35.

19) World Health Organization. Understanding and addressing violence against women: Intimate partner violence.2012;

20) Makayoto LA, Omolo J, Kamweya AM, Harder VS, Mutai J. Prevalence and associated factors of intimate partner violence among pregnant women attending Kisumu District Hospital, Kenya. Maternal and child health journal. 2013 1; 17:441-7.

21) Ramadugu S, Jayaram PV, Srivastava K, Chatterjee K, Madhusudan T. Understanding intimate partner violence and its correlates. Industrial psychiatry journal. 2015; 24:172.

22) Foran HM, O'Leary KD. Alcohol and intimate partner violence: A meta-analytic review. Clinical psychology review. 2008; 28:1222-34.

23) Koenig MA, Stephenson R, Ahmed S, Jejeebhoy SJ, Campbell J. Individual and contextual determinants of domestic violence in North India. American journal of public health. 2006; 96:132-8.

24) Speizer IS, Pearson E. Association between early marriage and intimate partner violence in India: a focus on youth from Bihar and Rajasthan. Journal of interpersonal violence. 2011; 26:63-81.

Self Reported Experiences of Interns' Regarding Oral Cancer Detection: A Questionnaire Survey

Sahana Maben [1],Audrey Madonna D'Cruz [2], Urvashi Ashwin Shetty[3]

[1]BDS, MHA. Tutor& Clinical Coordinator, [2]MDS. Professor and Head, Department of Public Health Dentistry, [3]MDS. SeniorLecturer, Department of Oral Pathology, A. B. Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangalore

Abstract

Aim: To determine theself-reported knowledge and experiences regarding oral cancer detection among dental interns relatingto the etiology, risk factors and signs of oral cancer.

Materials &Method:A cross-sectional survey was carried out using a questionnaire developed by Carter and Ogden which was modified, among 97 dental interns of a private dental college. The questionnaire was designed to collect information on demography; knowledge of interns in etiology, signs, and symptoms and undergraduate experience in examination and biopsy procedure and management of malignant and premalignant lesions.Descriptive analysis was carried out.Comparison of mean scores between gender using Unpaired t test. Differences were considered significant when $p<0.05$.

Results: The response rate was 97.9%. About 70.6% of the interns examine the oral mucosa routinely during clinical examination. Majority of them (83.7%)were aware of the red and white lesions affecting the oral mucosa and 81.5% have encountered oral cancer patients in their clinics. None of them felt that they have sufficient knowledge regarding detection and prevention of oral cancer and a vast majority (92.4%) were strongly positive and wanted more teaching and information on oral cancer in the form of information packs (32.6%), lectures (21.7%), seminars (25%) and interactive sessions (20.7%).

Conclusion: The level of awareness regarding early detection and prevention of oral cancer was low among the dental interns.

***Key Words**: Oral cancer, knowledge, practice, early diagnosis.*

Introduction

Oral cancer is global public health problem that affects the quality of life of people. It is the sixth most common cancer in the world.[1]Globally, there is a wide disparity in the incidence and intraoral site distribution of oral cancer. The highest incidence of oral cancer is found in India and Sri Lanka which accounts for about 40% of all cancers.It is one of the leading causes of mortality and disability in India.

Several studies have reported general lack of awareness among the public, dentists, dental and medical studentsregarding early detection of oral cancer and premalignant lesions due to which there is a delay in diagnosis and treatment of the lesions.[2,3,4,5,6]About 70% of the oral cancer patients present in the advanced stages.[7]A dental practitioner's negative attitude and low level of knowledge are considered to be factors that contribute to the delayed or inadequate detection of the early stages of oral cancer.[8]Consistently performing thorough oral cancer screening examination for all

Corresponding author:
Dr. Audrey Madonna D'Cruz,
Professor and Head, Department of Public Health Dentistry, A. B. Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangalore. Ph: +919880872658
Email: audreydcruz@yahoo.co.in, audreydcruz@nitte.edu.in

patients (including high-risk areas like tongue and floor of mouth), paying careful attention to suspicious red, white and ulcerative mucosal lesions and being aware of patients' high-risk tobacco and alcohol use offer the best potential for dentists to detect oral cancer at an early stage.[9,10]It has been reported that there exists an increasedneed for undergraduate dental students to be educated and trained in the identification of signs andsymptoms of oral malignancy and pre-malignancy aswell as early management of patients with suspiciousoral lesions.[11]

The objective of the present study was to determine theself reportedknowledge and experiences regarding oral cancer detection among dental interns relatingto the etiology, risk factors and signs of oral cancer.

Materials & Method

A cross-sectional survey was carried out using a questionnaire among 97 dental interns of a private dental college in Karnataka, India. Ethical approval to conduct the study was obtained from the Institutional Ethical Committee. Students were informed about the study. Participation was voluntary and interns willing to participate were included in the study.

The questionnaire that was used for the study was originally developed by Carter and Ogden[4]which was modified. The questionnaire consistedof ten close-ended questions divided into two sections, was designed to collect information on demography; knowledge of interns in etiology, signs, and symptoms and undergraduate experience in examination and biopsy procedure and management ofmalignant and premalignant lesions. The questionnaire was pretested on ten interns to check the adequacy of the questions. Modifications were made accordingto the responses before the final questionnaire wasadministered.

Interns were asked to mark the best answer among the options given. Data was entered into Microsoft Excel for Windows and analyzed using SPSS 15.0 version (SPSS Inc., Chicago, IL, USA). Descriptive analysis was carried out (number of correct responses) and presented as number and percentage. A score of '1' was given for each correct answer with 'may be/ Don't know' responses being counted as an incorrect response. Comparison of mean scores between gender using Unpaired t test. Differences were considered significant when $p<0.05$.

Results

Among the 97 dental interns, 5 were absent on the day of survey. Hence, the response rate was 97.9% (n= 92). There were 68 female and 24 male interns. About 70.6% of the interns examine the oral mucosa routinely during clinical examination. Majority of them (83.7%) were aware of the red and white lesions affecting the oral mucosa and 81.5% have encountered oral cancer patients in their clinics. About 47.8% of the participants said that tobacco chewing is the major risk factor for oral cancer, while 21.7% said that UV light exposure is a risk factor for oral cancer. About 12% responded smoking and 15.2% said that alcohol is a risk factor for oral cancer. About 46.7% said that leukoplakia and 31.5% said erythroplakia is associated with oral cancer. Only 68.5% of them were aware that long standing/ non healing scars anywhere in the oral cavity could be a sign for oral cancer and only 51.1% were aware that red or a white patch is a warning sign for oral cancer. None of them felt that they have sufficient knowledge regarding detection and prevention of oral cancer and a vast majority (92.4%) were strongly positive and wanted more teaching and information on oral cancer in the form of information packs (32.6%), lectures (21.7%), seminars (25%) and interactive sessions (20.7%).

Table 1 shows the comparison of mean scores across genders. The mean score among males was5.9 ± 2.4 and among females is 6.1 ± 2.1, the difference of which is insignificant when analysed using Unpaired t test.

Table 1: Comparison of mean scores between gender using Unpaired t test.

		Mean score (SD)	t	df	Standard error of difference	p value
Gender	Male	5.9+2.4	0.3863	90	0.518	0.7, not significant
	Female	6.1+2.1				

Discussion

Dentists need to possess a thorough knowledge of risk factors, clinical signs and symptoms of oral cancer in order to be effective in identifying, referring and counseling high-risk patients. Internship is a phase where most of the theoretical knowledge of dentistry is put into practice under supervision of the faculty. Interns need to possess adequate knowledge regarding of early detection of oral malignant and premalignant lesions as they are just one step away from being fully fledged dental surgeons who have an important role in prevention and control of oral cancer.

The results of the present study showed that the interns lacked sufficientknowledge regarding detection of oral cancer and premalignant lesions. These findings were in accordance to those reported in literature.[12,13,14]Studieshave also shown that dental students have a better knowledge regarding early detection and prevention of oral cancer when compared to medical students.[6,11]

In the present study, majority of the interns felt that they did not have adequate knowledge on early detection of oral cancer and wanted more even information regarding the same.This is a very relevant and important finding and should be viewed seriously. Although theory on epidemiology of oral cancer, etiopathogenesis of premalignant and malignant lesions, early detection, prevention and management of oral cancer in the dental curriculum exists, adequate clinical training under faculty supervision for careful comprehensive intraoral examination for identification of lesions is essential. Dental interns should be also trained to perform clinical diagnostic procedures like toludine blue staining, exfoliative cytology which would help in early detection of premalignant and malignant lesions. Interns should be encouraged to attend seminars/ workshops on oral cancer prevention.Also, it is important that proper and early referral and care is given to the patient diagnosed with oral cancer for a better prognosis.

Conclusion

The present study concluded that the level of awareness regarding early detection and prevention of oral cancer was low among the dental interns. There is a need to strengthen the knowledge and clinical skill of dental interns towards early detection and better management and prognosis of oral cancer.Ageneral lack of awareness among the public, dentists, dental and medical studentsregarding early detection of oral cancer and premalignant lesions results in delay in diagnosis and treatment of the lesions.

Conflict of Interest: Nil

Sources of Support: Self Funded

Ethical Clearance- Taken from Institutional Ethical Committee

References

1. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. Oral Oncology 2009;45:309–316.
2. Mehboob B, Khan E, Khan M. Awareness about oral cancer among non-medical university students of Peshawar. PakistanOral and Dental Journal 2011; 31: 392-95.
3. Ali TS, Baig S. Evaluation of a cancer awareness campaign: experience with a selected population in Karachi. Asian Pac J Can Pre 2006; 7(3): 391-95.
4. Bhurgri H, Gowani SA, Itrat A et al. Awareness of cancer risk factors among patients and attendants presenting to a tertiary care hospital in Karachi, Pakistan. J Pak Med Assoc. 2008;58(10): 584-8.
5. Shaila M, Shetty P, DCruz AM, Pai P. The Self-Reported Knowledge, Attitude and the Practices Regarding the Early Detection of Oral Cancer and Precancerous Lesions among the Practising Dentists of Dakshina Kannada—A Pilot Study. J Clin Diag Res 2013; 7(7): 1491-1494.
6. Lachlan M Carter and Graham R Ogden. Oral cancer awareness of undergraduate medical and dental students.BMC Medical Education 2007, 7:44.
7. Natarajan E. Contemporary Concepts in the Diagnosis of Oral Cancer and Precancer. Dental Clinics of North America. 2011; 55 (1): 63-88.
8. Schnetler JFC: Oral cancer diagnosis and delays in referral. Br J Oral MaxillofacSurg1992; 30: 210–213.
9. Patton LL, Elter JR, Southerland JH, Strauss RP: Knowledge of oral cancer risk factors and diagnostic concepts among North Carolina dentists: implications for diagnosis and referral. J Am Dent Assoc 2005; 136: 602–6.
10. Yellowitz JA, Horowitz AM, Drury TF, Goodman

HS: Survey of US dentists' knowledge and opinions about oral pharyngeal cancer. J Am Dent Assoc 2000;131:653–661.

11. Rehman S, Khan M. Awareness of Oral Cancer in Undergraduate Medical And Dental Students. J Pak Dent Assoc 2012; 32(3):385-88.
12. Božana Lončar Brzak , Ivana Canjuga , Marinka Baričević , Marinka Mravak-Stipetić. Dental Students' Awareness of Oral Cancer. Acta Stomatol Croat. 2012;46(1):50-58.
13. Ogden GR, Mahboobi N. Oral cancer awareness among undergraduate dental students in Iran. J Cancer Educ. 2011 Jun;26(2):380-5.
14. Uti OG, Fashina AA. Oral cancer education in dental schools: knowledge and experience of Nigerian undergraduate students. J Dent Educ. 2006 Jun;70(6):676-80.

Perception on Healing Rate of Patients after Dental Extraction Regarding their Adherence to Post Operative Care

Supraja.J[1], Surya Ramanan.K.R[1], Srivatsa Kenga Subbiah[2], Vishnu Priya.R[1], Veronica.J[1], Vasu Priyan.R, Varsha.V[1]

[1]CRRI, Thai Moogambigai Dental College and Hospital, Chennai, Tamilandu, India, [2]Professor, Department of Oral and Maxillofacial Surgery, Thai Moogambigai Dental College And Hospital, Chennai, Tamilnadu, India

Abstract

Objective: The understanding and adherence to postoperative care instructions are factors that influence the healing process of the patients after dental extraction. The aim of this study is to analyse the healing rate of the patients who strictly follow and who do not follow the postoperative instructions after dental extraction. **Study design:** One hundred patients with no medical complications who referred for non-surgical extraction were selected for this study. The patients were evaluated a week after extraction regarding their adherence to postoperative instructions. **Results:** 94 patients completed the study. Smoking, drinking of alcohol/ carbonated beverages are the main influential factors in which patients lack their adherence to post-operative care after dental extraction. **Conclusion:** The result of this study revealed no association of age, gender with the healing of the socket. However habit of smoking, consumption of alcohol associated with male gender highly influence the healing rate of patients after dental extraction.

Keywords: *Extraction, Healing, Instruction, Post-operative, Pain*

Introduction

A dental extraction (also referred to as tooth extraction or exodontia) is the removal of teeth from the dental alveolus in the alveolar bone.[1] It is the most common procedure performed in oral surgery and it is performed for variety of reasons in which teeth have become unrestorable through tooth decay, advanced periodontal disease or dental trauma associated with poor prognosis.[2,3] The other reason for extraction is removal of bicuspids for orthodontic treatment to create space.[3] Surgical removal of impacted or partially erupted third molar which may also cause recurrent infections on the gingiva (pericoronitis).[4]

Though each individual has their own capacity to heal, healing after dental extraction mainly depends on the cause of extraction, extraction procedure, and post-operative care.[5,6] Post operative care is influenced by the understanding of the patient and their subsequent implementation to the guidelines presented by the professional.[8]

The main objective of this study was to determine the percentage of healing rate of patients regarding their adherence to post operative care.[7,9]

Materials and Method

A total of 100 patients underwent dental extraction including surgical removal of impacted tooth were selected for this study. The patients chosen for the study were healthy without any systemic complications. The patients excluded from the study were those who could not attend the scheduled appointments, some psychological disorder and with systemic disorders.

Initially the questionnaire was distributed to the patients after a week of dental extraction. The part of the questionnaire contains the brief detail about the patient and the detail about the tooth which is extracted. The questions in the questionnaire were designed to evaluate patient's adherence to post operative care and their healing process.

Corresponding Author:
J.Supraja
E-mail: suprajasubi@gmail.com

Results

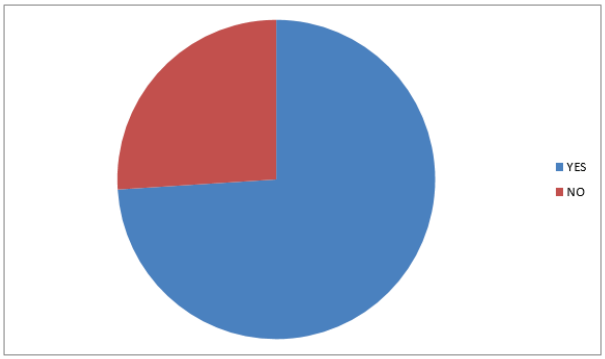


Chart 1: Did you follow the medications prescribed?

74% of patients follow the medications prescribed

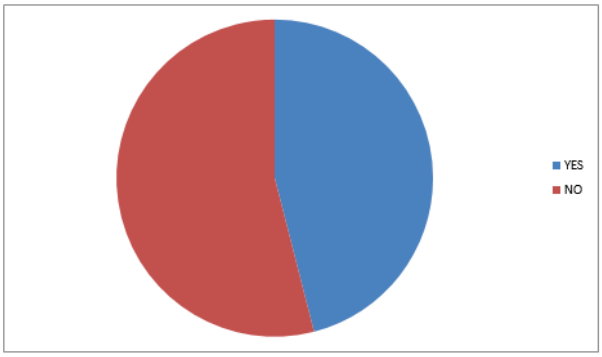


Chart 2: If smoker, did you follow the recommendation of not smoking for a week?

46% of patients follow the recommendation of not smoking for a week

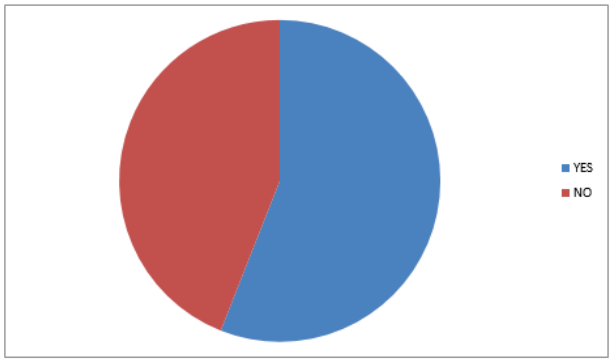


Chart 3: If alcoholic, did you follow the recommendation of not drinking alcohol for a week?

56% of patients follow the recommendation of not drinking alcohol for a week

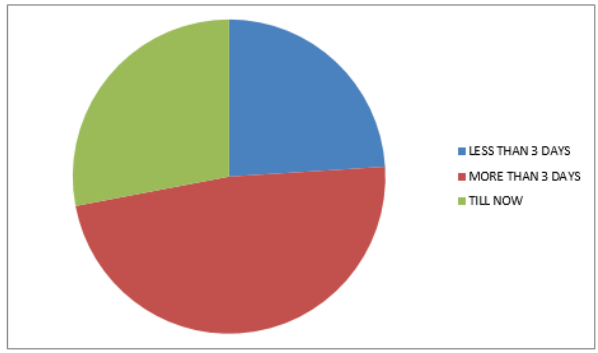


Chart 4: How many days you felt pain in the region of extraction?

24% of patients felt pain for less than 3 days, 48% of patients felt pain for more than 3 days, 28% of patients feel pain till now(after a week)

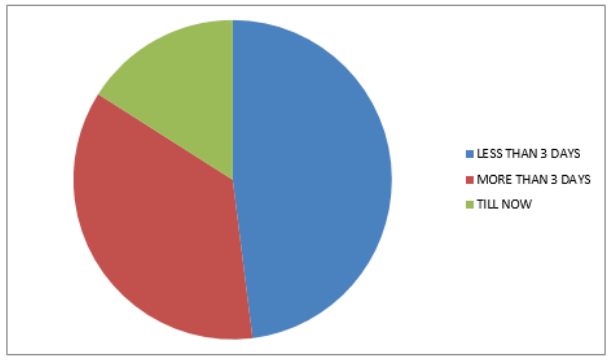


Chart 5: How long does swelling lasts after the extraction?

48% of patients have swelling lasts less than 3 days, 36% of patients have swelling lasts more than 3 days.16% of patients have swelling till now(a week after extraction).

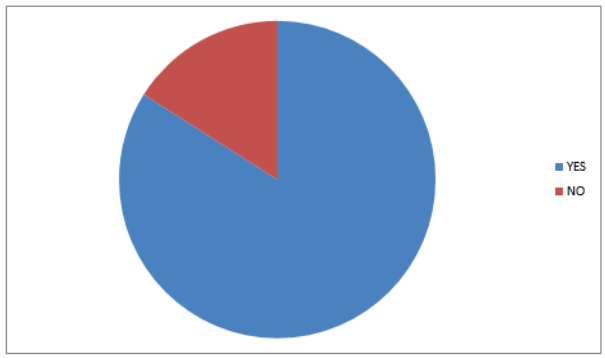


Chart 6: Are you aware that following these instructions influence the healing period?

85% of patients were aware of it

Discussion

The current study was sought to document the perception on healing rate of patients regarding their adherence to post operative care. A detailed survey on patients adherence to their post operative care is

evaluated.[9] Though most of the patients are aware of their post operative care, some of them lack their knowledge and interest on following the instructions told to them.[11]

The understanding and subsequent implementation of the post operative instructions are the factors that influence the healing after the dental extraction.[10] About 74% of patients followed the medicines prescribed, the rest ignored it because of the pain relief.[12] 82% patients followed the instruction of not spitting for next 24 hours, 72% patients followed the instruction of not rinsing with any liquid as all these can dislodge the clot formation after dental extraction which leads to the formation of dry socket. Maximum number of patients (86%) followed the recommendation of maintaining the soft temperature diet since solid and hot foods affect the healing process. Ice pack should be applied on the region of extraction in 15 minutes intervals for the first 36 hours.[6] After 36 hours, moist heat should be used instead.[8] These instructions are followed by 74% of patients.

About 92% patients followed the instruction to brush gently on the region of extraction. Rock salt water gargling is recommended to the patients after extraction, 85% of patients followed the instruction. When the question was asked about the use of carbonated beverages, only 40% of patients followed the recommendation of not drinking the carbonated beverages for a week, the rest were not aware of the instruction. The poor response was obtained when the question was asked to patients about the following of recommendation of not to disturb the region of extraction with tongue, only 36% of patients followed it, the rest were not aware of the instruction and did not follow it.[13,14]

The next question was asked to smokers, that whether they followed the recommendation of not smoking for a week, as it highly affect the healing process after extraction.[16] Smoking after extraction results in dry socket, as the clot moved out of place due to the sucking action used to draw the smoke from the cigarette.[15] Only about 46% of patients followed the recommendation of not smoking for a week. Similarly, the question was asked to alcoholic patients about the recommendation of not drinking alcohol for a week after extraction as it dislodge the blood clot and affects healing.[17] Only 56% of alcoholic patients followed the instruction, the rest ignored it.[18] These poor response has taken into consideration and awareness on effects of smoking and consuming alcohol in healing of tooth socket after extraction should be taught to the patients.[18,19] About 63% of patients follow the recommendation of using mouth washes for a week after extraction.

When question is asked to patients about the pain they felt after extraction, 24% of patients felt pain for less than 3 days, 48% of patients felt pain for more than 3 days, 28% of patients feel pain till the survey (a week after extraction).[19] About 70% of patients experienced normal pain, where 30% of patients felt aggrevating pain. On questions about swelling at the region of extraction 48% of patients have swelling lasts less than 3 days, 36% of patients have swelling lasts more than 3 days, 16% of patients have swelling till the survey (a week after extraction).[18] About 12% of patients encountered other complications after the extraction. About 85% of patients are aware about the instruction given and their influence on healing process after extraction. The overall level of awareness among patients to follow the post operative care is fairly good, it is about 85%.[20,21]

Conclusion

This study is to create the awareness and properly educate the patients about the post-operative instructions and complications and factors affecting, after extraction due to the non-compliance to the post-operative care. The habit of smoking and consumption of alcohol or carbonated beverages for a week after dental extraction influences the healing rate, it is associated with male gender. Hence awareness should be created on effects of smoking and alcohol on healing of socket to patients. It is very important to provide full details of the post-operative instructions to the patients as it promotes healing after tooth extraction. The result of this study revealed no association of age, gender with the healing of the socket. The patients who followed the post-operative instructions healed faster than the people who did not follow the instructions.

Conflict of Interest: There are no conflicts of interest.

Source of Funding: Self –sourcing.

Ethical Clearance: Ethical committee approval is obtained from the university (DR.MGR EDUCATIONAL AND RESEARCH INSTITUTE, MADURAVOYAL, CHENNAI).

References

1. Alvira-González J, Gay-Escoda C. Compliance of postoperative instructions following the surgical extraction of impacted lower third molars: A randomized clinical trial. Med Oral Patol Oral Cir Bucal. Mar 2015; 20(2); 224–230.
2. Faheem, Samra. *Patients Compliance and Follow-Up Rate after Tooth Extraction.* IOSR Journal of Dental and Medical Sciences. May 2017; 16(5); 115-120.
3. Akpata, O., Omoregie, O. F., and Owotade. F. Alveolar Osteitis: Patients' compliance to post-extraction instructions following extraction of molar teeth. Nigerian Medical Journal. 2013; 54(5); 335–338.
4. Alexander, R. E. Patients' understanding of postsurgical instruction forms. Oral Surgery Oral Medicine Oral Pathology Oral Radiology. 1999; 87(2); 153-158.
5. Amaratunga, N. A., and Senaratne, C. M. A clinical study of dry socket in Sri Lanka. British Journal of Oral and Maxillofacial Surgery. 1988; 26(5); 410-8.
6. Vallerand, W. P., Vallerand, A. H., and Heft, M. The effects of postoperative preparatory information on the clinical course following third molar extractions. Journal of Oral and Maxillofacial Surgery. 1994; 52(11); 1165-1170.
7. Kathreena, K. et al. Patients' Compliance to Post-surgical Instructions. International Journal of Dental and Oral Health. 2017; 1(1); 38-45.
8. D. Blinder, L. Rotenberg, M. Peleg, and S. Taicher. Patient compliance to instructions after oral surgical procedures, International Journal of Oral and Maxillofacial Surgery. 2001; 30(3); 216-219.
9. E. T. Adebayo and M. Dairo. Patients` compliance with instructions after oral surgery in Nigeria. Journal of Community Medicine and Primary Health Care. 2005; 17(1); 38-44.
10. Sayah, C. Janus, and D. M. Laskin. Patient's knowledge of oral and maxillofacial surgery terminology. Journal of Oral and Maxillofacial Surgery. 2014; 72(6); 1040-2000.
11. M. Eshghpour, A. Moradi, and A. H. Nejat. Dry Socket following Tooth Extraction in an Iranian Dental Center: Incidence and Risk Factors. 2013; 2(3); 86-91.
12. Weiner NF, Lovitt R. An examination of patients understanding of information from health care providers. Hospital and Community Psychiatry. 1984; 35(1); 619-620.
13. Mayeaux EJ et.al. Improving patient education for patients with low literacy skills. Am Fam Physician. 1996; 53(1); 205-211.
14. Taylor EM, Ramsay MP, Bunton L. Do our patients understand? A comparison of understanding in adult patients and schoolchildren. N Z Med J 1998; 111(1); 449- 451.
15. Arnet I, Schoenenberger RA, Spiegel R, Haefeli WE. Conviction as a basis for compliance and strategies for improving compliance. Schweiz Med Wochenschr 1999; 129(41); 1477-1486.
16. Katz, LG. The use of printed instruction sheets to enhance patient compliance. Semin Dermatol. 1991; 10(2); 91–95.
17. Lovitt, TC, Smith, JO. Effects of instructions on an individual's verbal behavior. Exceptional Child. 1972; 38; 685–693.
18. Monaco, G., Staffolani, C., Gatto, M. R., and Checchi, L. Antibiotic therapy in impacted third molar surgery. European Journal of Oral Science. 1999; 107(6); 437-41.
19. U. Khitab, A. Khan, and S. M. Shah. Clinical characteristics and treatment of dry socket –a study. Pakistan Oral and Dental Journal. 2012; 32(2); 206-209.
20. Azenha MR, Kato RB, Bueno RBL, Neto PJO, Ribeiro MC. Accidents and complications associated to third molar surgeries performed by dentistry students. Oral Maxillofac Surg. 2014 Dec; 18(4); 459-464.
21. Khan A, Khitab U, Khan MT. Mandibular third molars: pattern of presentation and postoperative complications. Pakistan Oral & Dental Journal. 2010 Dec; 30(2):307-312.

Estimation of Copper and Zinc Levels in Oral Cancer Patients

Leya Mathews[1], Saveetha[2], Shyamala Chandrasekar[3]

[1]BDS Student, Saveetha Dental College, [2]Senior Lecturer, Department of Oral Pathology, Saveetha Dental College, [3]Professor, Department of Orthodontics, Saveetha Dental College, Saveetha Dental College , Saveetha University – Chennai

Abstract

Background: Prevalence of oral cancer is high in India , other Asian countries, Brazil and France. Micro nutrients like copper and zinc are increasingly recognized for their role during the onset and progression of pre malignant and malignant oral lesions.

Aim -To determine serum levels of copper and zinc among oral cancer patients

Objective -To estimate and compare the serum levels of copper and zinc in healthy and cancer patients and to derive Cu/Zn ratio, to establish a possible relationship between micro nutrients and oral cancer.

Materials and Method - 25 patients clinically diagnosed with oral cancer (study group) and 25 healthy individuals (control group) in the age group of 30-50 years were included in the study. Blood samples were collected and serum copper and zinc values for both cancer and control group were estimated using ERBA CHEM 5 semi auto analyser. Mean and standard deviation of serum copper and zinc values for both the groups were determined and compared. .

Results- Significantly higher values ($p < 0.04$) were noted for serum copper level (mean value 249.39 ± 58.3 µg/dl) for study group compared to control group (123.95 ± 16.2 µg/dl). However there was no significant difference in serum zinc values between both the groups.

Cu /Zn ratio of 1.43 and 2.86 for control and study group respectively was derived from the above estimated value

Conclusion -Mean serum copper value in study group was significantly higher than in the control group mean may be considered as a biological marker for oral cancers.

Keywords : *Zinc , copper , oral cancer , serum levels, micronutrients*

Introduction

Oral cancer is one of the most prevalent and 6th most common type of cancer in the world [1]. Prevalence of oral cancer is higher in, India, Asia Brazil and France compared to other countries globally. Incidence and distribution vary by age, ethnic group, culture and lifestyle associated factors [2]. Alcohol, viruses, genetic mechanisms, candida, and chronic irritation have modifying effects on the etiology of oral cancer .Tobacco can cause genetic damage and can lead to development of oral cancer. Smoking and alcohol consumption are major risk factors. [3]. It mostly affects the tongue, buccal mucosa, gingivae, lips, and palate [4] .It was also found that higher intake of fruits and vegetables had lower risk of oral cancer but an unbalanced diet has been related to an elevated risk. [5]

Clinical and histopathological examination of oral lesions plays a major role in the diagnosis of oral cancer. In addition, it has been reported that levels of trace elements or micro nutrients such as copper, zinc, iron

Corresponding author:
Leya Mathews
Mail – leahmathews23@yahoo.com

and selenium are altered in serum, plasma and tissues of pre malignant oral lesions [2] [6]

Copper, zinc, iron are chemical elements required in minute quantities for vital biochemical reactions such as free radical formation and cellular homeostasis[2]. The enzymes of trace elements are an important part of certain biological and chemical reactions. [7]. Zinc is also an important constituent of biological bio membranes and contributes to membrane stability. It modulates activities of ribonucleic acid and deoxyribonucleic acid polymerase enzymes [8, 9].The need of zinc for a healthy immune system, cell division, skin, hair, and muscle growth cannot be overemphasized.

Copper is involved in the release of energy during cell formation of red blood cells, collagen production, and iron absorption.

However, it was found that there is a potential link between trace elements and carcinogenesis. The ratio of copper to zinc is also believed to be a reliable biomarker in the development and progression towards malignancy [10]. Copper and zinc are often recognized for their possible role in the prevention and modulation of diseases but recent studies have proved increased level of copper and decreased level of zinc in cancer [11].

The present study was undertaken to evaluate and compare the levels of copper and zinc in the blood serum of normal and patients with oral cancer.

Materials and Method

The sample for the present study consisted of 50 individuals. 25 healthy individuals from the outpatient clinic accepted to participate in the study as controls. 25 patients diagnosed with oral cancer were included as the observational study group from the outpatient department, Oral Cancer Institute of Sabetha dental college. The study was approved by the Institutional Ethical Committee and informed consent was obtained from the patients prior to the blood sample collection. The participants were chosen based on the following inclusion and exclusion criteria. Inclusion criteria included patients diagnosed with carcinoma, in the age group 30 – 50 years, and for control group, healthy individuals with no history of systemic disorders were chosen. Exclusion criteria included immuno compromised adults, patients diagnosed with endocrine disorder, coronary artery disease and infectious diseases like tuberculosis or syphilis. Methodology included collection of 5ml of blood sample under absolute asepsis and transferred to acid washed test tubes .The blood collected was centrifuged at 2500rpm for 15 minutes and preserved in a frozen state until analysis. The samples were then analyzed using ERBA CHEM 5 semi auto analyzer. Serum levels of zinc and copper were assessed with the help of reagents provided.

The data obtained, was statistically analyzed using the SPSS software. Range of values of all the samples for serum copper and zinc were evaluated and grouped (Tables Me, II). Mean and standard deviation for serum copper and zinc of both the groups were determined and compared for statistical significance $p<0.05$ (Table III). Cu/Zn ratio was then derived from the above estimated value.

Results

Analysis of the data revealed that serum zinc values ranged from 60 µg/dl to 119 µg/dl in both the groups. (Table I). However a maximum of 8 samples were in the range of 100- 109 µg/dl in controls , and a maximum of 7 samples were in the range of 90 - 100 µg/dl in the study group. The mean value for serum zinc in control group was 86.64±17.4 µg/dl ,while the serum zinc level in the study group was found to be 85.17±14.98µ/dl (Table III). There was no statistically significant difference in the mean serum zinc values between study and control groups.

Table 1 Frequency table and range of serum zinc values

Zinc serum level observed in the study	No. of samples in cancer study group (n=25)	No. of samples in control group (n=25)
60-69 µg/dl	3	3
70-79µg/dl	2	4
80-89µg/dl	4	5
90-100µg/dl	7	5
100-109µg/dl	3	8
110-119µg/dl	6	0

On the contrary, the serum copper level ranged from 180-340ug/dl in study group while in the control group it varied from 110-160ug/dl. (Table II). A maximum of 8 samples were in the range of120-129 µg/dl in the control

and a maximum of 8 were in the range of 300-339 µg/dl in the study group. The mean serum copper values were found to be higher in study group 249.39±58.3 µg/dl, compared to that of healthy control group 123.95±16.2 µg/dl. (Table III). Mean serum zinc levels showed no changes.

Cu /Zn ratio was1.43 and 2.86 for control and study group respectively.

Table II a	
Serum copper level in control group	**No of samples (n=25)**
110-119µg/dl	4
120-129µg/dl	8
130-139 µg/dl	5
140-149 µg/dl	4
150-159 µg/dl	4

Table II b	
Serum copper level in study group	**No of samples (n=25)**
180-219µg/dl	6
220-259µg/dl	5
260-299µg/dl	6
300-339µg/dl	8

Table II : Frequency table and range of serum copper values in control (Table IIa) and study groups(Table II b)

Table III: Mean values and standard deviation of serum copper and zinc values

Trace metals	**Mean Value ± sd in Control Group**	**Mean Value ± sd in Study Group**	**p value**
Zinc	86.64±17.4µg/dl	85.17±14.98µg/dl	0.67
Copper	123.95±16.2µg/dl	249.39±58.3µg/dl	0.04
Cu/ Zn Ratio	1.43	2.86	

$p < 0.05$value

Discussion

Trace elements Copper (Cu), zinc (Zn), selenium (Se) and molybdenum (Mo) are required in small concentration and have important role in many biochemical reactions. They are essential for proper functioning of life supporting processes and are an essential component of biologically active constituents [13, 14]. Copper is found in plasma (90-95%) as part of oxidative enzyme ceruloplasmin [15]. It is also a part of various enzymes like tyrosinase, cytochrome oxidase etc., and participates in oxidative process in cell metabolism. Zinc another micro nutrient is essential for gene transcription and cell multiplication and critical for activation of RNA and DNA polymerase activity. Decreased zinc levels are associated with increased oxidative stress at cellular level [16].

The normal serum copper and zinc levels are 0.6 - 1.6µg/ml and .6 -1.5µg/ml respectively where atomic absorption spectrometry has been used for analysis [17]. Others [10] have reported 114.20±38.69 mg/dl, 64.57±31.54 mg/dl as copper and zinc values respectively in their control sample by means of calorimeter. The values of these trace elements estimated in the present study were performed with ERBA CHEM 5 semi auto analyzer.

Concentrations of copper when exceeds the optimal level turns toxic. It breaks down the DNA strands or modifies the bases and deoxyribose. [12]. Sliwinski et al observed that zinc did not induce DNA damage in normal cells but exerted a protective effect against DNA damaging agents but increased cytotoxic effect on cancer cells[11] . A number of studies have estimated copper and zinc levels in serum, blood and saliva in various carcinomas especially oral squamous carcinoma and have established a positive correlation with the incidence of malignancy. Significant alteration in serum levels of the trace elements have been reported in head and neck cancer, lung and breast cancer [2, 18]. The increased levels of copper and zinc in cancer reported earlier have been 209.85± 160.28 mg/dl, 113.51± 52.30 mg/dl respectively [10] . In the present study, copper showed a significant increase [249.39±58.3µg/dl] in oral cancer group compared to control group [123.95± 16.23µg/dl]. Similar findings have also been reported by Khanna et al, Amitkumar et al, Yunus et al, Ayinam pudi BK, Jayadeep A et al and Shetty SR et al. [2, 6, 10, 17, 19, 20, and 21] they observed increased copper levels in sera of patients in oral pre malignant and malignant patients.

The increased level of serum copper in OSMF patient was attributed by Khanna et al to high copper content in areca nut, the major physiological factor in the pathogenesis of OSMF [17] it initiates fibrin genesis and inhibit collagen degradation. It has also been explained that increase in serum copper levels in cancer patients is a consequence of increased production of copper containing ceruloplasmin an oxidative enzyme which is precipitated by an inflammatory response to cancer or decrease in catabolism by serum ceruloplasmin [16] . Jayadeep et al also suggested that rise in copper levels might be due to increased turnover of ceruloplasmin, a copper carrying globulin with oxidative activity [19] .

Review of literature indicates low serum zinc level in several forms of cancer like cancer of breast, gallbladder, lung, colon and oral cancer [22, 23] . Serum zinc level in a present study did not reveal a similar finding. The serum zinc level among cancer patient in the present study was marginally lower or similar to control group. Contrary to this finding statistically significant decrease in mean serum zinc levels have been reported by various other studies [18, 20, and 24]

Amit kumar et al [6] suggested that zinc deficiency impair protective mechanism designed to protect against DNA damage, enhance susceptibility to DNA damaging agents and ultimately increased risk of cancer

Increased copper zinc ratio seen in oral sub mucous fibrosis (OSMF) and oral squamous cell carcinoma (OSCC) was also noticed in patients with pancreatic cancer, breast cancer, lymphoma etc. Yunus et al concluded that alterations in serum copper, zinc, copper zinc ratio can be used as potential biomarkers in early detection of oral pre cancerous lesion and their malignant transformation to frank cancer at early stages [2].In the present study the ratio was 1.43 in control, and increased to 2.86 in the study group, probably due to increased copper values. Other reports have shown that Cu/Zn ratio was 0.97 in health and 1.10 in cancer patients, but the diff was not statistically significant [17,25].

This study confirms the earlier reports on the possible relation between serum copper level and oral cancer and can be considered as a biochemical marker for oral cancer, but needs further evaluation on a larger sample including patients with oral premalignant lesions.

Conclusion

Trace element copper level in oral cancer patients did

show a significant increase compared to control group. Serum zinc level however did not show any difference between study and control groups. Alterations in serum copper level are suggestive of its important role in oral carcinogenesis and needs further research on larger population.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. Krishnaswamy K , Prasad MP, Krishna TP , Annapurna VV , Reddy GA. A case study of nutrient intervention of oral precancerous lesions in India. Eur J Cancer B Oral Oncol 1995; 31: 41-8
2. Shaikh Mohd Yunus ,Prakash Gadodia,Ritish Wadwani,Namratha N Patil,Vinod Kumar Patil.,Vanita Murgod, Abhishek Singh Nayyar. Estimation and comparison of serum levels of copper,Zinc, Cu/Zn ratio as markers of disease activity in oral submucous fibrosis(OSMF) and oral squamous cell carcinoma(OSCC) patients. Clinical cancer investigation Journal. 2017; 6(1), 51-55
3. Bouquot H,Whitaker SB.Oral leukoplakia rationale for diagnosis and prognosis of its clinical subtypes or phases. Quintessence Int.1994;25:133-40
4. Paul RR , Chaterjee J , Das AK , Cerevera ML, de la Guardia M , Chaudhari k . Altered elemental profile as indicator of homeostatic imbalance in pathogenesis of oral sub mucous fibrosis. Biol Trace elem Res 2002 ; 87:45 -56
5. Winn DM .Diet and Nutrition in the etiology of oral cancer . Am J ClinNutr , vol 61 , pp.437 -445 , 1995
6. Amit kumar, Suchetha Kumar,Dharnappa Poojary, Hiren Darji,Rashmi, K.S.Estimation of serum Micronutrient Levels and The Possible Risk of Oral Cancer And Premalignancy. International Journal of Research in Science Engineering and Technology 2014; vol 13:issue 1,8360-4
7. World Heaith Organisation .Trace elements in human nutrition and health 1996.
8. Cho GS, Han MW, LeeB, RohJL, Choi SH, ChoKJ et al Zinc deficiency may be a cause of burning mouth syndrome, zinc replacement therapyhas therapeutic effects.J Oral Pathol med 2010; 39:722-7
9. ShettyR ,Babu S , Kumar S , Shetty P, Vijay R, Karikal A.. Role of trace elements in oral pre cancer and oral cancer – A biochemical study. J Cancer Res Treat 2013; 1 : 1-3
10. Maryam Baharvand, SoheliaManifar. Reihaneh, Hamed MortaZavi, Siamak Sabour .,Serum levels of ferritin, copper and zinc in patients with oral cancer. Biomedica,l Journal ;2014;37 :331-336
11. Sliwinski T[1], Czechowska A, Kolodziejczak M, Jajte J, Wisniewska-Jarosinska Zinc salts differentially modulate DNA damage in normal and cancer cells. CellBiol Int. 2009 Apr;33(4):542-7.
12. TheophandesT ,AnastassopoulouJ.Copper and carcinogenesis . Critt Rev OncolHematol 2002 ;42:57-64
13. Schwartz,M.Rok of trace elements in cancer. Cancer Res.1975 ;35:3481-7.
14. Braverman. ER, Pfeiffercc. Essential trace elements and cancer orthomol Psychiatry 1982 ;11(1):28-41
15. Sham berger RJ.Antioxidants and cancer Se-sex and age adjusted human cancer mortality. Anh Environ_Health 1976;31:231-3
16. Andrews GS. Studies of plasma zinc, copper,cerulo plasmic and growth harmone with special reference to carcinoma of the bronchus J.Clin Pathol 1979;32:(4) 325-33
17. SunaliKhanna,A.C.Udas,G.KiranKumar,S. Suvarna,F.R.Karjodkar,Trace elements (copper,zinc,selenium and molybdenum) as marker in oral submucous fibrosis and oral squamous cell carcinoma.J Trace Elem Med Biol 2013;27:307-311.
18. Vashistha A,Singh.M, Chaudhary.M, Kaur.G, Alterationsinserumlevelofcopper,iron,zinc,vitamin c and lipid profile in patients with oral cancer and oral submucous fibrosis J.Chem.Pharm.Res 2015;7:261-265
19. Jaya Deep.A,Raveendran.P.K,Kannan.S,Naline Kumar K.R,MathewB, Krishnan NM, Serum levels of copper,zinc,iron,ceruloplasmin in oral leukoplakia and squamous cell carcinoma.J.Exp. Clin.Can.Res 1997;16:295-300
20. Jha IN,Singh HB, Prasad V,Serum Copper/Zinc ratio in oral Carcinoma. Indian J.Med.Res.1985;81; 602-6

21. Ayinampudi BK,Narasimhan M,Salivary Copper and Zinc levels in premalignant and malignant lesions J.oral maxilla pathol 2012;16:175-802
22. Margalith EJ,Schenker JG, Chevion M, Copper and Zinc levels in normal and malignant tissues. Cancer 1983;52:8672
23. Estimation of Serum Copper, Zinc and Iron in Patients with Oral Cancer . Keerthika*, Vishnu Priya V, Gayathri.R Saveetha Dental College Chennai . Int. J. Pharm. Sci. Rev. Res. 39(1) , August 2016 , 251-254
24. Varghese I, Suganathan CK, Balasubramaniyan G, Vijaykumar T,Serum Copper and Zinc levels in pre malighnant & malighnant lesions of oral cavity. Oncology 1987;44:224-7
25. Copper and Zinc Level in Oral Submucosal Fibrosis (OSMF) Patients. Srilekha. M Saveetha Dental College. Journal of Pharmaceutical Sciences and Research Vol. 7(8), 2015, 573-574

Prevalence of Black Stains in School Going Children in age Group 6-12 Years

Leya Meriam Mathews[1], Dhanalakshmi Ravikumar[2]

[1]Graduate Student, Saveetha Dental College, Saveetha University, Chennai, [2]Senior Lecturer, Department of Paedodontics, Saveetha Dental College, Saveetha University

Abstract

Introduction: Black stains are extrinsic discoloration in primary dentition that can also occur along with dental caries. It clinically presents as pigmented, dark lines or as an incomplete coalescence of dark dots rarely extending beyond the cervical third of the crown. This has often been a concern of dental aesthetics and its frequent recurrence, makes it necessary to find the causative factor and the treatment needed.

Materials and Method: In this cross sectional study, 93 children aged between 6-12years were examined clinically for the presence of black stains using mouth mirror and dental probe by one examiner. The DMFS / deft index were recorded in children with and without black stains.

Results: In the limited sample size recorded, it was observed that 11 children had black stains. Black stains were also found along with dental caries in 3 children. The p value was 0.85373, found to be insignificant

Conclusion: The prevalence rate of black stains is estimated to be 10% from the sample size, as per data collected, Black stains can occur along with caries but the incidence is less. In conclusion , the results of our study , indicates the prevalence of caries along with the black stains in children within the age group 6-12 years , highlight the need to do further investigations

Keywords **:** *Stains, intrinsic , extrinsic, iron , children , black stains, caries*

Introduction

Tooth discoloration can be defined as any change in the color, hue or translucency of a tooth due to a cause. It is an altered physical appearance of the tooth which is a common clinical finding and a concern of aesthetics, found more often among the children thereby having significant effects on their personality and self-confidence. There are several causes of tooth discoloration like food, drinks, poor dental hygiene, and medications [1].

Corresponding Author :
Dr Dhanalakshmi Ravikumar
Senior Lecturer , Department of Paedodontics, Saveetha Dental College., Saveetha Institute of Medical and Technical Sciences , Saveetha University , 162 Poonamalle High Road , Chennai 600077, Tamil Nadu, India . Phone :9003821299.
Email : leahmathews23@yahoo.com

Tooth discoloration can vary based on their location, etiology, appearance and composition. Historically, tooth discoloration can be classified, based on their location, to extrinsic, intrinsic and internalized [2]. Intrinsic Discoloration refers to the change that occurs due to the disturbance in the structural composition or thickness of the dental hard tissues. It occurs when the tooth structure is penetrated by pigmented materials, usually during tooth development. Extrinsic discoloration refers to the deposit or stain that occurs on the surface of the tooth or in the acquired pellicle. The origin of the stain might be metallic or non-metallic. Internalized discoloration is the presence of an external stain within the tooth following dental development. It is mostly seen in case of any enamel defects and in the porous surface of dental caries. This stain or discoloration can also be an acquired defect due to tooth wear, gingival recession and restorative materials [3, 4].

A common extrinsic discoloration is the black stain which appears as a dark line or an incomplete

coalescence of dark dots formed on the cervical third of the tooth and following the contour of the gingival margin, firmly attached to the tooth surface. It affects mostly the primary dentition and its prevalence seen in both the sexes [5]. Black stain is a form of dental plaque that covers a great surface of the tooth including the grooves, pits and fissures.

According to Ried et.al, the black pigmentation is considered to be an insoluble ferric compound, most likely a ferric sulfide, which arises from the interaction in the saliva or gingival fluid between hydrogen sulfide produced by the bacteria present in the periodontal environment and iron [6]. The microbiological composition of Black stain is hypothesized to be bacterial strains of Acitnomycetes, Lactobacillus and prevotella melaningenica [7].

The origin of Black stain has been discussed for over a century, since 1890. However, the criteria to diagnose the black stain have still not been established. Shourie used the following criteria for classifying black stain: 1) no line 2) incomplete coalescence of pigmented spots and 3) a continuous line formed by the pigmented spots. Further additional classification by Koch et.al, depending on the size of the spots and the presence of cavitation on the tooth surface, and, depending on the area of the tooth surface have also been used in different studies [8].

Tooth discoloration has been frequently associated with medical problems and sometimes due to certain medications or even restorative treatment. Few of the conditions like malnutrition, rubella, measles, and developmental disorders like gametogenesis imperfect show black stain as one of the manifestation. Another important differential diagnosis is the dental caries. Most of the studies show the occurrence of Black stain with lower caries experience which could imply that caries resistance in children with black stain could be a result of lower caries activity than a localized effect [9].

This study was done to find the prevalence of black stain in school children, aged 6-12 years, among the Chennai population. The children were also asked about their families and their place of residence to help evaluate the risk factors associated with the black stain.

Materials and Method

Sample Selection

A total of 93 children were aged from 6-12 years of age, were examined for black stains from the areas of Old Washermenpet and Perangallthur, Chennai. None of the children had any systemic or infectious diseases and were both physically and mentally well. A written informed consent was obtained from the parents of all the children enrolled in this study. The inclusion criteria and exclusion criteria were as follows;

Inclusion Criteria

- Age group 6-12 years
- Children with black stains

Exclusion Criteria

- Immunocompromised Patients
- Children with any systemic disease
- Enamel hypoplasia

Clinical Examination for Black Stains

The Clinical examination was performed under natural light with plane mouth mirrors and dental probe in the community halls of the respective places. The diagnosis of the black stains was examined based on the criteria given by Shourie and Koch et.al. [8].

A record was maintained for every child with Black stain, where the vestibular and the palatal surface was registered for the maxillary teeth and the vestibular and the lingual surface was registered for the mandibular teeth. In order to record the pigmentation location and extension, every tooth surface illustrated was segmented into three sectors – gingival, middle third and the incisal or occlusal surface.

The DMFS/deft index was recorded in children with and without black stains. The PUFA/pufa index was also recorded to check for any visible pulp, ulceration of oral mucosa, fistula and abscess, if present.

Statistical Analysis

After the examination, the data was processed and a statistical analysis was done using the Social Science Statistics Software for Windows, Version 20.0. Statistical Significance was considered at 5%.

Results

Out of 93 children examined, black stains were

observed in 11 children, 10.23 % of the sample size. 7 children belonged to the age group 6-9 years and 4 of them in the 10 -12 years of age. 82 children did not have any black stains, 76.26% of the sample size. Black stains were found to be more prominent in the lower age group as shown in Table 1

Table 1 - Number of children with Black stains and without

Age group	Black stains (%)	Non - Black stains
6years-12years	7 (6.27)	46 (46.73)
10years-12years	4 (4.73)	36 (35.27)

Dental caries were observed in 3 children black stains. It was observed that in Children without any black stains, dental caries were present in 45 children. (Table 2). The prevalence of caries was found to be insignificant ($p>0.05$)

Table 2 – Prevalence of caries and p value in children with and without black stains

	Black stains	Non - Black Stains	P value
Caries Present	3 (5.68) [1.26]	45 (42.32) [0.17]	0.853
Caries Absent	8 (5.32) [1.35]	37 (39.68) [0.18]	0.853

Discussion

This study was done to estimate the prevalence of black stains in children aged from 6 to 12 years. Additionally, this study helps to show the association between black stains and dental caries in a population based study. Out of 93 children examined, only 11 children were observed with black stains, indicating this type of condition, as a rare disorder, as shown in Table 1. This rare condition observed in this study agrees with other studies which showed similar results [10, 11]. Most of the studies took place in 1970's in different countries. Brazilian studies show a prevalence of 9.3 % of black stains for children aged from 6-13 years of age and 2.5 % for children aged from 3-5 years from different areas of the country [12]. Koch et.al reported a prevalence of 19.9% for school children, aged 7-15 years in Switzerland and 4.6% for children aged 6-10 years in Germany [8]. The different prevalence recorded in different studies could be due to different habitats and lifestyles of different populations, which could be possible etiological factors.

Though etiology behind the formation of black stains still remains unknown, studies show a possible correlation between various risk factors and black stains. Various etiological factors include gender, socioeconomic factors like maternal education, family income, and diet and fluoride level in water consumed. These factors were also commonly associated with the development of caries [13]. With this understanding, Franco et.al found a significant association between black stains and lower income. Children from families with lower income showed a higher prevalence of black stains [14]. Consumption of vegetables, fruits and dairy products also consume black stains development. Certain studies contradict to the fact with the association between sex and black stains prevalence. However, due to insufficient data, the etiology still remains unclear making it difficult to distinguish factors associated with its formation [15, 16].

The association between dental caries and black stains is debatable because of the varying results from different studies. Gallardo et.al stated that there is no association between dental caries and black stains [13]. Contradicting to this, other studies show similar findings demonstrating lower level of caries experience along with black stain Gasparetto et al. Showed a negative correlation between black stains and dental caries, but did not find any association between the presence of black stains and caries prevalence. Similarly, Koch et

al. found a tendency for children with black stains in primary dentition to present less dental caries, but the difference was not statistically significant [8,17] . Other Findings show that both black stains and dental caries had common co-variables, like socioeconomic factors and behavioral which could be reasonable enough to help hypothesize that there could be a possible association [12].

The results of our study suggest that black stains can occur along with dental caries as shown in Table 2. The data revealed that the prevalence of caries in this study was lower among the children with black stains (0.3%) than those of without black stains (36%) ,this finding is in accordance with study done by Gasparetto A et al.10 , Koch et al.8. and Sutcliffe [18] . The mean DMFS values were found to be statistically significant between children with black stains and those without black stains. The mean value of DMFT was 1.5 ± 0.7, which is a bit higher than the mean value observed in another study done in Udaipur for the same age range, which tells us the need for further exploration to find the causative factors responsible [19].

Various hypotheses relating to caries development and black stains have been put forward to understand the biological interaction between microbiota related to the extrinsic pigmentation. Morphological stains reported by Ried et.al and Thaelide et.al confirmed that this kind of stain is a special kind of dental plaque characterized by its flora and its tendency to calcify . The most prominent organisms involved are Actinomyces and Prevotella melaninogenicus. The tendency towards calcification within the black material benefits a high level of calcium and phosphate that gives to a reduction in the enamel dissolution and an increase in the buffering capacity [6, 20]. The saliva of the children with black stains showed a higher content of total calcium, inorganic phosphates, copper, sodium and total protein and less glucose than in controls [21].

With this understanding, and the inverse relationship between dental caries and calculus stated by Duckworth and Hunnigton, Gasperrato et.al proposed that calcium and phosphate are part of the reaction for black stain formation and together with fluoride and pH conditions are the main tooth remineralization components. Because caries development is a demineralization process due to the acids produced by oral bacteria, the presence of a larger amount of minerals in the oral cavity – which could be the case in children with black stains – increases the remineralization process, to keep the oral cavity in a balanced equilibrium and reducing the risk for caries development [12].

Another hypothesis states that low cariogenic oral micro flora is associated with the presence of black stains. The bacteria related to black stains could establish a competitive environment for bacteria related to caries development, impairing the adhesion of these bacteria to dental surfaces or changing the characteristics of the dental biofilm, reducing the potential for caries to develop [22].

The management of extrinsic stains involves proper diet and maintaining oral hygiene. Whitening toothpastes with abrasives help remove extrinsic stains. Other methods include Selective polishing , where polishing is done over a specific tooth using prophylactic angle and rubber cup , with the right toothpaste and use of prophylactic paste , air jet polishing , ultrasonic scaling etc. . However, due to unclear etiology, black stains have a tendency to recur and frequent use of these modalities can lead to enamel removal, which is highly undesirable [23].

In conclusion , the results of our study , indicating the prevalence of caries along with the black stains in children within the age group 6-12 years , highlight the need to do further investigations and statistical analysis with multivariable analysis to help understand the biological mechanism. This in turn will help find a possible solution to help treat this condition.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. In Jablonski S Dictionary of dentistry (1992) ,p253 retrieved from http://www.reference.md.files
2. Addy M, Moran J. Mechanisms of stain formation on teeth, in particular associated with metal ions and antiseptics. Adv Dent Res. 1995; 9(4):450-6.
3. Watts a, Addy M. Tooth discoloration and staining: Tooth discoloration and staining: a review of the literature. Br dent J. 2001; 190(6):309-16.
4. Priyanka.S.R, Dr.Veronica .Tooth discoloration due to endodontic materials and Procedures (Saveetha

Dental College, Saveetha University, India). JDMS 2013 : 9(4) : 32-36

5. Rachid F, Mehdi HE. Black Stains in Primary Teeth: Overview. Pediatr Dent Care. 2016; 1(123):2.
6. Reid JS, Beeley JA, MacDonald DG. Investigations into black extrinsic tooth stain. J Dent Res; 56(8):895-9.
7. Shah HN, Bonnett R, Mateen B, Williams RA. The porphyrin pigmentation of subspecies of Bacteroides melaninogenicus. Biochem.J. 1979; 180(1):45-50.
8. Koch MJ, Bove M, Schroff J, Perlea P, García-Godoy F, Staehle HJ. Black stain and dental caries in schoolchildren in Potenza, Italy. ASDC journal of dentistry for children. 2001; 68(5-6):353-5.
9. Heinrich-Weltzien R, Bartsch B, Eick S. Dental caries and microbiota in children with black stain and non-discoloured dental plaque. Caries Res. 2014; 48(2):118-25.
10. Caldas CT, Mialhe FL, Silva RP. Prevalence of extrinsic black dental stains and its relation to dental caries in the municipality of Santa Terezinha de Itaipu—PR. Rev Fac Odontol UPF. 2008; 13:22-6.
11. Franco KD, Issao M: Black stains and their relationship to dental caries. Rev Paul Odontol 1990; 12: 23–30.
12. Gasparetto A, Conrado CA, Maciel SM, Miyamoto EY, Chicarelli M, Zanata RL. Prevalence of black tooth stains and dental caries in Brazilian schoolchildren. Braz Dent J. 2003; 14(3):157-61.
13. França-Pinto CC, Cenci MS, Correa MB, Romano AR, Peres MA, Peres KG, Matijasevich A, Santos IS, Barros AJ, Demarco FF. Association between black stains and dental caries in primary teeth: findings from a Brazilian population-based birth cohort. Caries Res. 2012; 46(2):170-6.
14. Meurman PK, Pienihäkkinen K. Factors associated with caries increment: a longitudinal study from 18 months to 5 years of age. Caries Res. 2010; 44(6):519-24.
15. Żyła T, Kawala B, Antoszewska-Smith J, Kawala M. Black stain and dental caries: a review of the literature. BioMed Res. Int.; 2015.
16. J. M. G. Martin, M. G. Garcia, J. S. Leston, S. L. Pendas, J. J. D. Martin, and M. J. Garcia-Pola, "Prevalence of black stain and associated risk factors in preschool Spanish children," Pediatr Int. 2013 ;55(3):355-9.
17. Sarah Banu1 and Shanmugaavel. Different mode of management of anterior teeth with early childhood caries. IJCAR 2017; 6(4); 3184-3186.
18. Sutcliffe P: Extrinsic tooth stains in children. Dent Pract 1967; 17: 175–179.
19. .Bhat S. Black tooth stain and dental caries among Udaipur school children. IJPHD. 2010; 1(1):13-7.
20. Theilade J, Slots J, Fejerskov O. The ultrastructure of black stain on human primary teeth. Scand J Dent Res 1973; 81:528-532.
21. Slots J. The micro flora of black stain on human primary teeth. Scand J Dent Res 1974;82:484-490
22. Surdacka A. Chemical composition of the saliva in children and adolescents with black tartar. Czas Stomatol 1989;42:525-533
23. Prathap S, Rajesh H, Boloor VA, Rao AS. Extrinsic stains and management: a new insight. J Acad Indus Res. 2013; 1(8):435-42.

Complications of Root Canal Irrigation - A Review

Leya Meriam Mathew[1], Jayalakshmi Somasundaram[2]

[1]Graduate Student, [2]Senior Lecturer, Department of Conservative and Endodontics, Saveetha Dental College ,, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India

Abstract

Root canal irrigation plays an important role in the debridement and disinfection of the root canal. Most commonly used irrigants have good benefits of tissue dissolving and disinfection capability. However, it also produces toxic effects on the vital tissues resulting in ulcer, necrosis etc. The aim of this review is to analyze the factors causing or affecting the Root canal irrigation during a root canal treatment.

Keywords *: Root canal , irrigants , infection, microbial , complications, toxici*ty .

Introduction

The main aim of a root canal treatment is to ensure complete removal of connective tissue and destruction of residual microorganisms found in the infected root canals[1]. The complexity of root canal system, presence of numerous dentinal tubules in the roots, invasion of the tubules bymicroorganisms and preservation of healthy dentin after achieving the primary objectives of complete shaping and cleaning of root canal systems are done with the help of a proper irrigation [2]. However many mishaps can occur while cleaning and shaping the root canals with irrigating solutions ranging from damage to the patient's clothing, splashing the irrigant into the patients or operators eye, to allergic reactions. The ideal properties of an irrigant [3] include, a potent tissue debris solvent ,low toxicity, low surface tension, lubricant, sterilizing agent, removal of smear layer, low cost and inactive endotoxin

Endodontic Irrigants

Non-bactericidal irrigants

Some general dental practitioners either use saline, local anaesthetics and/or distilled water. These have no antibacterial action and will not lessen bacterial significantly. These irrigants may be used regularly as they are easy to use, readily available and safety. However, irrigants have no role in handling infected root canals..

Bacteriostatic/bactericidal irrigants

These include a collection of solutions which also kill bacteria or enable their death by allowing other irrigants to come into contact with the bacteria.

Sodium Hypochlorite (NaOCl)

Sodium hypochlorite was first recognized as an antibacterial agent in 1843 and used as a hand wash . Its advantages are pulpal dissolution and antimicrobial effect. Studies show that a decrease in microbial numbers is achievable when using NaOCl for endodontic treatment of teeth with apical periodontitis. It was used as an endodontic irrigant ,with low viscosity ,effective antimicrobial properties but low tissue dissolving capabilities acceptable shelf life , easily available and inexpensive [4]. The mechanism of action involvesbreak down of protein by dissolution of amino acid content of vital and necrotic tissue by the available free chlorine in NaOCl

However, certain disadvantages of this irrigant are the toxicity to the vital tissues which includes cytoxicty, foul smell and foul taste, fabric bleach on accidental spillage and corrosive on metals [5].

Hydrogen Peroxide

Hydrogen peroxide (H_2O_2) is a colorless liquid and has been used in dentistry in concentrations varying from 1% to 30% [6]. H_2O_2 degrades to form water and oxygen. It is active against microbes via the production of hydroxyl free radicals which attack proteins and DNA [7]. It has been shown that NaOCl, combined with H_2O_2, is no more effective against E. faecalis than NaOCl alone [8] , however, CHX combined with H2O2 was a better antimicrobial agent than either one on their own.

Chlorhexidine

Chlorhexidine digluconate is widely used in disinfection because of its excellent antimicrobial activity. It is highly antimicrobial especially at pH 5.5-7.0 and is known for its longlasting effectiveness even after the removal of the solution [9] .It is a positively charged hydrophilic and lipophilic molecule which relates with phospholipids and lipopolysaccharides in cell membranes. Consequently, there is disruption of the cell membranes which allows CHX molecules to enter the cell to cause intracellular toxic effects, such as coagulation of the cytoplasm. Other advantages include available in acceptable flavor and not injurious to the surrounding tissues. Chlorhexidine has a persistent residual antimicrobial action.. Commonly, Chlorhexidine is used in conjunction with NaOCl as an irrigant as it raises the effectiveness of the irrigation protocol [10] .

However, in spite of the advantages chlorhexidine cannot be considered as an ideal root canal irrigant because of its inability to dissolve necrotic tissue remnants [11] .But capable of dissolving the smear layer [12] . Additionally studies have revealed the presence of desquamategingivitis, discoloration of teeth and tongue or dysgeusia associated with it .Laboratory findings showed chlorohexidine to be highly cytotoxic to human periodontal cells, fibroblast via inhibition of protein synthesis [13] While it does not appear to cause any long term damage to host tissues, it may still cause an inflammatory response in these tissues if expressed beyond the root canal [14] .

MTAD

MTAD is a mixture of 3% doxycycline, 4.25% citric acid and detergent developed by Torabinejad et.al. The irrigant has a combination of both chelating and antibacterial properties [15] . The citric acid may serve to remove the smear layer, allowing doxycycline to enter the dentinal tubules and exert an antibacterial effect [16] MTAD is considered to be more superior to Cholorhexidine in antimicrobial activity and is also7more biocompatible and enhances bond strength [17] . MTAD was seen to be less toxic than eugenol, 3% H2O2, CA (OH) 2 paste, 5.25% NaOCl, Peridex (a CHX mouthwash with additives) and EDTA, however, was more lethal than NaOCl in absorptions of 2.63%, 1.33% and 0.66%. The procedure for clinical use of MTAD is 20 minutes with 1.3% NaOCl followed by 5 minutes of MTAD . This irrigant is based on a tetracycline isomer; there may be problems with staining, resistance and sensitivity.

EDTA

Ethylenediaminetetraacetic acid (EDTA) is a synthetic amino acid and the sodium salts of EDTA (Na2EDTA) are used in dentistry. It is often used as a chelating agent. EDTA is not bactericidal nor bacteriostatic but inhibits the growth of, and eventually kills, bacteria . EDTA at concentrations of 15–17% removes calcium from dentine leaving a softened matrix of dentine. It also emulsifies soft tissue and removes the smear layer with no deleterious effect to pulpal or periapical tissues. EDTA reacts with the calcium ions in dentine and forms soluble calcium chelates. It is reduces the intracranial microbial flora and also helps to detach biofilms adhering to root canal walls [18] However irrigation with 5%NaOCl or alternated with 17% EDTA, significantly increased the tooth strain .It reduces the chlorine in solution, rendering the sodium hypochlorite irrigant ineffective on bacteria and necrotic tissue [16] . A one minute application of 17% EDTA combined with ultrasonic is efficient for smear layer and debris removal in the apical region of the root canal [19]. EDTA is available in a liquid form for irrigation and a gel form for lubrication .

Other Irrigating Solutions

The other irrigating solutions are sterile water, physiologic saline, iodine compounds, ureaperoxide, etidronic acid, citricacid, maleic acid, tetraclean, chlorine dioxide etc [20]

HEBP is also known as etidronic acid or etidronate and has been proposed as an alternative potential alternative to EDTA or citric acid because it shows no reactivity with NaOCl [19] .It is nontoxic but h owever, the demineralization kinetics was lower than those of 17% EDTA.

Maleic acid is a mild organic acid used as acid conditioner in adhesive dentistry. Ballal et.al reported that the final irrigation with 7%maleic acid for 1minute was more efficient than 17% EDTA in the removal of smear layer [20]

Iodine Compounds are bactericidal, fungicidal, and virucidal. 2% iodine in 4% potassium iodide has been used in endodontics. It shows less toxicity and a

decreased tendency to stain dentine.. However it is not the first choice as an irrigant. Despite its antimicrobial activity, iodine is a very potent allergen thereby causing a risk for allergy [21]

Curcuma longa (Turmeric): Curcumin, possesses anti-inflammatory,anti-oxidant,anti-microbial andanti-canceractivity. In an in vitro study conducted by Prasanna Neelakantan, it has been shown that curcumin has significant anti-bacterial activity against E.faecalis and can be used as an alternative to sodium hypochlorite for root canal irrigation [22, 23] .

Complications during Root Canal Irrigation

Root canal irrigation is an integral part of the rootcanal treatment to ensure proper debridement and disinfection of the root canal system. A review of these complications have been described briefly below, which necessitates the need to carry out effective techniques in order to avoid complications .

Damage to Clothing

Sodium Hypochlorite, a common bleaching agent can cause a concern of damage. Accidental spillage of minute quantities can lead to rapid, irreparable bleaching [24, 25] . When using an ultrasonic device for root canal irrigation the aerosol may also cause damageto the clothing. These mishapsshould be prevented by proper shield of the patients' clothing. When using hand irrigation, oneshould reassure that the irrigation needle and syringe are tightly attached .

Damage to the Eye

Mild burns with the alkali such as sodium hypochlorite can result in significant injury causing blurring of vision and patchy coloration of cornea [26] .Irrigant in contact with patients or operators eyes can result in immediate pain, intense burning and erythema. Immediate ocular irrigation with large amounts of tap water or sterile saline should be performed by the dentist.

Damage to Oral mucosa and Skin

Skin injury with an alkaline substance requires an immediate irrigation with water as alkalis combine with proteins or fats in tissue to form soluble protein complexes or soaps which could further cause irritation to the mucosa. Accidental swallowing of irrigant by patient requires proper monitoring. It is possible that skin injury can result from secondary contamination [27, 28].

Allergic reactions

Various allergic reactions to Chlorhexidine have been described. It is known to elicit allergic contact dermatitis, generally after repeated application. It can also contact urticarial,photosensitivity, fixed drug eruption and occupational asthma [29] .

The allergic potential of sodium hypochlorite was first reported by Sulzberger when a 32 year old female reported a rapid onset of pain, swelling and difficulty in breathing [30] . A subsequent allergy skin scratch test performed two weeks later confirmed a positive result to sodium hypochlorite. Other symptoms include burning sensation, shortness of breath [31] .

Complications arising from the irrigant extrusion beyond root canal apex

Chemical Burns and necrosis

When sodium hypochlorite is extruded beyond the root canal into the periradicular tissues, the effect is a chemical burn leading to localized or extensive tissue necrosis. This can further lead to tissue swelling both intra orally and extra orally. The swelling could later produce a sudden onset of pain, associated bleeding, acute sinusitis, ecchymosis of the mucosa [32].

Neurological Complications

The major complications include parathesia and anesthesia affecting the mental, inferior dental and infraorbital branches of the trigeminal nerve.

Facial nerve damage was first described by Witton et al. in 2005, where the buccal branch of the facial nerve was affected in 2 cases. Both patients exhibited a loss of the naso-labial groove and a down turning of the angle of the mouth. Both patients were reviewed and their motor function, was regained after several months [33].

Upper Airway Obstruction

Without adequate tooth isolation, sodium hypochlorite can lead to the leakage of the solution into the oral cavity and ingestion or inhalation by the patient. This could result in throat irritation and the upper airway could be compromised [34]. Ziegler presented a case of a 15-month-old girl who presented a complication of root canal irrigation with acute laryngotracheal bronchitis, stridor and profuse drooling from the mouth as a result

of ingestion of a high concentration of household sodium hypochlorite.

Air Emphysema

Studies show cases of emphysema which occurs when the root canal is dried with compressed air after injecting hydrogen peroxide into it. Symptoms and signs include a rapid swelling and erythema in the region of the treated tooth, emphysema of the face, the suborbital region, and neck. The mainsymptom is a crepitus of the swelling [35] .

Flare up

An endodontic flare-up is a complication of endodontic treatment which is defined as an acute exacerbation of asymptomatic pulp, after the initiation or continuation of root canal treatment. Excessive pressure during irrigation will cause large amounts of irrigant to come in contact with the periapical tissues, thereby a possible etiological factor for Flare up [36].

Conclusion

Thus, it is important to carry out an effective technique in order to avoid complications. In the event of an accidental extrusion of any solution, treatment guidelines should be applied as may be relevant to each case.

Ethical Clearance: Department of research , Saveetha Dental College

Source of Funding : Self

Conflict of Interest : Nil

References

1. Endodontic Irrigants: A Comprehensive Review ; Soumya Abraham,Dr.James.D.Raj, MurvindranVenugopal ,Soumya Abraham et al, J. Pharm. Sci. & Res. Vol. 7(1), 2015, 5-9 .
2. Torabinejad M, Handysides R, Khademi AA, Bakland LK. Clinical implications of the smear layer in endodontics: a reviewOral Surg Oral Med Oral Pathol Oral RadiolEndod. 2002 Dec;94(6):658-66.
3. Taft J. A practical treatise on operative dentistry. London: Trubner and Co, 1859:244.
4. H. R. Spencer, V. Ike & P. A. Brennan · Review: the use of sodium hypochlorite in endodontics — potential complications and their management British Dental Journal 2007 Nov; 202, 555–559
5. Sena NT, Gomes BP, Vianna ME, Berber VB, Zaia AA, Ferraz CC, Souza-Filho FJIn vitro antimicrobial activity of sodium hypochlorite and chlorhexidine against selected single-species biofilms.I ntEndod J. 2006 Nov; 39(11):878-85.
6. Steinberg D, Heling I, Daniel I, Ginsburg. Antibacterial synergistic effect of chlorhexidine and hydrogen peroxide against Streptococcus sobrinus, Streptococcus faecalis and Staphylococcus aureus. J Oral Rehabil. 1999 Feb; 26(2):151-6.
7. Seal GJ, Ng YL, Spratt D, Bhatti M, GulabivalaK .An in vitro comparison of the Streptococcus intermedius biofilms in root canals. IntEndod J. 2002 Mar; 35(3):268-74
8. AzharIqbal, BDS, FCPS .Antimicrobial Irrigants in the Endodontic Therapy.Int J Health Sci (Qassim). 2012 Jun; 6(2): 186–19
9. Carlos Estrela, Julio Almeida Silva, Ana Helena Gonçalves de Alencar, Claudio Rodrigues Leles, Daniel Almeida Decurcio. Efficacy of sodium hypochlorite and chlorhexidine against Enterococcus faecalis – a systematic review 2008.J. Appl. Oral Sci. vol.16 no.6
10. Naenni N, Thoma K, Zehnder M. Soft tissue dissolution capacity of currently used and potential endodontic irrigants.J Endod. 2004 Nov;30(11):785-7.
11. Mohammadi Z, Abbott PV . The properties and applications of chlorhexidine in endodontics. IntEndod J. 2009 Apr;42(4):288-302.
12. Torabinejad M, Khademi AA, Babagoli J, Cho Y, Johnson WB, Bozhilov K, et al . A new solution for the removal of smear layer. J Endod. 2003;29:170–5.
13. DeivanayagamKandaswamy and Nagendrababu . Root canal irrigants J Conserv Dent. 2010 Oct-Dec; 13(4): 256–264.
14. Babich H, Wurzburger BJ, Rubin YL, Sinensky MC, Blau An in vitro study on the cytotoxicity of chlorhexidine digluconate to human gingival c L ells. Cell BiolToxicol. 1995 Apr; 11(2):79-88.
15. Torabinejad M, Cho Y, Khademi AA, Bakland LK, Shabahang S The effect of various concentrations of sodium hypochlorite on the ability of MTAD to remove the smear layer. J Endod. 2003 Apr; 29(4):233-9.

16. Zehnder M, Schmidlin P, Sener B, WaltimoT,Chelation in root canal therapy reconsidered. J Endod. 2005 Nov; 31(11):817-20.
17. Zehnder M. Root canal irrigants. J Endod 2006; 32(5):389-8.
18. Von Der Fehr FR, NygaardÖstbyB. Effect of EDTAC and sulfuric acid on root canal dentine. Oral Surg Oral Med Oral Pathol. 1963;16:199–205.
19. De-Deus G, Zehnder M, Reis C, Fidel S, Fidel RA, Galan J Jr, PaciornikSLongitudinal co-site optical microscopy study on the chelating ability of etidronate and EDTA using a comparative single-tooth model. J Endod. 2008 Jan; 34(1):71-5
20. Ballal NV, Kandian S, Mala K, Bhat KS, Acharya SComparison of the efficacy of maleic acid and ethylenediaminetetraacetic acid in smear layer removal from instrumented human root canal: a scanning electron microscopic study. J Endod. 2009 Nov; 35(11):1573-6.
21. M. Hülsmann& W. Hahn Complications during root canal irrigation – literature review and case reports .IntEndod J. 2000 May;33(3):186-93
22. Prasannaneelakantan, chandanasubbarao, chandragirivenkatasubbarao. Analysis of antibacterial activity of curcumin against enterococcus fecalis, International journal of current research and review, 9, 2011
23. Pratishta Jain, Manish Ranjan . Role of herbs in root canal irrigation-A review IOSR Journal of Pharmacy and Biological Sciences 2014, Volume 9, Issue 2 Ver. VI , PP 06-10.
24. Ingram T A. Response of the human to accidental exposure to sodium hypochlorite. J Endod 1990; 16: 235–237.
25. Rutala W, Weber D J. Uses of inorganic hypochlorite (Bleach) in health-care facilities. Clinical Microbiology Reviews 1997; 10: 597–610.
26. Marx, Hockberger, Wallis. Rosen's emergency medicine. 6th edn. pp 931–933. UK: Mosby Elsevier, 2006.
27. Krautheim AB, Jermann TH, Bircher AJ Chlorhexidine anaphylaxis: case report and review of the literature. Contact Dermatitis. 2004 Mar; 50(3):113-6
28. Serper A, Ozbek M, Calt S. Accidental sodium hypochlorite-induced skin injury during endodontic treatment. J Endod 2004; 30: 180–181
29. Caliskan M K, Turkun M, Alper S. Allergy to sodium hypochlorite during root canal therapy: a case report. IntEndod J 1994; 27: 163–167.
30. Mehra P, Clancy C, Wu J. Formation of a facial hematoma during endodontic therapy. J Am Dent Assoc 2000; 131: 67–71
31. Sulzberger M B. Dermatologic allergy: an introduction in the form of a series of lectures. Springfield, IL, USA: Charles C. Thomas, 1940.
32. Gernhardt C R, Eppendorf K, Kozlowski A et al. Toxicity of sodium hypochlorite used as an endodontic irrigant. Int Dent J 2004; 37: 272–280.
33. Witton R, Henthorn K, Ethunandan M et al. Neurological complications following extrusion of sodium hypochlorite solution during root canal treatment. IntEndod J 2005; 38: 843–848.
34. Ziegler D S. Upper airway obstruction induced by a caustic substance found responsive to nebulised adrenalin. J Paed Child Health 2001; 37: 524–525
35. Adnan Torgay, ErdinicAydin, UlkemCilasun, LaleDurmaz, GulnazArslan Subcutaneous emphysema after dental treatment: a case report 2004,16:3 , 314- 317
36. Priyanka.S.R , Dr.Veronica, Saveetha Dental CollegeFlare-Ups in Endodontics – A Review IOSR- Journal of Dental and Medical Sciences, 2013, Volume 9, Issue 4, 26-31

Phytochemical and Antimicrobial Analysis of *Portieria Hornemannii*, A Marine Red Macro Algae

Louis Cojandaraj[1], Gurdyal Singh[2], John Milton[3]

[1]Assistant Professor, Department of Medical Laboratory sciences, Lovely professional University, Phagwara, [2]Plant Head, Affy Parenteral, Baddi, Distt. Solan, H.P. India, [3]Associate Professor, PG & Research Department of Advanced Zoology and Biotechnology, Loyola College, Chennai

Abstract

The present study was designed to evaluate the phytochemical activity of *Portieria hornemannii*. The primary metabolites from *Portieria hornemannii* were obtained by soxhlet extraction using various solvent like acetone, chloroform, ethyl acetate and methanol. The phytochemical analysis determined the presence of flavonoids, terpeniods Saponins, Phenol and Cardiac Glyciosides. The extracts of ethyl acetate exhibited a higher phenolic content of **764.413 ± 22.11 mg/GAE.** The antibacterial activity determined that the extracts of ethyl acetate exhibited a good zone of inhibition of 19mm and 14mm at 20µg against *Klebsiella pneumonia* and *Staphylococcus aureus.* and in the case of antifungal activity no zone of inhibition was obtained in any of the extracts.

Key words: *Portieria hornemannii, Seaweed, Phytochemical Analysis, Red algae, Antibacterial activity, anti-fungal activity.*

Introduction

Seaweeds are able to produce a great variety of secondary metabolites characterized by a broad spectrum of biological activities and because of these properties they are considered to be the most predominant source for bioactive compounds. Seaweeds during metabolic process, infrequently suffer serious photodynamic damage even though they grow in a harsh environment. This fact suggests that seaweed cells possess some protective compounds and mechanisms.[1] Marine algae, like other photosynthesizing plants, are exposed to a combination of light and oxygen that leads to the formation of free radicals and other strong oxidizing agents. However, the absence of oxidative damage in the structural components of macro algae (i.e., polyunsaturated fatty acids) and their stability to oxidation during storage suggest that their cells have protective anti-oxidative defence systems which are similar to vascular plants[1,2].

In developing countries diseases are the major cause of death and accounts to 50% of it. Antimicrobial agents are essentially important in reducing the global burden of infectious diseases. But pathogens with resistance develop and spread, because of which the effect of those antibiotic drugs is reduced. This kind of resistance by bacterial species to the antimicrobial agents invoke a serious threat worldwide[3,4]. Bacterial resistance to antibiotics increases mortality likelihood of hospitalization and also increases the period of hospitalization.[5] Hence, there occurs an urge of antimicrobials with alternate strategies.[6,7] It has been well established by several scientific teams that seaweeds belonging to all three major pigments exhibit inhibitory action against both Gram negative and Gram positive bacteria. Antibacterial activity of nine species of seaweeds belonging to all major pigmentations revealed that brown and red seaweeds had greater antibacterial activity than the green and brown algae.[8] This study reveals the antibacterial and the phytochemical aspects exhibited by the marine red algae. *Portieria hornemannii* is a small red marine algal species which is widely distributed in tropical and subtropical water bodies of the Pacific and Indian Ocean.[9] Portieria belongs to the family Rhizophyllidaceae. The family Rhizophyllidaceae includes 4 genera Contarinia, Ochtodes, Nesophila and Portieria. The geographical distribution of the species belonging to the genera is interesting and exclusive.[10–12]with an evaluation of the ordinal classification of

the Florideophyceae (Rhodophyta The present study was designed to investigate the presence of major phytochemical compounds present in *Portieria hornemannii*.

Materials and Method

The crude metabolites from the sample were extracted using Soxhlet extraction method using solvents like acetone, chloroform, ethyl acetate and methanol. The extracts were subjected to phytochemical analysis to detect the presence of following biomolecules using the standard qualitative and quantitative procedures as described by Trease and Evans[13] and Total phenolic assay was determined by using Folin-Ciocalteu assay.[14]

The screening of anti-bacterial and antifungal activity against fastidious pathogens was performed with extracts of *Portieria hornemannii* by determining the zone of inhibition using disc diffusion method.[15–17]

Result and Discussion

The phytochemical characters of *Portieria hornemannii* were determined for all the crude extracts derived from the solvents after condensation in rotary vacuum evaporator.[13] From the present study, it was observed that Flavonoids, Terpenoids, Phenol and Cardiac glycosides were present in all the four crude extracts derived from acetone, Ethyl Acetate, Chloroform and methanol. However, Saponins were present only in methanol and ethyl acetate extracts (Table 1).

Table 1: Qualitative analysis of Phytochemicals from*Portieria hornemannii.*

Phytochemicals	Solvents			
	Acetone	Methanol	Ethyl Actetate	Chloroform
Tannins	-	-	-	-
Saponins	-	+	+	-
Flavanoids	+	+	+	+
Terpenoids	+	+	+	+
Alkaloids	-	-	-	-
Cardiac Glycosides	+	+	+	+
Phenol	+	+	+	+

The seaweeds are known for their secondary active metabolites which are used in several medical and pharmaceutical industries. Metabolites like Tannins, Saponins, Flavanoids, Terpenoids, Alkaloids and phenolic compounds have a great medicinal value and are extensively used for the manufacturing of new drugs.[13] Saponins are widely used in the treatment of hypercholesterolaemia and hyperglycaemia. It is also used as a mild detergent. Apart from this saponins also possess several medical properties like anti-microbial, cholesterol lowering, anti-oxidant, anti-cancer, anti-carcinogenic, and immune modulatory activities. It also helps in the treatment of congestive heart failure by inhibiting Na^+ and Ca^{2+}antipotal by producing cytosolic Ca^{2+} which reduces congestive heart failure by strengthening heart muscles.[18]

Tannins possess antibacterial anti-cancerous and anti-viral activities, is also used for the inhibition of HIV replication.[19] Flavonoids also possess similar activities like tannins like antioxidant, anti-inflammatory, anti-cancer, antimicrobial and anti-allergic activity.[20]

Determination of Total phenols

Earlier reports have stated that the polyphenols obtained from marine algae possess a good anti-oxidant property [21,22]. Total phenolic content of the extracts was calculated from the regression equation of calibration

curve (Y = 0.001+ 0.25x; R2 = 0.966) and expressed as mg gallic acid equivalents (GE) per gram of sample in dry weight (Figure 1) The Results of the phenolic content of *Portieria hornemannii* determined the ethyl acetate extract has high phenolic content followed by methanol extract comparing to other extracts (Table 2; Figure 2). The differences between the content of phenolic compound between each solvents and extraction methods were statistically significant ($p < 0.05$) (Table 3). The presence of high phenolic compound could be useful for the prevention of oxidative activities of the extract.

Table 2. Mean ± SD of Total Phenolic Content of *Portieria hornemannii*

Solvent	Total Phenolic Content (mgGAE/g)
	Mean ± Std. Deviation
Acetone	486.206 ± 4.84
Methanol	696.146 ± 3.85
Ethyl Acetate	764.413 ± 22.11
Chloroform	449.026 ± 14.43

Table 3. Two way ANOVA Total Phenolic Content of *Portieria hornemannii*

	Sum of Squares	**Degrees of freedom**	**Mean Square**	**F-Value**	**Sig.**
Between Groups	216040.115	3	72013.372	391.723	0.000
Within Groups	1470.699	8	183.837		
Total	217510.814	11			

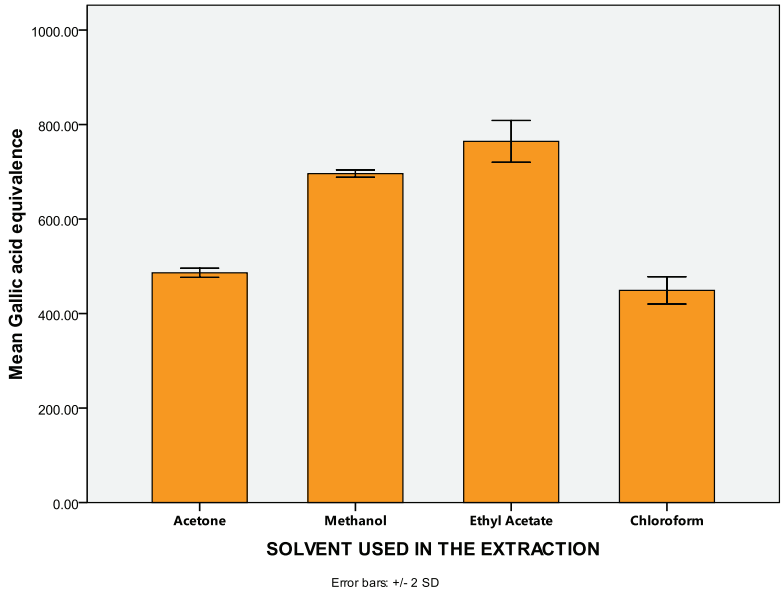


Figure 1. Mean ± SD of Total Phenolic Content of *Portieria hornemannii.*

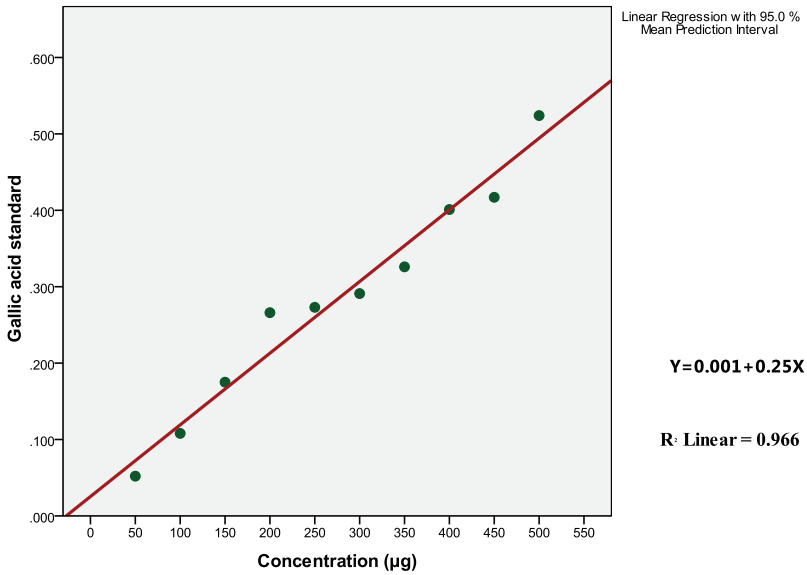


Figure 2. Gallic Acid Equivalence

Phenols are the most significant constituent in seaweed as of for their scavenging activity due to presence of the hydroxyl groups [23]. Pedersen reported that the increase in the phenolic content depends upon two major factors i.e. it increases with the aging of the tissue and also the salinity concentration of its habitat. [24] The bioactive compounds of macro algae is determined by certain aspects like environment, salinity, maturity of the algae and climatic conditions.[25] A lower phenolic content range of 1.5 to 4.1 mg GAE/g, with crude methanolic extracts of red seaweeds which is comparatively very lower with the range obtained with present study [26]. The Phenolic compounds derived from the marine algae play a vital role against the abiotic and biotic stress conditions through cell defense mechanism.[27]8 Phaeophyta and 23 Rhodophyta. In general, the biological activities of the seaweed are reflected by the phenolic compounds present in the seaweed.

Antimicrobial Activity

Antibacterial activity

In this present study the screening of the antibacterial activity was performed against five different bacterial strains *Bacillus subtilis, Staphylococcus aureus, Klebsiella pneumonia, Escherichia coli, Pseudomonas aeruginosa* under various concentration of each crude extracts ranging from 2, 5, 10, and 20µg. From the study, the zone of inhibition of *Bacillus subtilis* was obtained at a concentration range of 20µg only in chloroform extracts (10 mm). Whereas, in *Klebsiella pneumonia*, the zone of inhibition (10 mm and 19 mm) was obtained at a conc. range of 20µg in both the acetone and ethyl acetate extracts. Also, the zone of inhibition against, *Escherichia coli* was observed at a conc. range of 20µg in the extracts of ethyl acetate (11 mm), methanol (10 mm) and chloroform (12 mm). Apparently, the zone of inhibition against *Staphylococcus aureus* was observed at a conc. range of both 10µg and 20µg in the extracts of acetone (10 mm, 11 mm), and ethyl acetate (10 mm, 14 mm). Finally, the zone of inhibition against *Pseudomonas aeruginosa* was observed at a conc. range of 20µg only in the extracts of chloroform (10 mm) (Table 4). Therefore the highest zone of inhibition was seen only in the ethyl acetate extracts comparing with other extracts and also the ethyl acetate extracts inhibited the growth of three bacterial strains followed by acetone and chloroformic extracts which inhibited two bacterial strains and finally methanolic extracts inhibited only a single bacterial strain (Table 4).

Table 4. Antibacterial activity of *Portieria hornemanii*

Bacterial Species	Acetone				Ethyl Acetate				Methanol				Chloroform			
	Concentration in µg															
	2	5	10	20	2	5	10	20	2	5	10	20	2	5	10	20
Bacillus subtilis	-	-	--	--	-	-	--	--	-	-	--	--	-	-	--	10
Klebsiella pneumonia	-	-	--	10	-	-	--	19	-	-	--	--	-	-	--	--
Escherichia coli	-	-	--	--	-	-	--	11	-	-	--	10	-	-	--	12
Staphylococcus aureus	-	-	10	11	--	--	10	14	-	-	--	--	-	-	--	--
Pseudomonas aeruginosa	-	-	--	--	-	-	--	--	-	-	--	--	-	-	--	10

The acetone extract of Caulerpa scalpelliformis showed broad spectrum antibacterial activity when compared to other seaweed extracts.[28,29] But in the present study the maximum zone of inhibition was obtained from the extracts of Ethyl acetate. The maximum antibacterial activity was observed in the methanol extract of Caulerpa scalpelliformis against Salmonella typhi, Micrococcus sp., and Shigella bodii. [30]. Ely *et al*., studied with the methanolic extracts of *Chadophorea profileria* exhibited a moderate antibacterial activity against *Staphylococcus aureus* and *Vibrio cholera* [31].

Anti-fungal activity

In the present study the screening of the antifungal activity was performed by agar disc diffusion method against five different fungal strains *Aspergillus niger, Aspergillus flavus, Aspergillus fumigatius, Fusarium solanum, Exoserohium species* under various concentration of each crude extracts ranging from 2, 5, 10, and 20µg. From the study, the zone of inhibition was not observed in any of the concentrations.

In contradiction to this, the methanolic extracts of *Aspergillus taxiformis* showed inhibitory activity against fungal species like *Fusarium solanum, Aspergillus flavus,* and *trichoderma species*. The organic extracts obtained from *Aspergillus taxiformis* showed low inhibitory zone against *Aspergillus fumigatius* [32]. From the reports of El-Baroty *et al*., it was observed that the hexane and ethyl acetate extracts of *Aspergillus taxiformis* showed a good anti-fungal activity against *Fusarium oxysporees* [33] .

Conclusion

The phytochemical (Flavanoids, Terpenoids, Saponins, Phenols and Cardiac Glycosides) studies were determined for *Portieria hornemannii*. Ethyl acetic extracts showed a significant amount of phenolic content on comparing with other crude extracts. The antibacterial activity for different solvents extracts was measured in range of 10 mm to 19 mm. The extracts of ethyl acetate showed a maximum zone of inhibition against *Staphylococcus aureus, Klebsiella pneumonia, E. coli* at 10µg and 20µg/ml. It was followed by chloroform and acetone extracts. *Portieria hornemannii* was also analyzed for antifungal activity against five ocular pathogens. But, there was no significant zone of inhibition in any of the extracts at any concentration. This algal species possesses a good antibacterial activity which can be used for the drug developmental against various fastidious bacterial strains.

Conflict of Interest: The authors declare no conflict of interest.

Ethical Clearance: Animal study was not involved in this research.

Source of Funding: Self

References

1. Matsukawa, R., Dubinsky, Z., Kishimoto, E., et al., A comparison of screening methods for antioxidant activity in seaweeds. *J. Appl. Phycol.*, 1997, **9**, 29.
2. Stein, E. M., Colepicolo, P., Afonso, F. A. K., and Fujii, M. T., Screening for antifungal activities of extracts of the Brazilian seaweed genus Laurencia (Ceramiales, Rhodophyta). *Brazilian J. Pharmacogn.*, 2011, pp. 290–295.
3. Levy, S. B. and Marshall, B., Antibacterial resistance worldwide: causes, challenges and responses. *Nat. Med.*, 2004, **10**, S122.
4. Mandal, S. and Mallick, N., Microalga Scenedesmus obliquus as a potential source for biodiesel production. *Appl. Microbiol. Biotechnol.*, 2009, **84**, 281–291.
5. Winstanley, T. G., Limb, D. I., Eggington, R., and Hancock, F., A 10 year survey of the antimicrobial susceptibility of urinary tract isolates in the UK: the Microbe Base project. *J. Antimicrob. Chemother.*, 1997, **40**, 591–594.
6. Basualdo, C., Sgroy, V., Finola, M. S., and Marioli, J. M., Comparison of the antibacterial activity of honey from different provenance against bacteria usually isolated from skin wounds. *Vet. Microbiol.*, 2007, **124**, 375–381.
7. Mandal, S., DebMandal, M., Pal, N. K., and Saha, K., Synergistic anti--Staphylococcus aureus activity of amoxicillin in combination with Emblica officinalis and Nymphae odorata extracts. *Asian Pac. J. Trop. Med.*, 2010, **3**, 711–714.
8. Kamat, S. Y., Wahidulla, S., D'Souza, L., et al., Bioactivity of marine organisms. VI. Antiviral evaluation of marine algal extracts from the Indian coast. *Bot. Mar.*, 1992, **35**, 161–164.
9. Guiry, M. D., AlgaeBase. World-wide electronic publication, National university of ireland, Galway. *http//www. algaebase. org/*, 2010.
10. Saunders, G. W., Chiovitti, A., and Kraft, G. T., Small-subunit rDNA sequences from representatives of selected families of the Gigartinales and Rhodymeniales (Rhodophyta). 3. Delineating the Gigartinales sensu stricto. *Can. J. Bot.*, 2004, **82**, 43–74.
11. Krayesky, D. M., Norris, J. N., Gabrielson, P. W., Gabriel, D., and Fredericq, S., A new order of red algae based on the Peyssonneliaceae, with an evaluation of the ordinal classification of the Florideophyceae (Rhodophyta). *Proc. Biol. Soc. Washingt.*, 2009, **122**, 364–391.
12. Verbruggen, H., Maggs, C. A., Saunders, G. W., Le Gall, L., Yoon, H. S., and De Clerck, O., Data mining approach identifies research priorities and data requirements for resolving the red algal tree of life. *BMC Evol. Biol.*, 2010, **10**, 16.
13. Trease, G. E. and Evans, W. C., Pharmacognosy, Saunders. *Elsevier, Amsterdam, the Netherlands*, 2002, **36**, 51.
14. Sadasivam, S. and Manickam, A., *Biochemical methods for agricultural sciences* Wiley eastern limited, 1992.
15. Kumar, G. and Sahoo, D., Effect of seaweed liquid extract on growth and yield of Triticum aestivum var. Pusa Gold. *J. Appl. Phycol.*, 2011, **23**, 251–255.
16. Patra, J. K., Rath, S. K., Jena, K., Rathod, V. K., and Thatoi, H., Evaluation of antioxidant and antimicrobial activity of seaweed (Sargassum sp.) extract: A study on inhibition of glutathione-S-transferase activity. *Turkish J. Biol.*, 2008, **32**, 119–125.
17. Bayer, E. A., Zalis, M. G., and Wilchek, M., 3-(N-Maleimido-propionyl) biocytin: a versatile thiol-specific biotinylating reagent. *Anal. Biochem.*, 1985, **149**, 529–536.
18. Oloyede, O. I., Chemical profile of unripe pulp of Carica papaya. *Pakistan J. Nutr.*, 2005, **4**, 379–381.
19. Haslem, E., Plant Polyphenols—Vegetable Tannins. Cambridge University Press, UK, 1989.
20. Pietra, F., Secondary metabolites from marine microorganisms: bacteria, protozoa, algae and fungi. Achievements and prospects. *Nat. Prod.* Rep., 1997, 14, 453–464.
21. Xu, N., Fan, X., Yan, X., Li, X., Niu, R., and Tseng, C. K., Antibacterial bromophenols from the marine red alga Rhodomela confervoides. Phytochemistry, 2003, 62, 1221–1224.
22. Kuda, T., Tsunekawa, M., Hishi, T., and Araki, Y., Antioxidant properties of driedkayamo-nori', a brown alga Scytosiphon lomentaria (Scytosiphonales, Phaeophyceae). Food Chem., 2005, 89, 617–622.
23. Wang, T., Jonsdottir, R., and Ólafsdóttir, G., Total phenolic compounds, radical scavenging and metal

chelation of extracts from Icelandic seaweeds. *Food Chem.*, 2009, **116**, 240–248.

24. Pedersen, A., Studies on phenol content and heavy metal uptake in fucoids. In *Eleventh International Seaweed Symposium* 1984, pp. 498–504.
25. Kumar, M., Kumari, P., Trivedi, N., et al., Minerals, PUFAs and antioxidant properties of some tropical seaweeds from Saurashtra coast of India. *J. Appl. Phycol.*, 2011, **23**, 797–810.
26. Ganesan, P., Kumar, C. S., and Bhaskar, N., Antioxidant properties of methanol extract and its solvent fractions obtained from selected Indian red seaweeds. *Bioresour. Technol.*, 2008, **99**, 2717–2723.
27. Zubia, M., Robledo, D., and Freile-Pelegrin, Y., Antioxidant activities in tropical marine macroalgae from the Yucatan Peninsula, Mexico. *J. Appl. Phycol.*, 2007, **19**, 449–458.
28. Thillairajasekar, K., Duraipandiyan, V., and Perumal, P., Antimicrobial activity of Trichodesmium erythraeum (Ehr) (microalga) from South East coast of Tamil Nadu , India Plant material Antifungal activity and minimum Gas chromatography-mass spectrometry Antimicrobial assay. *Int. J. Integr. Biol.*, 2009, **5**, 167–170.
29. Liao, W. R., Lin, J. Y., Shieh, W. Y., Jeng, W. L., and Huang, R., Antibiotic activity of lectins from marine algae against marine vibrios. *J. Ind. Microbiol. Biotechnol.*, 2003, **30**, 433–439.
30. TÜney, \.Inci, Cadirci, B. H., Ünal, D., and Sukatar, A., Antimicrobial activities of the extracts of marine algae from the coast of Urla (Izmir, Turkey). *Turkish J. Biol.*, 2006, **30**, 171–175.
31. Ely, R., Supriya, T., and Naik, C. G., Antimicrobial activity of marine organisms collected off the coast of South East India. *J. Exp. Mar. Bio. Ecol.*, 2004, **309**, 121–127.
32. Mtolera, M. S. P. and Semesi, A., Antimicrobial Activity of Extracts from Six GreenAlgae from Tanzania. 1996.
33. El-Baroty, G. S., Moussa, M. Y., Shallan, M. A., Ali, M. A., Sabh, A. Z., and Shalaby, E. A., Contribution to the aroma, biological activities, minerals, protein, pigments and lipid contents of the red alga: Asparagopsis taxiformis (Delile) Trevisan. *J. Appl. Sci. Res*, 2007, **3**, 1825–1834.

Combination of Walking Practices and Yogic Practices on Low Density Lipoprotein (LDL) among Middle Aged Women

James Rathinaraj. S[1]. P. Yoga [2], K. Alaguraja[1], K. Selvakumar[1]

[1]Research Scholar, [2]Assistant Professor, Alagappa University College of Physical Education, Alagappa University, Karaikudi, Tamilnadu, India

Abstract

The purpose of the present study was to investigate the efficacy of combination of walking practices and yogic practices on low density lipoprotein (LDL) among middle aged women. To achieve the purpose of the study thirty school students were selected from Karaikudi, Tamilnadu, India during the year 2019. The subject's age ranges from 35 to 45 years. The selected subjects were divided into two equal groups consists of 15 middle aged women each namely experimental group and control group. The experimental group underwent a combination of walking practice and yogic practices programme for six weeks. The control group was not taking part in any training during the course of the study. Low density lipoprotein was taken as criterion variable in this study. The selected subjects were tested on low density lipoprotein was measured through heparin precipitation method. Pre-test was taken before the training period and post- test was measured immediately after the six week training period. Statistical technique't' ratio was used to analyse the means of the pre-test and post test data of experimental group and control group. The results revealed that there was a significant difference found on the criterion variable. The difference is found due to combination of walking practice and yogic practices given to the experimental group on low density lipoprotein when compared to control group.

Keywords: *combination of walking practice and yogic practices, low density lipoprotein and't' ratio.*

INTRODUCTION

Everyday the human body have received some unwanted food store from the individual habits and its leads to some acute and chronic issues. Yoga is a great soul of the Universe. It can promote the social well being through limps of yoga (Asanas, Pranayama, Kriyas, Mudras and Meditations). To practising yoga regularly it can make you into sound body and sound mind. Yoga is the costless permanents treatment for more diseases, alaguraja, k[1]. It is a practical holistic philosophy designed to bring about profound state as well is an integral subject, which takes into Consideration man as a whole, alaguraja, k. et.al.,[2].

One can start practicing Yoga at any given moment of time and you may start with meditation or directly with pranayama without even doing the asanas (postures), alaguraja, k. et.al,[3]. The science of Yoga Nidra is based on the receptivity of consciousness. When consciousness is operating with the intellect and with all the senses, by making an individual think that he or she is awake and aware, but the mind is actually less receptive and more critical, yoga, p. et. al., 2019[4]. Training is a chain process that can be able to attain certain needs of the person's goal, alaguraja, k.[5]. In the sports world, physical education is the most essential aspect due to the fact physical schooling increases the performance and the effectiveness of the sports, alaguraja, k. et.al.,[6]. Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy, alaguraja, k. et.al,[7]. The sports training can produce some physical fitness, Physiological and psychological benefits to the person and attain performance related task. It's also promoting the individual overall wealth to the sports person, alaguraja, k.[8]. Yoga is a methodical effort towards self-perfection by the development of the potentialities latent in the individual, alaguraja, k. et.al,[9]. Today's there is an escalating emphasis on appearing smarter, feeling etter and living longer. In order to achieve these ideals

as, scientific evidence tells us that one of the keys is high fitness and exercises, alaguraja, k. et.al,[10]. Asanas is a limp of Yoga practice it can make some health related gains to the individual who involved in yogasana practice regularly. Asanas can be used upon the needs of the person. It's a scientific process the person must be follow the basic principles yogasana practice[11]. Yoga is a practical aid, not a religion and its techniques may be practiced by Buddhist, Jews, Christians, Muslims, Hindus and Atheist alike. Yoga is union for all, selvakumar, k. et.al,[12]. Yogic action, or inner technique, such as breath control, parthasarathy., s. et.al,[13].

Research Methodology

Selection of subjects

The purpose of the study was to find out the effect combination of walking practices and yogic practices on low density lipoprotein (LDL) among middle aged women. To achieve this purpose of the study, thirty middle aged women were selected as subjects at random. The age of the subjects were ranged from 35 to 45 years.

Selection of variable

Independent variable

- Combination of walking practice and yogic practices

Dependent variable

- Leg Explosive Power

Experimental Design and Implementation

The selected subjects were divided into two equal groups of fifteen subjects each, such as a combination of walking practice and yogic practices group (Experimental Group) and control group. The experimental group underwent combination of walking practice and yogic practices for five days per week for six weeks. Control group, which they did not undergo any special training programme apart from their regular physical activities as per their curriculum. The following bio chemical variable namely low density lipoprotein was selected as criterion variable. All the subjects of two groups were tested on selected criterion variable low density lipoprotein was measured through heparin precipitation method at prior to and immediately after the training programme.

Statistical technique

The't' test was used to analysis the significant differences, if any, difference between the groups respectively.

Level of significance

The 0.05 level of confidence was fixed to test the level of significance which was considered as an appropriate.

ANALYSIS OF THE DATA

The significance of the difference among the means of the experimental group was found out by pre-test. The data were analysed and dependent 't' test was used with 0.05 levels as confidence.

TABLE I: Analysis of t-ratio for the pre and post tests of experimental and control group on

Low density lipoprotein (Scores in mg/dl)

Variables	Group	Mean		Degree of freedom	't' ratio
		Pre	Post		
Low density lipoprotein	Control Group	101.11	101.16	14	1.37
	Experimental Group	101.18	100.70	14	**15.87***

**Significance at 0.05 level of confidence.*

The Table-I shows that the mean values of pre-test and post-test of the control group on low density lipoprotein were 101.11 and 101.16 respectively. The obtained 't' ratio was 1.37, since the obtained 't' ratio was less than the required table value of 2.14 for the significant at 0.05 level with 14 degrees of freedom it was found to be statistically insignificant. The mean values of pre-test and post-test of the experimental group on low density lipoprotein were 101.18 and 100.70 respectively. The obtained 't' ratio was 15.87* since the obtained 't' ratio was greater than the required table value of 2.14 for significance at 0.05 level with 14 degrees of freedom it was found to be statistically significant.

Result of the Study

The result of the study showed that there was a significant difference between control group and experimental group in low density lipoprotein. It may be concluded from the result of the study that experimental group improved in low density lipoprotein due to six weeks of combination of walking practice and yogic practices.

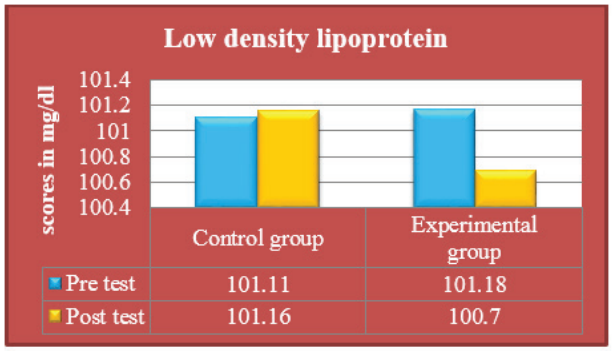


Figure-1: Bar Diagram Showing the Pre and Post Mean Values of Experimental and Control Group on Low density lipoprotein

Discussions on Findings

The result of the study indicates that the experimental group, namely combination of walking practice and yogic practices group had significantly improved the selected dependent variable, namely low density lipoprotein, when compared to the control group. It is also found that the improvement caused by combination of walking practice and yogic practices when compared to the control group.

Conclusion

On the basis of the results obtained the following conclusions are drawn,

1. There was a significant difference between experimental and control group on low density lipoprotein after the training period.

2. There was a significant improvement in low density lipoprotein. However the improvement was in favor of experimental group due to six weeks of combination of walking practice and yogic practices.

Source of Funding : Self funding

Conflict of Interest: Nil.

Ethical Clearance: With respect to the above said Research Article involving human subjects for which the ethical clearance being sought, I am to state that I have gone through the "NIMHANS Ethical Guidelines…….Human Subjects" and am aware of the Helsinki Declaration of 1975, as revised in 2000 (5) rules governing the studies involving the human subjects. I am also aware that these guidelines are strictly to be followed while carrying out the above said research article involving human subjects.

References

1. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research.* 2019; *9,* (10), pp. 73-74.
2. Alaguraja, K., &Yoga, P. Influence of yogasana practice on flexibility among obese adolescent school boys. *International Journal of Yoga, Physiotherapy and Physical Education.* 2017; *2*(7), pp.70-71.
3. Alaguraja, K., & Yoga, P. Effect of yogic practice on resting pulse rate among school students. *Indian Journal of Applied Research,* 2019; *9,* (7), pp. 43-44.
4. Yoga, P., Balamuralikrishnan, R., & Alaguraja, K. Influence of cyclic meditation on selected physiological parameter. *International Journal of Advanced Education and Research,* 2019; *4* (1), pp. 17-18.
5. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter

among sports people. *Indian Journal of Applied Research,2019; 9,* (10), pp. 73-74.

6. Alaguraja, K., & Yoga, P. Effect of core stability training on dynamic strength among college male students. *International Journal of Yogic, Human Movement and Sports Sciences, 2018; 3* (2), pp. 436-437.
7. Alaguraja, K., Yoga, P., Balamuralikrishnan, R., & Selvakumar, K. A scientific study on efficacy of yogic package on resting pulse rate among obese school students. *Journal of Information and Computational Science,*2019*; 9*(8), pp. 483-487.
8. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 2019; 9* (10), pp. 73-74.
9. Alaguraja, K., & Yoga, P. Analyze of pranayama technique on physiological parameter among rural school students. *Journal of Information and Computational Science, 2019; 9*(8), pp.545-550.
10. Alaguraja, K., Yoga, P., James Rathinaraj, S., R., & Selvakumar, K. A study on yoga intervention on maximal oxygen uptake among stress patient. *Indian Journal of Applied Research,2019; 9* (9), pp. 38-39.
11. Alaguraja, K. Analyze of combined asanas pranayama practices on psychosocial parameter among sports people. *Indian Journal of Applied Research, 20019; 9*(10), pp. 73-74.
12. Selvakumar, K., & Yoga, P. (2019). Influence of yogic practice on flexibility among college students. *Indian Journal of Applied Research,2019; 9,* (7), pp. 45-46.
13. Parthasarathy., & Dhanaraj. A scientific study on combined effect of yogasana and shambhavi mahamudra practice on systolic blood pressure. *Indian Journal of Applied Research,2019; 9*(11), pp. 45-46.

Risk Factors Leading to Mental Illness among Patients: A Retrospective Study

Jiji Benny[1], Shivakumara J[2], Thereza Mathias[3]

[1]P G Student -M.Sc Nursing (Psychiatric Nursing), [2]Professor, [3]Professor and HOD, Department of Mental Health Nursing, Laxmi Memorial College of Nursing, Mangaluru

Abstract

Background: Mental disorder is a psychological factor reflected in the behavior, which affect the normal development of a person's culture. The burden of mental health problems is increasing globally. Most mental disorders are result of a combination of several different factors rather than just a single factor. Knowing the risk factors leading to mental illness, may help in future to reduce the incidences of mental illness by taking possible preventive measures.

Aim: The main aim of this study was to determine the risk factors leading to mental illness among patients.

Materials and Method: Case control study design with quantitative non experimental descriptive survey approach was used .Mini mental status examination tool was used to select 100 psychiatric patients based on inclusion criteria and 100 general populations to find the odds ratio. Data was collected using a demographic proforma and risk factors assessment check list.

Results: In biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162), feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

Conclusion: Most of the subjects are having one or other risk factors for developing mental illness**.** Hence we need to take care about risk factors and maintain good lifestyle to promote optimal mental health.

Keywords: *Risk factors of mental illness; psychiatric patients; general population; retrospective study.*

Introduction

Mental health as an adjustment of human being to the world and to each other with maximum of effectiveness and happiness.[1] Mental illness is often disorders of the brain that disrupts a person's thinking, feeling, mood, and ability to relate to others. Mental illnesses are of different types and degrees of severity. Some of the major types are depression, anxiety, schizophrenia, bipolar mood disorder, personality disorders, and eating disorders etc. [2]

The causes of mental disorders are complex and interact and vary according to the particular disorder and individual. Genetics, early development, drugs, a loss of a family members, disease or injury, stress, bereavement, relationship breakdown, physical and sexual abuse, unemployment, social isolation, and major physical illness or disability neuro cognitive and psychological mechanisms and life experiences, society and culture can all contribute to the development or progression of different mental disorders.[3] According to WHO, one in every four people develops one or more mental disorders at some stages in life. In India, the reported rate is 73 per 1000 population.[4]

Corresponding author:
Shivakumara J
Professor, Department of Mental Health Nursing,
Laxmi Memorial College of Nursing,
A J Towers, Balmatta, Mangaluru
Contact number-09886594682,
Email- chethu1977@gmail.com

The report of District Health and Family Welfare Office of Dakshina Kannada showed that nearly 238 neurotic and 300 psychotic cases of mental disorder were recorded during the year 2007-2008. Among these only 59 neurotics and 77 psychotic cases had approached for the treatment.[5]

The National Institute of Mental Health and Neuro Science (NIMHANS) report shows that in India 70 million people suffer from mental ailments and yet, 50-90% of them are not able to access corrective services due to less awareness and negative attitude or stigma towards mental illness.[6]

Community- based surveys conducted during the past two decades in India showed that the total prevalence of psychiatric disorder was around 5.8% and depression will be one of the biggest health problems worldwide by the year 2020.[7]

Materials and Method

The study was conducted over a period of two years at selected hospitals, Mangalore, India. Case-control study design with quantitative non experimental descriptive survey approach was used. Formal permission was obtained from the director and administrative department of selected hospitals. The researcher used the Mini Mental Status Examination tool for assessing the level of insight of the patients and followed by the researcher was selected 100 psychiatric patients who has the insight and 100 general populations in a similar background and setting by purposive sampling technique based on sampling criteria to find odds ratio of mental illness. The investigator used demographic proforma and risk factors assessment check list to determine the risk factors leading to mental illness.

Mini Mental Status Examination tool :(Folstein MF, Folstein SE and MC Hugh PR, 1987): It is a standardized tool for assessing the level of insight of psychiatric patients. The reliability of the tool was 0.98. It consisted of five characteristics namely, orientation, registration, attention and calculation, recall, language with total number of score 30 and it is graded as (24-30 no cognitive impairment, 18-23 mild cognitive impairment, 0-17 severe cognitive impairment).

Demographic Proforma: This is for assessing the background information of samples. Which consisted of 11 characteristics namely, age, gender, education, occupation, and marital status, types of family, number of children, number of siblings, birth order, duration of illness and number of previous admission in psychiatric unit.

Risk factors assessment checklist: To determine the risk factors leading to mental illness. Tool was prepared on five aspects of the risk factors such as biological factors (36 items), socio economic factors (9 items), environmental factors (5 items), psychological factors (24 items), and personal factors (15 items) with a total of 89 items in five areas with check responses provided as yes or no answers.

The gathered data was analysed using SPSS software system of version 16. Frequency and percentage distribution was calculated to analyse the sample characteristics and risk factors leading to mental illness. The chi-square test was computed to analyse the association of risk factors leading to mental illness with selected demographic variables. Odds ratio was calculated to compare the magnitude of various risk factors for that outcome.

Results

Section –1: Description of Sample characteristics

The study finding shows that highest percentages (27%) of the psychiatric patients were in the age group of 20-29 years in case group where as in control group, highest percentage (30%) of the samples were in the age group of 30-39 years' old. Majority (57%) of psychiatric patients were female where as in control group, majority (60%) of samples were female. Educational status of the psychiatric patients revealed that highest percentage (26%) of patients had studied up to secondary education where as in control group, highest percentage (27%) of them had studied up to secondary education. Majority (53%) of the patients were unemployed in case group where as in control group, highest percentage (38%) of them was unemployed. Most (69%) of the patients were married where as in control group, most (92%) of the patients were married. Majority (72%) of the patients belonged to nuclear family where as in control group, majority (73%) of them belonged to nuclear family. Majority (34%) of the patients had two children where as in control group, majority (44%) of them had two children. Number of the siblings of the psychiatric patients revealed that majority (52%) of the patients had more than 3 siblings where as in control group, majority (63%) had 3 siblings. Orders of birth in the case group, majority (42%) were first born where as in control group,

majorities (35%) were second child. Majorities (26%) of the patients were having mental illness for less than a year. Number of previous admission in the psychiatric unit revealed that majorities (41%) of the patients were admitted once to the psychiatric ward previously.

Section II: Assessment of Risk Factors Leading To Mental Illness

Table 1: Frequency Percentage Distribution of Risk Factors Leading To Mental Illness

Sl. No.	Risk factors	Case (N=100)	Control (N=100)	Chi-square value	df	P- value
		(f)	(f)			
I	**Biological factors**					
1	**Physical deprivation**					
1.1	Poor nutrition	7	0	0	0	0.014
1.2	Sleep disturbance	71	13	69.048	1	0.000*S
2	**Present physical illness**					
2.1	Hypertension	16	28	4.196	1	0.041
2.2	Epilepsy	9	2	4.714	1	0.030
2.3	Thyroid dysfunction	13	2	8.721	1	0.003
3	**Family history of Paternal**					
	Father	19	9	4.153	1	0.042
	Brother/sister	23	9	7.292	1	0.007
	Maternal					
	Uncle	6	1	3.701	1	0.054
	Cousins	8	2	3.789	1	0.052
	Brother/sister	9	0	0	0	0.003
II	**Socioeconomic factors**					
4	Financial problems	32	13	10.351	1	0.001
5	Joint family	24	11	5.853	1	0.016
6	Family migration	5	0	0	0	0.059
III.	**Environmental factors**					
7	Place of residence					
7.1	Slum area	26	10	8.672	1	0.003
8	Adverse influence of mass media (computer, radio, newspaper)	5	0	0	0	0.059
IV.	**Psychological factors**					
9	Stress full life events					
9.1	Love failure	8	0	0	0	0.007
9.2	Feeling of loneliness	22	2	18.939	1	0.000
10	Loss of a significant person					
	Father	18	3	0	0	0.001
V.	**Personal factors**					
11	Chronic smoking	14	1	12.180	1	0.000
12	Family conflict	13	3	6.793	1	0.009
13	Difficulty at school					
13.1	Fear of punishment	5	0	0	0	0.059

Data depicted in [Table 1] shows that the following risk factors are significantly predisposed to mental illness among cases (psychiatric patients) such as poor nutrition (P=0.014), sleep disturbance (P=0.000), hypertension (P=0.041), epilepsy (P=0.030), thyroid dysfunsction (P=0.003), paternal-father (P=0.042), brother/sister (P=0.007), maternal-uncle (P=0.054), maternal-cousins (P=0.052), maternal-brothers/sisters (P=0.003), financial problems (P=0.016), family migration (P=0.059), slum area (P=0.003), adverse influence of mass media (P=0.059), work related stress (P=0.069), love failure (P=0.007), feeling of loneliness (P=0.000), loss of significant person (father) (P=0.001), chronic smoking (P=0.000), family conflict (P=0.004), and fear of punishment (P=0.054) along with case and control group.

Section III: Determination of Odds ratio of Risk Factors Leading To Mental Illness

Table 2: Odds ratio of risk factors for mental illness among psychiatric patients and general population n=200

SL. No	Risk Factors			Odds Ratio
		Case (100)	Control (100)	
I	Biological factors			
	• Sleep disturbance	71	13	16.385
II	Socioeconomic factors			
	• Financial problems	32	13	3.149
III	Environmental factors			
	Place of residence			
	• Slum area	26	10	3.162
IV	Psychological factors			
	• Feeling of loneliness	22	2	13.821
V	Personal factors			
	• Chronic smoking	14	1	16.116

Data in Table 2 shows that in biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162), feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

Section IV. Association of risk factors of mental illness with selected demographic variables.

Table 3: Association of demographic variables with risk factors of mental illness in case and control group n=200

Sl. No.	Demographic factor with Risk Factors	Case(100)		Control (100)	
		Chi-square value	P Value	Chi-square value	P Value
1	Occupation (sleep disturbance)	9.460	0.051*	3.057	0.548
2	Gender (diabetes mellitus)	0.672	0.412	4.001	0.045*
3	Age(hypertension)	9.008	0.016*	0.814	0.937
4	Marital status(hypertension)	15.534	0.004*	1.036	0.309
5	Education(epilepsy)	5.328	0.5036	16.667	0.020*
6	Type of family(epilepsy)	3.846	0.050*	0.548	0.459
7	Marital status(migraine)	9.789	0.048*	0.524	0.469
8	Age (thyroid dysfunction)	17.880	0.001*	2.211	0.697
9	Marital status (joint family)	5.606	0.231	6.238	0.013*
10	Type of family (joint family)	41.009	0.000*	25.612	0.000*
11	Type of family (riot prone area)	3.725	0.054*	1.118	0.290
12	Gender (work related stress)	6.206	0.013*	0.174	0.677
13	Occupation (work related stress)	20.572	0.000*	2.245	0.691

*- significant

Data presented in Tables 3 shows that there is a significant association between the risk factors of mental illness like sleep disturbance, diabetes mellitus (control), hypertension, epilepsy, (both case and control group) migraine, thyroid dysfunction, joint family (both case and control group), riot prone area, work related stress with selected demographic variables. Hence the null hypothesis is rejected and research hypothesis is accepted. There is no significant association found between the rests of the risk factors of mental illness with selected demographic variables.

Discussion

There is a paucity of literature looking to identify the various risk factors leading to mental illness. The present study intended to identify the risk factors leading to mental illness among patients in selected hospitals, Mangalore.

The present study findings are consistent with a longitudinal study conducted on sleep disturbances and depression: risk relationships for subsequent depression and therapeutic implications shows that 90% of patients with depression will have sleep quality complaints. About two third of the patients undergoing a major depressive episode will experience insomnia, with about 40% of patients complaining of problems initiating sleep (sleep onset difficulties), maintaining sleep (frequent awakenings), and/or early-morning awakenings (delayed or terminal insomnia), and many patients reporting all three. Hypersomnia occurs in about 15% of patients. Sleep problems sometimes emerge as a symptom of depression or as a side effect of treatment.[8]

The present study showed that in biological, socioeconomic, environmental, psychological and personal factors, the highest value of the odds ratio of risk factors for mental illness is sleep disturbance (16.385), financial problems (3.149), slum area (3.162), feeling of loneliness (13.821) and chronic smoking (16.116) respectively; it is higher among patient with mental illness compared to the general population.

The study findings are supported by an epidemiologic study of sleep disturbances and psychiatric disorders shows that the risk of developing new major depression was much higher in those who had insomnia at both interviews compared with those without insomnia (odds ratio, 39.8; 95% confidence interval, 19.8 to 80.0).[10]

Study on loneliness in the general population: prevalence, determinants and relations to mental health shows that a total of 10.5% of participants reported

some degree of loneliness (4.9% slight, 3.9% moderate and 1.7% severely distressed by loneliness). Loneliness declined across age groups. Loneliness was stronger in women, in participants without a partner, and in those living alone and without children. Controlling for demographic variables and other sources of distress loneliness was associated with depression (OR=1.91), generalized anxiety (OR=1.21) and suicidal ideation (OR=1.35).[11]

The present study shows that there is a significant association between the risk factors of mental illness like sleep disturbance, diabetes mellitus (control), hypertension, epilepsy, (both case and control group) migraine, thyroid dysfunction, joint family (both case and control group), riot prone area, work related stress with selected demographic variables. Hence the null hypothesis is rejected and research hypothesis is accepted. There is no significant association found between the rests of the risk factors of mental illness with selected demographic variables.

The study findings are supported by a study on relationships of occupational stress to insomnia and short sleep in Japanese workers shows that in men, high occupational stresses were significantly associated with insomnia, especially a high level of Effort Reward Imbalance (defined as the presence of high effort and low reward), had a remarkably higher odds ratio. In women, high occupational stresses were significantly associated with insomnia as well. High occupational stresses were significantly associated with short sleep in men. However, in women, only Effort Reward Imbalance showed a significantly association with short sleep.[12]

Conclusion

Most of the samples are having one or other risk factors for developing mental illness**.** Some of the most relevant risk factors are sleep disturbance, financial problems, slum area, feeling of loneliness, chronic smoking etc. Hence we need to take care about these risk factors and maintain good lifestyle to promote optimal mental health.

Financial support and sponsorship- NIL

Conflicts of Interests- There are no conflicts of interests

Ethical Clearance: obtained from Institutional Ethics committee of A J Ethics committee, Mangalore.

References

1. Sreevani R. A guide to mental health & psychiatric nursing. 3rd ed. Jaypee Brothers Medical Publishers (P) Ltd. p. 1.
2. Department of Health. Australian Government. What is the mental illness? [Online]. May 2007. Availablefrom:URL:http://www.health.gov.au/internet/publications/publishing.nsf/Content/mental-pubs-w-whatmen-toc~mental-pubs-w-whatmen-what
3. Chentwitter M. Mental illness is a global crisis. 2017 Oct 26.
4. What is mental illness: mental illness facts? National Alliance of Mental Health. Available from: URL: www.namihelps.org.
5. The District Health and Family Welfare Office, Dakshina Kannada District. Statistics of mental illness of the year 2007-2008.
6. Murali MS. Epidemiological study of prevalence of mental disorders in India. Indian Journal of Community Medicine 2001; 26(4):10-2.
7. Kumar S G,Das A,Bhandary PV, Soans SJ, Harsha K, Kotian MS. Prevalence and pattern of mental disability using Indian disability evaluation assessment scale in a rural community of Karnataka. Indian J Psychiatry 2008 Jan-Mar;50(1):21-30.
8. Franzen PL, Buysse DJ. Sleep disturbances and depression: risk relationships for subsequent depression and therapeutic implications. Dialogues in Clinical Neuroscience 2008; 10(4).
9. Daniel E, Ford MD, Douglas B. Kamerow. Epidemiologic study of sleep disturbances and psychiatric disorders. JAMA Network 1989; 262(11):1479-84.
10. Beutel ME, Eva M, Klein EM, Brähler E, Reiner I, Jünger C, Matthias Michal M, WiltinkJ, Philipp SW, Thomas M, Lackner KJ, Tibubos AN. Loneliness in the general population: prevalence, determinants and relations to mental health. BMC Psychiatry 2017; 17:97.
11. Utsugi M. Saijo Y. Yoshioka E. Horikawa N. Sato T. Gong Y and Kishi R. Relationships of occupational stress to insomnia and short sleep in Japanese workers. Occupational Stress and Sleep 2005; 28(6): 728-35.

Targeted Local Drug Delivery – A Possible Approach in Dentistry

Gummuluri Sriram[1], Kavalipurapu Venkata Teja[2], Kaligotla Apoorva Vasundhara[3]

[1]Undergraduate Student, Bachelor of Pharmacy, SVS Group of Institutions, SVS School of Pharmacy, Bheemaram, Hanumakonda, Warangal, Telangana, India, [2]BDS, Private consultant, Hyderabad, [3]Postgraduate, Sibar Institute of Dental Sciences, Guntur

Abstract

Drug delivery is a method of administering a pharmaceutical compound to achieve a therapeutic effect in humans and animals. Conventional therapy is a classical method of achieving drug delivery. Where, it provides drug release immediately and causes fluctuation of drug level in in blood depending on the dosage forms compared to conventional, which improves the drug potency, controlled drug release to give a sustained therapeutic effect, provide greater safety and target a drug specifically to a desired tissue. It mainly includes targeted, controlled and modulated drug delivery systems. Hence, there is an increased interest towards the application of targeted therapies in medicine and dentistry and has proven to be successful in prevention and treatment of various oro-dental disorders.

Keywords: *Biodegradable; Carrier System; Nanoparticle; Target Drug*

Introduction

Targeted drug delivery is a special form of system, where the medicament is selectively targeted or delivered only to its site of action or absorption and not to the non-target organs or tissues or cells. It improves the efficacy and reduces the side effects [1]. The drug may be delivered, to the capillary bed of the active sites, to the specific type of cell or even an intracellular region, to a specific organ or tissue by complexion with the carrier that recognises the target. The main objective of a targeted therapy, is to mainly achieve a desired pharmacological response at a selected site, thereby the drug has a specific action with minimum side effects and better therapeutic index [1]. The main reason behind the targeting of the drug is in intervention, prevention or treating a disease. Conventional dosage forms have few drawbacks like, pharmaceutical drug instability, low absorption and high membrane bounding, biological instability. The drug delivered through conventional system, has a very low specificity, shorter half life, large volume of distribution and low therapeutic index. These challenges lead to increased interest towards a targeted therapy [2]

Requirements of drug targeting

For a drug to be targeted, it should have certain characteristics or requirements to be satisfied. Mainly it should be nontoxic, biocompatible, biodegradable and physico-chemically stable both invitro and invivo. The drug that has been delivered should be restricted to the targeted area and should have a uniform capillary distribution. It should be controllable and with predictable drug release. Amount of release is therapeutic, with minimal leakage during transit [3]. Carriers used must be bio-degradable or readily eliminated from the body without any problem. Although targeted therapy has several advantages, but still it has many limitations that hinder its application. The main disadvantage of this therapy is difficulty in predicting the exact action of drug at the specified site. Rapid clearance of targeted systems, immune reactions, insufficient localisation of targeted systems, possible toxic reactions in therapeutic dosages and tedious preparation procedures lead to decreased usage for day to day basis [4].

Carriers in targeted drug delivery:

Targeted drug delivery, can be achieved by using carrier system. Carrier is a special molecule or system essentially required for effective transportation of loaded drug to the selected site. Various pharmaceutical carriers used are polymers, microcapsules, microparticles, lipoproteins, liposomes, micelles. The important componential properties that influence drug targeting

are mainly the drug delivered its concentration, particulate location and distribution, molecular weight, physicochemical properties and drug carrier interaction. In case of carrier molecule, its type, number of excipients, surface characteristics, size and density. In vivo electric field [5,6].

Various strategies in drug targeting [5] are, passive, active, ligand mediated, physical, dual, double inverse and combination targeting. Passive targeting utilises, the natural course of bio-distribution of the carrier. The colloids which are taken up by the reticulo-endothelial system can be ideal vectors for passive targeting. Active targeting involves the modification or functionalization of the drug carriers so that the contents are delivered exclusively to the site corresponding to which carrier is architectured. It can be affected at different levels like first order or organ compartmentalization, second order or cellular targeting, third order or intercellular organelles targeting. In first order targeting, there is a restricted distribution of drug carrier system to the capillary bed of a pre-determined target site, organ or tissue. In second order targeting, the drug is selectively delivered to a specific cell type such as tumor cells and to the normal cells. In third order targeting, drug is delivered to the intracellular organelles of the target cells. Inverse targeting is a reverse of passive system which avoids the passive uptake of colloidal carriers by the reticuloendothelial system. It can be achieved, by suppressing the function of reticulo-endothelial system by pre-junction of a large amount of blank colloidal carriers or macromolecules [5]. Ligands are carrier surface groups, which can be selectively direct the carrier to the pre-specified site, housing the appropriate receptor units to serve as homing device to the carrier or drug. The ligands confer recognition and specificity upon drug carrier and endow them with an ability to approach the respective target selectivity and deliver the drug. Physical targeting involves environmental changes like pH, temperature, light intensity, electric field and ionic strength. Dual targeting is an approach where, the carrier molecule itself, have their own therapeutic activity and thus increase the therapeutic effect of the drug. Double targeting is of two types, it can be achieved by spatial and temporal control. In spatial control, drugs are targeted to specific organs, tissues, cells or even subcellular component. In temporal control, the rate of the drug delivery is controlled to the target site. Combination targeting systems are equipped with carriers, polymers and homing devices of molecular specificity that could provide a direct approach to the target site [5,6, 7].

Delivery systems

Drug delivery, is a method or process of administrating a pharmaceutical compound to achieve a therapeutic effect. It is achieved through delivery systems, which help in delivering or carrying the drug to the specified site. The various delivery systems used are nanotubes, nanowires, nano shells, quantum dots, gold nano, dendrimers niosomes virosomes, liposomes, nanocrystals, magnetic nanoparticles, nanorobots [8]. Nano tubes are the hollow cylinder tubes made of carbon atoms, which can be filled and sealed for potential drug delivery they measure about 10 to 100 micrometers [9,10]. Nanowires are the thin wires which are usually microns in size, they localize the pinpoint damaged site. It has its wide applicating in patients with neurological disorders [8]. Nanoshells are the hollow silica spheres, covered with gold. Antibodies can be attached to their surfaces, enabling shells to target a particular cell in the body [8]. Quantum dots are miniscule silica particles, which are mainly the semiconductor particles, which are useful in various diagnostic and therapeutic purposes. Gold nano can be nanoparticles that are coated or made of gold particles. They are helpful in detection of DNA and protein markers. It has its wide applications in cancer treatment and genetic engineering [11]. Dendrimers are precisely defined [10,12]. Synthetic nanoparticles that are approximately 510nm in diameter. They are made up of layers of polymer surrounding a central core. They contain different sites to which the drugs are attaches and delivered. They have wide applications in gene transfection and medical imaging [8,9]. Liposomes are small microscopic vesicles in which an aqueous volume is entirely composed by membrane of lipid molecule. The drug molecules can either be encapsulated in aqueous space or intercalated into the bilayers [13,14,15]. Niosomes are non- ionic surfactant vesicles which can entrap both hydrophilic or lipophilic drugs either in aqueous phase or vesicular membrane made of lipid materials. It seems to have better stability than liposomes. Virosomes are immuno-modulating liposomes consist of glycoprotein of viruses. They helpful in genome grafting and cellular microinjection [16,17,18,19]. Nanocrystals are nanoparticles with lesser than 100nm in diameter. Nanorobots include the technology of creating robots at nanoscale diameters, it is a hypothetical designing principle, which is still in research. It is claimed that they specifically delivered to certain areas and get targeted [8,9].

Applications of targeted drug delivery:

The applications of targeted drug delivery mainly include in treating oral mucosal lesions, in treating endodontic infections, cancer therapy and treating patients with periodontitis [20]. In treating oral mucosal lesions, various drugs are targeted using different strategies like usage of quantum dots, liposomes [13,14,15] which are bio-compatible, biodegradable and nonimmunogenic. Which ultimately reduce the toxicity and side effects of drugs. They have a wider role, with increased therapeutic effect as an antimicrobial, antiviral, antitumoral and also used in gene therapeutics. Folate targeting and sono poration have proven to be useful in treating patients with oral cancer. The major importance of nano particles, compared to the other conventional medicinal drugs is that the targeting of the nanoparticles to the specific tumor tissue. Compared to the microparticulate systems, nanoparticles can easily traverse in the blood vessels and the tumor tissue. In targeting the cancer tissue mainly by active and passive targeting modalities. In passive targeting, the injectable drug carriers have been surface modified to evade the reticule endothelial system. They are lived for longer time they have a greater advantage of reaching the blood vessels surrounding the solid tumors. The nanoparticulate molecules have enhanced permeability and retention. Active targeting is by conjugating a ligand to the surface of the particle, such ligand only target the specific cancerous tissue. Most of the studies till date, have focused on the tissue specific antigen mainly the tissue specific antigen. Liposomal carriers and the polymeric nanoparticles are the major important pathways of the targeted drug delivery [13]. Although other nanomicelle systems and studies are still being undertaken.

Periodontic and endodontic diseases are the conditions which mainly occur due to the inflammatory responses from the teeth and the supporting tissues. Endodontic and periodontal pathologies are both biofilm mediated diseases. Thus suppression of the microorganisms and the bio films is challenging. The recurrence of the infection is more common due to the adaptive nature of the microorganisms, protective extracellular polysaccharide matrix formation and development of resistance to microbial agents. To circumvent these challenges, nanomaterials in the form of nanofibers and nanoparticles have been considered in dental therapies. The micro and nano particles are used for localised delivery of the anti-infective agents for the periodontal and endodontic diseases. The micro particles seem to have a greater potential in improving the strategies in management of the endodontic and periodontal diseases. They are very effective when directed against the periodontal pockets and root canals as they have prolonged antibacterial effect and extremely effective. Among all the natural and synthetic polymers available, copolymers of lactic and glycolide family are the most studied and versatile with reference to its availability, release profile, biodegradation time and biocompatibility [21,22,23,24].

In controlling periodontal pathogens, various antibiotics such as doxycycline, tetracycline and minocycline are used. When these antibiotics, encapsulated with the polylactic glycolic acid blend spheres, it is observed the minimal inhibitory concentration was more than required in the gingival crevicular fluid, with continuous drug release up to a week. There was significant improvement in the plaque and gingival index scorings with relative attachment levels. Calcium hydroxide nanospheres are seen to be more effective in endodontic therapy compared to the conventional calcium hydroxide. The nanoparticles can also be used in dental materials, as nanoparticles, for improving the physicomechanical properties of the dental materials. Polymeric nanoparticles such as chitosan nanoparticles, serve as a prophylactic approaches for prevention of bacterial biofilm formation and possibility of penetration into the already formed biofilms. In addition to chitosan, polylactic glycolic acid and cellulose acetate phthalate nanoparticles have been used optimally as antibacterial agents for endodontic and periodontal disease management [25]. Charged and surface charged nanoparticles have direct interaction with the microorganisms and they are helpful in the selective eradication. It is a process where selectively the bacteria are eradicated by binding to the opposite charged bacteria or pathogens. The concept utilised in both endodontics and periodontics is by usage of the photosensitisers encapsulate with the nanoparticles, in the active photodynamic therapy to eradicate the microorganisms [25]. The principle is that the photosensitiser is preferentially taken by the bacteria and the activation of the light generates free radicals and singlet oxygen which kills the microorganisms. Specific targeting nanoparticles is a strategy where a particular and specific pathogen can be identified and targeted. It is possible via conjugation of the antibodies with the respective nanoparticles. Immunoliposomes have been used to for the precise delivery of these Antimicrobial

agents for specific plaque control. Although there are currently only a limited number of endodontic and periodontal nanodrug delivery systems, there is a future hope of developing and applying these nanoparticles in the endodontic and periodontal perspective [25,26].

Conclusion

Targeted drug delivery is an effective and alternative pathway for the modern dentistry. Although it is beneficial in several ways, the delivery systems still have to be I proved for they effective delivery into the targeted tissues. And there is a hope in near future that nano targeted dentistry will improve the treatment outcomes.

Ethical Clearance- Not applicable

Source of Funding- Nil

Conflict of Interest - Nil

References

1. Hillery AM. Supramolecular lipidic drug delivery systems: From laboratory to clinic A review of the recently introduced commercial liposomal and lipid-based formulations of amphotericin B. Advanced Drug Delivery Reviews. 1997;24(2-3):345-63.
2. Rani K, Paliwal S. A review on targeted drug delivery: Its entire focus on advanced therapeutics and diagnostics. Sch. J. App. Med. Sci. 2014:328-31.
3. Mody N, Tekade RK, Mehra NK, Chopdey P, Jain NK. Dendrimer, liposomes, carbon nanotubes and PLGA nanoparticles: one platform assessment of drug delivery potential. Aaps Pharmscitech. 2014;15(2):388-99.
4. Bae YH, Park K. Targeted drug delivery to tumors: myths, reality and possibility. Journal of controlled release. 2011;153(3):198.
5. Gupta M. and Sharma V. Targeted drug delivery system: A Review. Res. J. Chem. Sci 2011; 1(2): 135-138.
6. Agnihotri J, Saraf S, Khale A. Targeting: new potential carriers for targeted drug delivery system. International Journal of pharmaceutical sciences Review and Research. 2011;8(2):117-23.
7. Martinho N, Damgé C, Reis CP. Recent advances in drug delivery systems. Journal of biomaterials and nanobiotechnology. 2011;2(05):510.
8. Reddy RS, Dathar S. Nano drug delivery in oral cancer therapy: An emerging avenue to unveil. Journal of Medicine, Radiology, Pathology and Surgery. 2015 ;1(5):17-22.
9. Hu CM, Aryal S, Zhang L. Nanoparticle-assisted combination therapies for effective cancer treatment. Therapeutic delivery. 2010;1(2):323-34.
10. Tang M, Lei L, Guo S, Huang W. Recent progress in nanotechnology for cancer therapy. Chin J Cancer. 2010;29(9):775-80.
11. Khan AK, Rashid R, Murtaza G, Zahra A. Gold nanoparticles: synthesis and applications in drug delivery. Tropical journal of pharmaceutical research. 2014;13(7):1169-77.
12. Patra JK, Baek KH. Green nanobiotechnology: factors affecting synthesis and characterization techniques. Journal of Nanomaterials. 2014; 2014:219.
13. Jones MN, Kaszuba M. Polyhydroxy-mediated interactions between liposomes and bacterial biofilms. Biochimica et Biophysica Acta (BBA)-Biomembranes. 1994 ;1193(1):48-54.
14. Sanderson N, Jones M. Encapsulation of vancomycin and gentamicin within cationic liposomes for inhibition of growth of Staphylococcus epidermidis. Journal of drug targeting. 1996;4(3):181-9.
15. Jones MN, Kaszuba M, Reboiras MD, Lyle IG, Hill KJ, Song YH, Wilmot SW, Creeth JE. The targeting of phospholipid liposomes to bacteria. Biochimica et Biophysica Acta (BBA)-Biomembranes. 1994;1196(1):57-64.
16. Manchester M, Singh P. Virus-based nanoparticles (VNPs): platform technologies for diagnostic imaging. Advanced drug delivery reviews. 2006;58(14):1505-22.
17. Singh P, Destito G, Schneemann A, Manchester M. Canine parvovirus-like particles, a novel nanomaterial for tumor targeting. Journal of nanobiotechnology. 2006;4(1):2.
18. Flenniken ML, Willits DA, Harmsen AL, Liepold LO, Harmsen AG, Young MJ, Douglas T. Melanoma and lymphocyte cell-specific targeting incorporated into a heat shock protein cage architecture. Chemistry & biology. 2006;13(2):161-70.
19. Flenniken ML, Liepold LO, Crowley BE, Willits DA, Young MJ, Douglas T. Selective attachment

and release of a chemotherapeutic agent from the interior of a protein cage architecture. Chemical Communications. 2005(4):447-9.

20. Munot NM, Gujar KN. Orodental delivery systems: an overview. Int J Pharm Pharm Sci. 2013;5(3):74-83.
21. Ghali RF. The potential link between periodontitis and systemic diseases–an overview. J Advanc Med Res. 2011; 1:24-35.
22. Greenstein G, Polson A. The role of local drug delivery in the management of periodontal diseases: a comprehensive review. Journal of periodontology. 1998 ;69(5):507-20.
23. Robinson AM, Bannister M, Creeth JE, Jones MN. The interaction of phospholipid liposomes with mixed bacterial biofilms and their use in the delivery of bactericide. Colloids and Surfaces A: Physicochemical and Engineering Aspects. 2001;186(1-2):43-53.
24. Venkatesh A, Ramamurthy J. Local drug delivery systems in the treatment of periodontitis–An Overview. Int J Pharm Pharm Sci. 2012;4(1):30-7.
25. Shrestha A, Kishen A. Antibacterial nanoparticles in endodontics: a review. Journal of endodontics. 2016;42(10):1417-26.
26. Kishen A. Nanotechnology in endodontics. Springer International Pu; 2016.

Association of *Viharaja* and *Manasika Hetus* (Behavioural and Mental Factors) with A*mlapitta (*Hyperacidity) amongst Police Professionals in Pune

Babar Smeeta Shivaji[1], Joshi Mrudula Vinayak[2,] Joshi Vinayak Nilkanth[3]

*[1]Ayurveda Practitioner, Pune, Maharashtra, [2]Professor and HOD, P. G. Department of Ayurveda Samhita and Siddhanta, [3]Professor and HOD, Rognidan and Vikruti Vidnyan, Dr. D.Y. Patil Vidyapeeth,, Dr. D.Y. Patil College of Ayurveda and Research centre, Pimpri, Pune, Maharashtra***,** *India*

Abstract

Background-Changing life style in conjunction to unhealthy dietary pattern, mental stress and strain is leading to *Ajeerna* (indigestion), and further *Amlapita* (hyperacidity). **Aim-**To evaluate the association of *Viharaja* and *Manasika Hetus* (behavioural and mental factors) with A*mlapitta (*Hyperacidity) amongst police professionals in Pune.

Settings and Design- This cross sectional study was conducted among Police professionals in Pune region. **Methods and Material: S**tudy included 100 identified patients of *AMLAPITA*; both males and females from the age group of 25-50years. A self administered, structured, pilot tested 9 item questionnaire was used to collect data. **Statistical Analysis:** Descriptive data was analyzed using number and percentages. **Results:** Maximum patients with *Pitta-Vataja Prakruti were* n=47, *Kapha-Pittaja Prakruti* were n = 41 and *Kapha-VatajaPrakruti were* n= 12. 71 (100%) *Amlapitta* Police Professionals did daily ***Ratri-jagarana*** who had night shift and 29 (100%) reported day shifts out of which 21(72.41%) Police Professionals did daily *Ratri-jagarana* yet they had day shift duty. Mental stress was more in Night shift personnel n=52 (73.24%) than stress observed in Day shift participants n=17(58.62%).

Conclusion: Present study help us to estimate association of *Amlapitta* with changed life style pattern. These etiological factors like *Viharaj and Manasika hetus* namely *Ratrijagarana,Vegavidharana,* Mental stress cannot be eradicated totally due to current career progression scenario. But definitely alternative therapies like yoga, meditation and diet plans can be suggested and practiced as and when necessary.

Key Words –*Amlapitta, Etiological factors, Police Professionals, Hyperacidity, Stress, Behavioural causes, mental causes*

Introduction

Amlapitta(Hyperacidity) is a very common disease of this era.30% of the general population is suffering from gastro-oesophageal reflux and gastritis resulting in heartburn.It is very troublesome disease and can give rise to many serious problems if not treated in time. Signs and symptoms of *Amlapiita* are very similar to gastritis [1]. *Amla* means sour and *Pitta* is the functional digestive component of the body. Thus *Amlapitta* (Hyperacidity) is a disease; in which sour blenching is the major symptom. *Avipak*(Indigestion), *Klama*(Exhaustion including normal 8 hr. duty) , *Utklesha* (Nausea) ,*Katu/ Tikta / Amla udgar* (pungent/ bitter/ sour Blenching) , *Hrut / kantha daha*(Heart / Throat burning) , *Aruchi* (Tastelessness), *Chchardi*(vomiting) ,*Shirashoola*(Head ache) are the important signs and symptoms of the disease[2,3].

Corresponding author:
Dr. Joshi Mrudula Vinayak
Professor and HOD, Department of Ayurveda Samhita and Siddhanta, Dr. D.Y. Patil Vidyapeeth,
Dr. D.Y. Patil College of Ayurveda and Research centre, Pimpri, Pune.
E mail - mrudula.doctor@gmail.com
Mobile: +919022374758

It has been indicated that *Amlapitta* occurs in the persons having unhealthy food habits[1, 4]. The diet today is governed by social and professional background, has led people to consume unhealthy food and subsequently indigestion. Indigestion caused produces *Annavisha* (toxins) which get mixed up with *Pitta Dosha* and lodges in *Amashaya*(Stomach) and then it produces *Amlapitta* disease[5].

Police officer's job is one such public service profession wherein noxious conjunction due to disturbed life pattern is seen.Policeman has to be on duty for longstanding hours either in a day or night shift, leading to disturbed body clock. *Ratrijagarana* (Night awakening)[6,7,8,9], *Atapa sevana* (exposure to bright Sunlight), *Vega vidharana* (suppression of natural urges like hunger, thirst stool, urine, etc.)[7] is very common in their day to day life. *Ajeernashana*(repeated eating)[1,10,11,12], *Amla / katu / Vidahi/ ViruddhaAhar[12,13,14]sevan*(sour, pungent, spicy food & food having opposite qualities)are mentioned as dietary causes of the disease.This disturbed life pattern also causes, addiction of Paan, tobacco chewing, Gutka, alcohol which in addition contributes to Gastro-Intestinal disorders like *Amlapitta*. Moreover, work pressure causes high stress level especially mental stress, which again contributes to vitiate the *Pitta dosha* leading to *Amlapitta* disease.Therefore it becomes necessary to avoid *Hetus* (etiological factors) to minimize diseases like *Amlapitta* in police professionals.

This study will help us to evaluate the association of *Viharaja* and *Manasika Hetus* (behavioural and mental factors) with A*mlapitta (*Hyperacidity) amongst police professionals in Pune.

This data will help to fetch remedy for different preventive and curative modified dietary and life style changes on the basis of dominant etiological factors.

Materials and Method

This cross sectional study was conducted among 100 pre- diagnosed police professionals from Pune region suffering from *Amlapitta*, who were working on various posts, of both sex and aged between 25 to 50 years, willing to participate in the study were selected. Individuals suffering from *Avipak*, *Klama ,Utklesha ,Katu/ Tikta / Amla udgar ,Hrut / kantha daha ,Aruchi ,Chchardi , Shirashoola* (Head ache) as main symptoms were included; while those who suffered from Hypertension, Cardiac diseases, Diabetes mellitus, Congenital and Immunological disorders were excluded from the study. Approval was obtained from the scientific committee and Institutional Ethics committee (No: AY/PG/130/2014/15/IEC). Every participant signed an informed consent form before starting the study. A structured questionnaire with 9 major questions was administered. All the Police Professionals were asked to complete the questionnaire. Information regarding *Hetus*, *Lakshanas* of *Amlapitta*, Daily schedule and duty shifts and other occupational causes related to stress in Police profession was recorded.The collected data was entered in Microsoft Excel 2007. Descriptive analysis in the form of number and percentages were calculated.

Results

This cross sectional study was completed among 100 police professionals. Important findings regarding demographic variables like Age, *Prakruti* (Physical constitution), *Viharaja hetus namely Ratrijagarana, Vega vidharana* and Mental stress are listed. It was found that according to age, maximum number of patients were n= 39 from the group of 45 -50 years i.e. belonging to higher grade and minimum patients i.e. n= 24 from age group 35-45 years (Table 1).

TABLE 1 - Distribution of 100 patients of *Amlapitta* according to Age

Age Range in years	Number	
25 – 35		37
35 – 45		24
45 – 50		39
Total		100

TABLE 2. Distribution of 100 Amlapitta Police Professionals according to Prakruti

PRAKRUTI	**Number**
PV(Pitta-Vata)	47
KP(Kapha-Pitta)	41
KV(Kapha-Vata)	12

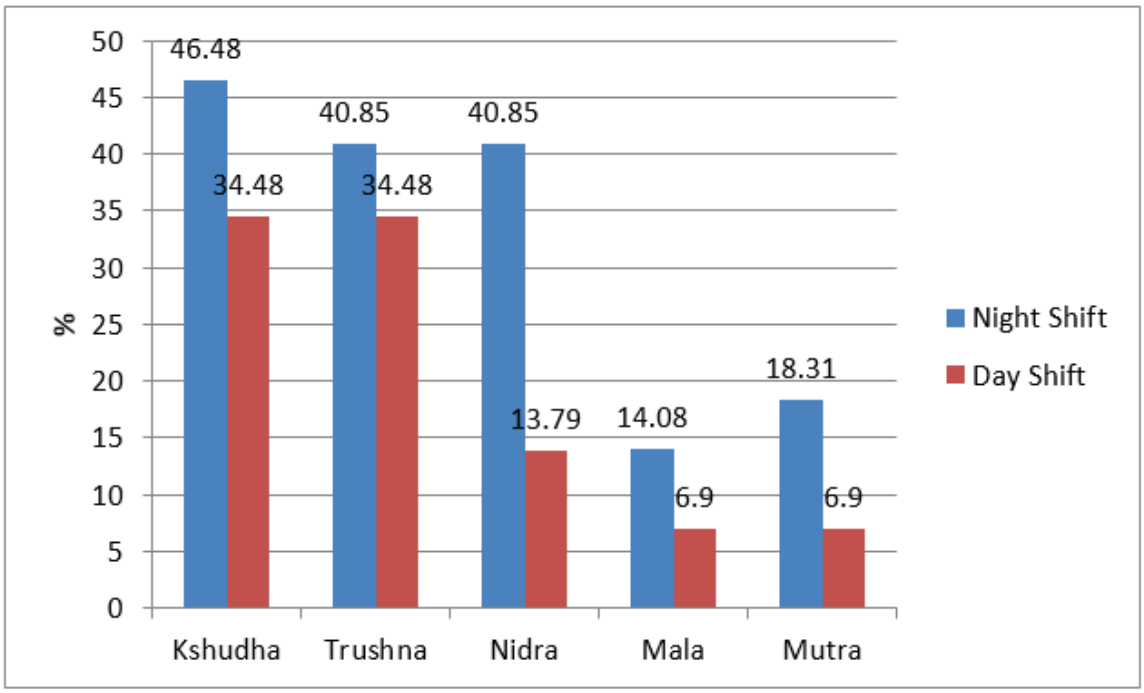


Fig1: Distribution of police professional based on the daily *Vega Vidharana*

Figure 1.***Vegavidharana*** ***(***suppression of natural urges***)*** It was noted in Night shift Participants *-Kshudha (hunger), Trushna(thirst), Nidra(sleep) and Mala(stool),Mutra (urine)Vegavidharana* was prominently noticed in 46.48%, 40.85%, 40.85%, 14.08% and 18.31% respectively.

TABLE 3– Distribution of 100 Police professionals with *ManasikaHetus* of *Amlapitta*

MENTAL STRESS	**Number (%)**
Night duty(n =71)	52(73.24)
Day duty(n =29)	17(58.62)

Prakruti **-**Observations related to Physical constitution denoted maximum patients with *Pitta-Vataja Prakruti* n=47, *Kapha-Pittaja Prakruti* in n = 41 and *Kapha-VatajaPrakruti* n= 12(Table 2).

71 (100%) *Amlapitta* Police Professionals did daily ***Ratri-jagarana*** who had night shift and 29 (100%) reported day shifts out of which 21(72.41%) Police Professionals did daily *Ratri-jagarana* yet they had day shift duty.

It is more in comparison with Day Shift duty Police Professionals where the percentage noted was 34.48%, 34.48%, 13.79%, 6.90%, and 6.90% respectively.

Table 3.*Manasikhetu***-Mental stress was more in Night shift personnel n=52 (73.24%) than stress observed in Day shift participants i.e. n=17(58.62%)**

Discussion

Present survey study executed on 100 Police Professionals, pre-diagnosed with *Amlapitta*; acknowledges prevalence of disease *Amlapitta* in Police Professionals; along with important role of *Viharaja and Manasika Hetus* in disease creation. Age of Police professionals plays vital role in disease progression mainly due to continuous change in life style for longer duration. Working in shift duty is trigger factor for uneven sleep pattern, unpunctual and unhealthy food habits.

Present study reveals that Police Professionals with Night Shift were found to be more exposed to *Hetus* of *Amlapitta* and were suffering from classical symptoms of *Amlapitta* as compared to Day shift Police Professionals. According to this study *Hetu* – **Age** between 45-50 years in participants indicates the middle age group which is *Pitta* dominant phase of life. Further, the increasing load of responsibilities is also a characteristic of this age group which can be an etiological factor. ***Sharirprakruti(***Physical constitution***)*** adds on to susceptibility to disorders. *Pitta Vataj prakruti* dominates with n=47. These type of constitutions in persons make them physically weak and more sensitive to external factors.

Working in Night shift exposes them to *hetus* like *Ratrijagarana, Vegavidharana of Kshudha, Trushna, Nidra, Mala and Mutra vega.* These *hetus* are *Viharaj hetus* and cause *Annavaha and Rasavaha srotas dushti*(disturbed digestion and assimilation). This leads to *ajeerna*(indigestion), *agnimandya(weak capacity of digestion)* and finally results in *Amlapitta*.

In *Manasika hetus*[15]; *Krodha* (Anger) causes *Pitta prakopa(increase in Pitta), Chinta* (Stress)causes *rasa dhatu dushti, Bhaya(Fear)* causes *Trasa (*pain) and *Shoka(*Grief *)* causes *vataprakopa(Increase in Vata)*[16]. *Vata pitta anubandha* is there in *Manasika hetus* which causes indigestion[15] which again leads to *Agnimandya* and creates *Vidhaha(burning), Shuktata(sour blenching) and Amlapitta* symptoms appear.

Apart from above *hetus* if person takes *Pitta prakopak (spicy ,pungent food items) Ahara, Vihara, Adhyashana(excessive eating), Viruddha-ahara(*opposite property in food*) ,Pishtanna (*Bakery products*), katu-lavan Rasa sevana (food with pungent and salty taste)*, it leads to *vidagdhata (incomplete digestion)* of *Ahar(food)* and then leads to *Amlapitta.*

Conclusion

Present study help us to estimate association of *Amlapitta* with changed life style pattern. These etiological factors like *Viharaj and Manasika hetus* namely *Ratrijagarana,Vegavidharana,* Mental stress cannot be eradicated totally due to current career progression scenario. But definitely alternative therapies like yoga, meditation, diet plans etc. can be suggested and practiced as and when necessary. This may help in lowering the rate of incidence, symptomatic relief and act as preventive measure in young Police professionals.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: Obtained from Institutional Ethics Committee, DR D Y Patil College of Ayurveda and Hospital, Pimpri, Pune.

Acknowledgement: The authors wish to thank Dr Pradnya Kakodkar, Dy. Director Reseach (Dr D Y Patil Vidyapeeth) for the help rendered during manuscript preparation.

References

1. AcharyaYadavjiTrikamji,editor.CharakaSamhita ofAgnivesha, ChikitsaSthana, Reprint ed. Varanasi: ChaukhambaSurbhartiPrakashan; 2014. P- 517.
2. AcharyaNarendranathShastri, editor , 1 st ed.,MadhavaNidana (Madhukosa commentary), Amlapittanidanam,New Delhi : MotilalBanarasidas 2009, shloka -1, p-641.
3. PanditHemrajshermana, editor.of Kashyapsamhita, khilasthan, Amlapittachikitsa, Chaukhambha Sanskrita Sansthana, 2004, p-335-338.
4. Pandit Hemrajshermana, editor.of Kashyapsamhita, khilasthan,, Amlapittachikitsa, Chaukhambha Sanskrita Sansthana, 2004, p-335-336.
5. PanditHemrajshermana, editor.of Kashyapsamhita, khilasthan, ,Amlapittachikitsa, ChaukhambhaSanskritaSansthana, 2004, p-336-337.
6. Pandit. HariSadashivShastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta&AyurvedRasayana of Hemadri,Sutrasthana 7/55, Chaukhambha Sanskrita Sansthana, 2009.

7. Pandit. HariSadashivShastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta& AyurvedRasayana of Hemadri, Sutrasthana 4/1, Chaukhambha Sanskrita Sansthana, 2009.
8. Pandit. Hari Sadashiv Shastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesSarvangsundara of Arunadatta& AyurvedRasayana of Hemadri, Sutrasthana 47/54, ChaukhambhaSanskritaSansthana, 2009.
9. Dr.Shivprasadsharma editor of Ashtang Sangraha of VruddhaVagbhat with Shashilekha Sanskrit Commentary byIndu, Sutrasthana 9/39, ChaukhambhaSanskritaSeries office, 2016.
10. Dr.Shivprasadsharma editor of Ashtang Sangrahaof VruddhaVagbhat with Shashilekha Sanskrit Commentary byIndu, Sutrasthana 13/2, Chaukhambha Sanskrita Series office, 2016.
11. Pandit. HariSadashivShastriparadkar editor of AshtangHrudayam of Vagbhatawith CommentriesS arvangsundara of Arunadatta&Ayurved Rasayana of Hemadri, Nidanasthana 1/22, ChaukhambhaSanskritaSansthana, 2009.
12. Pandit. HariSadashiv Shastriparadkar editor of AshtangHrudayam of Vagbhatawith Commentries Sarvangsundara of Arunadatta&AyurvedRasayana of Hemadri, Sutrasthana 8/13,14, ChaukhambhaSanskritaSansthana, 2009.
13. Pandit. HariSadashivShastriparadkar editor of AshtangHrudayam of Vagbhatawith Commentries Sarvangsundara of Arunadatta&AyurvedRasayana of Hemadri, Sutrasthana 7/45, Chaukhambha Sanskrita Sansthana, 2009.
14. AcharyaYadavjiTrikamji, editor. CharakaSamhita of Agnivesha, Sutra Sthana,26/84 Reprint ed. Varanasi: Chaukhamba Surbharti Prakashan; 2014. P- 150.
15. AcharyaYadavji Trikamji,editor. CharakaSamhita ofAgnivesha, VimanaSthana 2/9, Reprint ed. Varanasi: ChaukhambaSurbhartiPrakashan; 2014. P- 238.
16. AcharyaYadavjiTrikamji, editor. CharakaSamhita of Agnivesha, Chikitsa sthana 3/114-124, Reprint ed. Varanasi: Chaukhamba Surbharti Prakashan; 2014. P- 407.

Salivary Selenium Levels in Dental Caries

Nireeksha[1], Mithra N Hegde[2], Suchetha Kumari N[3], Sharmila[4], Roopa[5]

[1]Lecturer, [2]Vice principal, Head of the Department, Department of Conservative Dentistry and Endodontics, A.B.Shetty Memorial Institute Of Dental Sciences, Nitte University(deemed to be), , Deralakatte Mangalore, [3]Professor, Department of Biochemistry, Principal Scientific Officer, [4]Research Assistant, [5]Junior Research Fellow Central Research Laboratory, K.S.hegde medical academy, Nitte university(deemed to be), Deralakatte , Magalore

Abstract

Background: Selenium , an essential trace element performs various biological functions through different -containing proteins[7].Selenium has over 25 different proteins named as selenoproteins. These trace elements play a major role in remineralisation and demineralization cycle of tooth surface. Therefore, this study is aimed at evaluating the salivary selenium levels in caries free and caries active individuals.

Methods and Materials: After obtaining the ethical clearance the study was conducted among the 60 individuals reporting to the department of conservative dentistry and Endodontics A.B.Shetty memorial institute of dental sciences , Nitte University, Deralakatte Mangalore who can be included into the study based on the inclusion and exclusion criteria. Salivary samples were collected and assessed by Micowave Plasma Atomic Emission Spectrometer (MP-AES) for selenium levels in caries free and caries active group .

Results: The values obtained where statistically analyzed using SPSS version 2.0 software. Caries free group showed a mean selenium levels of 116.9863 microgram/L with a standard deviation of 9.60601. Whereas caries active group showed a mean selenium levels of 63.7547 microgram/L and standard deviation of 12.06005 . Levene's Test for Equality of Variances was done to test the significance. The values shows significant difference between the two group.

Keywords: *Saliva, dental caries, trace elements, selenium*

Introduction

Saliva due to its unique properties and constituents plays a protective role against occurrence of dental caries. Dental caries is a multi-factorial disease which occurs due to various etiological factors[1]. Presence of an ocean of anions ,minerals,electrolytes,proteins and enzymes in different degrees of intensity contributes to various important functions of the saliva namely buffering capacity, cleansing ability, anti-bacterial action and maintaining of supersaturated state. Presence of trace elements which are required in minute quantities for the physiology and proper growth development of organisms are present in approximately 0.2 % concentration of saliva[2].

A trace element is an element in a sample that has an average concentration of less than 100 parts per million measured in atomic count or less than 100 micrograms per gram[3].These trace elements play a major role in remineralisation and demineralization cycle of tooth surface. Various levels trace elements like phosphorous, Zinc, copper, molybdenum, calcium, magnesium, barium, strontium ,iron, ,selenium, lead and potassium are associated with increased or decreased occurrence of caries[4].Even though microorganisms play a major role in occurrence of dental caries ,the components of saliva which are in very minute concentration play a part in caries incidence and progression[5,6].

Corresponding Author:
Dr.Nireeksha
Lecturer, Department of conservative dentistry and Endodontics, A.B.Shetty memorial institute of dental sciences Nitte university(deemed to be), Deralakatte Mangalore, 575018, Email id: nireekshashetty24@gmail.com ,MOB: 09739755940

Selenium , an essential trace element performs various biological functions through different -containing proteins[7].Selenium has over 25 different proteins named as selenoproteins[8].It is a part of several metabolically active enzymes thioredoxin reductases and glutathione peroxidises. These selenoproteins play a major role in anti-oxidant defences, redox regulation of homeostasis and thyroid hormone metabolism. Various pathogens and pathogenic conditions are influenced by the presence of selenium.

Low levels of selenium leads to decline of tissue selenium-dependent glutathione peroxidase activity. One among the various sites selenium concentrations are evaluated is saliva[9].Selenium concentration varies according to different geographical locations. Their content in soil, plant also their bioavailability and retention also varies[10].

Therefore, this study is aimed at evaluating the salivary selenium levels in caries free and caries active individuals .

Methods and Materials

After obtaining ethical clearance the study was conducted among the 60 individuals reporting to the department of conservative dentistry and Endodontics A.B.Shetty memorial institute of dental sciences , Nitte university(deemed to be), Deralakatte Mangalore who can be included into the study based on the inclusion and exclusion criteria.

Inclusion Criteria:

- Age group of 18-40 Y.
- Free from systemic and local illness that affects the salivary flow.

Exclusion Criteria:

- Individuals with systemic illness like diabetes, Rheumatoid arthritis, undergoing radiotherapy affecting oral health.
- Individuals with chronic generalized gingivitis and periodontitis.
- Long-term medication and intake of other nutritional supplements.
- Individuals under a restricted diet will be excluded from the study.

Oral examination:

Mouth mirror and straight probe was used to perform clinical evaluation ,patients seated on the dental chair.

Dental caries evaluation:

"D" in DMFT index determines the no. of a decayed tooth, But PUFA index detects the depth, severity of this decayed tooth.

DMFT:

The patient will be seated in the dental chair, under ideal illumination mouth mirror and the straight probe will be used to evaluate caries and recorded in WHO oral survey2013 format. Any probe, catch or caries involving to any extent will be coded as "D"

Individuals were further divided in caries active and caries free group based on the no.of decayed tooth present. Individuals with caries; **caries active group(D=more than 4)** and absence of caries; **caries free group(D=0).**

Biochemical analysis:

Unstimulated saliva samples will be collected by NavazeshProtocol[22]. Subjects will be asked to abstain from smoking brushing of teeth, use of mouthwash, eat/ drink for 2 hour prior to the sample collection. Sample will be collected between 10.00 am – 11.00 am.

During sample collection subject will be seated in a normal chair instead of dental chair to maintain stress free environment. Once saliva is pooled in the floor of the mouth 5 ml will be collected in a Tarson's saliva collection tube. Five millilitres of saliva will be collected from the patient, centrifuged, and the supernatant obtained will be stored at 4°C for subsequent analysis.

Evaluation of Trace element Selenium in saliva was performed by Micowave Plasma Atomic Emission Spectrometer (MP-AES):

Image courtesy: ICAR-Directorate of Cashew Research

MP-AES is a high sensitive instrument for detection of wide range of elements down to sub ppb levels and is faster compared to conventional atomic absorption based instruments. Instead of flammable gases, MP-AES uses micro wave energy to produce plasma for ionisation of elements, using nitrogen extracted from ambient air. The excited electrons while returning to ground state emits radiation characteristics to each element and the intensity of emission being proportional to the concentration of element in solution.

Results

The values obtained where statistically analyzed using SPSS version 2.0 software. Caries free group showed a mean selenium levels of 116.9863 microgram/L with a standard deviation of 9.60601.Whereas caries active group showed a mean selenium levels of 63.7547 microgram/L and standard deviation of 12.06005 . Levene's Test for Equality of Variances was done to test the significance. The values shows significant difference between the two group.

TABLE 1: DEPICTS THE MEAN LEVELS OF SALIVARY SELENIUM

	Carries	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Selenium level (microgram/L)	FREE	30	116.9863	9.60601	2.20377
	ACTIVE	30	63.7547	12.06005	2.76677

TABLE 2: STATISTICAL ANALYSIS DEPICTING THE LEVEL OF SIGIFICANCE

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Selenium level	Equal variances assumed	1.273	.267	15.04	36	.000	53.2315	3.53717	46.058	60.405
	Equal variances not assumed			15.05	34.29	.000	53.2315	3.53717	46.045	60.418

*There is significant difference in selenium level among the subjects with and without carries with p<.001

Discussion

Presence of trace elements in the saliva and its accumulation on the tooth surface may affect the susceptibility of tooth to caries or may prevent occurrence of caries. The minute elements may attach to the apatite structure thereby decreasing the solubility and increasing the crystalline nature of enamel decreasing dissolution of tooth surface .The tooth surface turns more rigid there by making it more resistant to acid attack[11,12].The role of fluoride and tooth surface in the demineralization and remineralisation cycle itself explains that trace elements do play a role in occurrence of dental caries[13].

In the present study salivary selenium levels where significant higher in caries free group which can be attributed to the protective role of selenium element on tooth surface. A study conducted by Sekhri P et al did not show any significant changes in selenium and potassium levels among caries active and caries free individuals ,whereas caries free group showed significant levels of calcium and fluoride levels in childrens[14].Various other authors mentioned in their studies that selenium was associated with increased occurrence of dental caries and few others reported there was no relationship between selenium levels and dental caries. Selenium molecules serve has generator of superoxide radicals produced from thiols thereby helping in free radical scavenging and also are toxic to the bacteria's like staphylococcus aureus, E.coli[16].In a study conducted by Hegde MN copper and zinc were significantly high in caries active childrens[16].

Therefore the above study can be concluded as the concentration of salivary selenium estimated and showed a significantly increased salivary selenium levels in caries free group, a study with larger sample size could define the association better.

Acknowlegde: *ICAR-Directorate of Cashew Research,Darbe,Puttur for helping us with the equipment*

Prof. Krishna Bhat ,Statistician, KSHEMA,Nitte deemed to be university for helping us with the statistical analysis.

Funding*:* Self-funded

Conflict of Intrest*:* Nil

References

1. Roberson TM, Heymann HO,Swift EJ Cariology: The lesion, aetiology, prevention and control. Sturdevant's art and science of operative dentistry 2008. 5th edition, pp. 65−78.
2. Losee FL, Ludwig TG, Trace Elements and Caries. J Dent Res 1970. 49(6):1229-1235.
3. Zakhir S, Sarkar S.Study of trace elements in mixed saliva of caries free and caries active children. J Ind Soc Pedod Prev Dent 2006;27-9.
4. Lakomaa EL, Rytomaa N.Mineral composition of enamel and dentin of primary and permanent teeth in Finland. Scandinavian J Dent Res1977;85: 89-95.
5. Featherstone JD. Prevention and reversal of dental caries: role of low level fluoride. Community Dent Oral Epidemiol; 1999.27(1):31-40.
6. Edgar WM and Mullane DMO.*Saliva and Oral Health*, British Dental Association.1996.2nd edition
7. Kryukov GV and Gladysshev VN. Mammalian selenoprotein gene signature: identification and functional analysis of selenoprotein genes using bioinformatic methods. Enzymology 2002. 347 ;84-100.
8. Savarino L, Granchi D, Ciapetti G, Cenni E, Ravaglia G, Forti P, Maioli F, and R Mattioli. Serum concentrations of zinc and selenium in elderly people: results in healthy nonagenarians/ centenarians. *Exp Gerontol* 2001, 36:327-39
9. Schamberger RJ .Selenium metabolism and function. Clin. Biochem. Physiol.1986:4;42.
10. Ogboko B. Selenium in Saliva and Hair of School Going Children in Ceres District of the Western Cape South Africa. *J. Basic. Appl. Sci. Res.* 2013(3)246-254
11. Anderson R.J. and Davies B.E. Dental caries prevalence and trace elements in soil with special reference to lead. J Geol Soc London;137:547-558.1980.
12. Anderson RJ, Davies BE and James PMC; Dental caries prevalence in a heavy metal contaminated area of the west of England. Br Dent J,1976.141:311-14.
13. Arnold FA. Fluorine in drinking water: Its effect on dental caries,JADA;3:28-36. 1948.
14. Punya S, Meera S, Vinod S, Radhika C. Estimation of Trace Elements in Mixed Saliva of Caries Free and Caries Active Children. The Journal of Clinical Pediatric Dentistry.2018 ;42(2)
15. Babior BM , Curnutte JT, Kipnes RS, Biological defense mechanism. Evidence for the participation of superoxide in bacterial killing by xanthine oxidase. J Lab Clin Med; 1985.44;235-7.
16. Hegde MN. Biochemical indictors of dental caries in saliva: an in vivostudy. Caries Res.;2014.48(2):170-173.

Automated Glaucoma Detection Using Variational Mode Decomposition from Fundus Images

Bhupendra Singh Kirar[1], Dheeraj Kumar Agrawal[2], Seema Kirar[3]

[1]Ph.D. Research Scholar, [2]Assistant Professor, Department of Electronics and Communication Engineering, Maulana Azad National Institute of Technology, Bhopal, India, [3]Assistant Professor, Department of Electronics and Communication Engineering, Bansal Institute of Science and Technology, Bhopal, India

Abstract

Glaucoma is a chronic eye disorder and one of the major causes of vision loss. Increased intraocular pressure damaged the optic nurves and hence blindness. Available methods on glaucoma image classification are expensive and slow. Therefore fast and low cost methods are needed. In this paper, glaucoma image classification using two dimensional variational mode decomposition and support vector machine from fundus images is proposed. The variational mode decomposition is used to decompose the glaucoma and normal images. Features are extracted from decomposed sub band images. Selected and reduced features are used to classify images in glaucoma or normal by support vector machine. The obtained accuracy, sensitivity, specificity are 94.17 %, 95 %, and 95 %, respectively for tenfold cross validation technique. Obtained results confirm that proposed method is adequate and improved over the state-of-the-art methods.

Keywords: *Glaucoma, pre-processing, variational mode decomposition, feature extraction and normalization, singular value decomposition, support vector machine*.

Introduction

Glaucoma is a dangerous disorder within the eye and has become a second main reason of vision loss over the world.(1) About 64.3 million glaucoma cases reported in the year of 2013 and it may reach to 111.8 million by the year 2040.(2) Glaucoma is of two kind, open angle and angle closure.(3) Generally, former type of glaucoma is mainly responsible for vision loss due to increase intraocular pressure within the eye. Open angle glaucoma is also known as silent destroyer of the optic nerves of the eye because it grows gradually with continuing destroyed the optic nerves.(4) There is no heal for glaucoma, it can be stop to further damage of optic nerves if it is detected at early stage .(5)

At present computer aided diagnosis is increasing research area in glaucoma detection. (6) There are several research papers on glaucoma detection. Kolar(7) extracted fractal dimensions (FD) and power spectral features. The support vector machine (SVM) yielded an accuracy of 74%. Bock(1) extracted features from fast Fourier transform (FFT) and B-spline coefficients and fed to SVM which yielded accuracy, specificity and sensitivity of 80%, 85% and 73% respectively. Acharya(8) extracted texture and higher order spectra (HOS) features and classified by SVM. They reported an accuracy of 91%. Dua(9) extracted energy features using discrete wavelet transform (DWT) and classified by SVM. They reported an accuracy of 93%. Yadav(10) extracted texture feature with artificial neural network (ANN) and reported an accuracy of 72%. Raja(11) used wavelet packet decomposition (WPD). They extracted entropy and energy features and fed to ANN which yielded accuracy of 85%. Gajbhiye(12) proposed a method for glaucoma detection using WPD and moment features. Extracted features were normalized and fed to SVM. They reported an accuracy of 86.57%. Ghosh(13) extracted grid colour moment features and BPNN. The reported accuracy, sensitivity and specificity are 87.47 %, 88 % and 87.45 % respectively for tenfold cross validation. Maheshwari(14) proposed glaucoma diagnosis method. They extracted correntropy features using two dimensional empirical wavelet transform (2DEWT). The features are classified using SVM. They reported an accuracy of 80.66 %. Kirar(15) proposed a new glaucoma diagnosis approach using third level 2dimensional discrete wavelet transform (2D DWT). Six histogram features namely mean, variance, skewness, kurtosis,

energy and entropy were extracted and fed to LS-SVM. They reported an accuracy of 88.3 %.

State of the art methods explained above are less accurate because these methods are limited to dyadic scale and required predefined basis function. In higher level of decomposition only low frequency sub band is used for next level of decomposition. It creates interference from other nearby frequencies in every sub band. All the above explained methods are not adaptive. 2DEWT is adaptive but it suffered from interference and redundancy due to improper segmentation of image spectrum and design of wavelet filter bank. In this adaptive filter bank sub band images varies. Hence the conventional methods are less accurate.

This paper presents an automated glaucoma detection using variational mode decomposition from fundus images. 2dimensional variational mode decomposition (2DVMD) decomposes the input images in to sub band images. Concatenated sub band images (SBI) are used to extracted features. The proposed method also uses singular value decomposition (SVD) and SVM classifier to classify images in glaucoma and normal. The obtained accuracy is more than the existing methods. Hence the proposed method is better than the state of art methods. The obtained performances are validated and compared with the existing methods for tenfold cross validation. The proposed method is better because it decomposes images in to sub band images which are centered around a specific frequency and with no interference, no boundary distortion and mod mixing problem.

The remaining part of the article is organized as follows: Section materials and method explains the glaucoma image data and presents the proposed method. At last results and their discussion are presented followed by conclusion and references.

Materials and Method

In this paper 15 normal and 15 glaucoma fundus images have been used from publically available image database RIM-1 Medical Image Analysis Group (MIAG).[16] The proposed methodology contains a number of stages, which are presented in the Fig. 1.

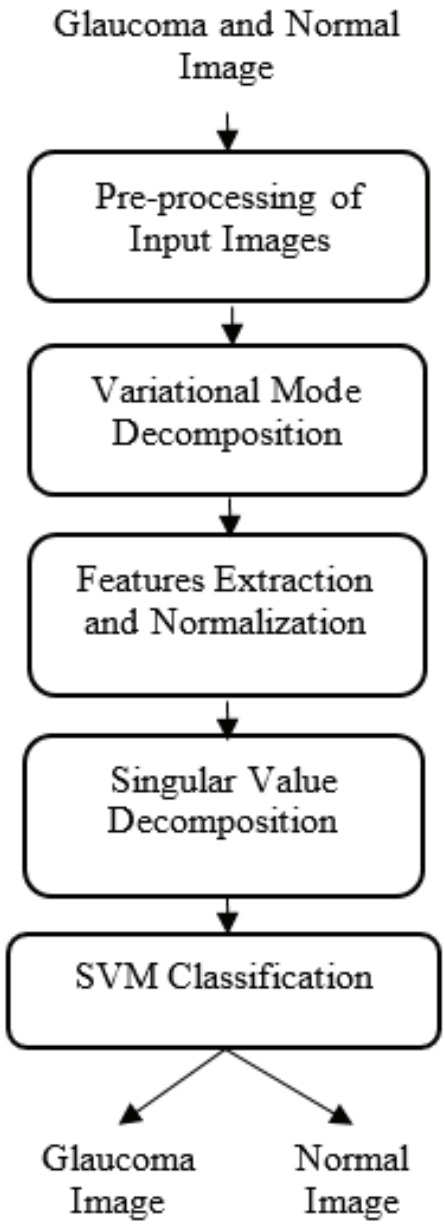


Fig.1. Block diagram of proposed method

Preprocessing: It is used to remove irrelevant variations. In this, images are resized to make all input images of same dimensions. Only green channel image is used because it contains more amount of information [1]. Contrast limited adaptive histogram equalization (CLAHE) is applied on green channel to improve the image quality.[17] The noise is reduced using median filter (MF).[18]

Variational Mode Decomposition: In this paper 2dimensional variational mode decomposition (2DVMD) is used. 2DVMD[19] is non-recursive, non stationary and fully adaptive decomposition technique for analysis of images. It overcomes the limitations of

conventional methods. In this paper decomposed sub band images are band limited and centered around a specific frequency. The bandwidth of a band limited sub band images are calculated as follows.[19]

Constrained variational problem for VMD is expressed as follows:

$$\min_{\psi_p \omega_p} \left\{ \sum_p \left\| dt \left[\left(\delta(t) + \frac{i}{\pi t} \right) * \psi_p(t) \right] e^{-i\omega_t} \right\|^2 \right\} \quad (1)$$

Such that $\sum_p \psi_p = S$

where S is a signal. ψ_p and ω_p are the p^{th} VMD component and centre frequency respectively. The above equation can be written as:

$$\mathcal{L}(\psi_p, \omega_p, \beta) = \alpha \sum_p \left\| dt \left[\left(\delta(t) + \frac{i}{\pi t} \right) * \psi_p(t) \right] e^{-i\omega_p t} \right\|_2^2 + \left\| s(t) - \sum_p \psi_p(t) \right\|_2^2 + \langle \beta(t), s(t) - \sum_p u_p(t) \rangle \quad (2)$$

The estimate of the p^{th} mode is given as follow:

$$\hat{\psi}_p^{m+1}(\omega) = \frac{\hat{S}(\omega) - \sum_{f \neq p} \hat{\psi}_f(\omega) + \frac{\hat{\beta}(\omega)}{2}}{1 + 2\alpha(\omega - \omega_p)^2} \quad (3)$$

where α is balancing parameter. The center frequency can be expressed as:

$$\omega_p^{m+1} = \frac{\int_0^\infty \omega |\hat{\psi}_p(\omega)|^2 d\omega}{\int_0^\infty |\hat{\psi}_p(\omega)|^2 d\omega} \quad (4)$$

[19,20]well explained the complete algorithm of 2DVMD. The 2DVMD sub band images for normal and glaucoma images are used to extract features.

Feature Extraction Normalization and Reduction: After decomposition, sub band images are concatenated and 77[21-29] features are extracted. Extracted features are normalized using z- score and selected using reliefF method.[30] 45 features have been selected and fed to singular value decomposition (SVD) [31] which reduces the dimensionality (r) of the dataset from 45 to 9. This part removes the redundant features while retaining important features.

Support Vector Machine: This paper used least squares support vector machine (LS-SVM) [32] with RBF kernel.[33] It is a supervised widely used method to classify two or more classes in the field of medical image classification.

The performance parameters (in %), namely accuracy, sensitivity, specificity are calculated as: [34]

$$\text{Accuracy (ACC)} = \frac{TP + TN}{TP + FP + TN + FN} \times 100 \quad (5)$$

$$\text{Sensitivity (SEN)} = \frac{TP}{FN + TP} \times 100 \quad (6)$$

$$\text{Specificity (SPE)} = \frac{TN}{FP + TN} \times 100 \quad (7)$$

where, FP, FN, TP and TN represents false positive, false negative, true positive and true negative.

Results and Discussion

Results: This paper represents a new method for glaucoma detection using 2DVMD from fundus images. The performances of proposed method using LS-SVM with RBF kernel and tenfold cross validation are listed in Table 1. The obtained specificity, sensitivity and accuracy are 95%, 95% and 94.17% respectively for tenfold cross validation.

Table 1: Performance of proposed method

(CV) Cross Validation	ACC (%)	SEN (%)	SPE (%)
3 folds	93.33	93.33	93.33
5 folds	93.33	86.67	100
10 folds	94.17	95.00	95.00

The radial basis function (RBF) kernel parameter is taken from one to ten with a uniform step size of one. Fig.2 shows performance versus cross validations

The highest accuracy is achieved for kernel parameter value = 3 and tenfold cross validation. Therefore kernel parameter = 3 and tenfold cross validation has been chosen. Fig. 2(d) has the highest value.

The cross validation technique is taken from two to eleven with a uniform step size of one. The plot of performance versus cross validation for kernel parameter = 3 and 9 features is depicted in Fig. 3. Tenfold cross validation technique yielded highest glaucoma detection accuracy. Therefore tenfold cross validation is better and selected for the proposed method.

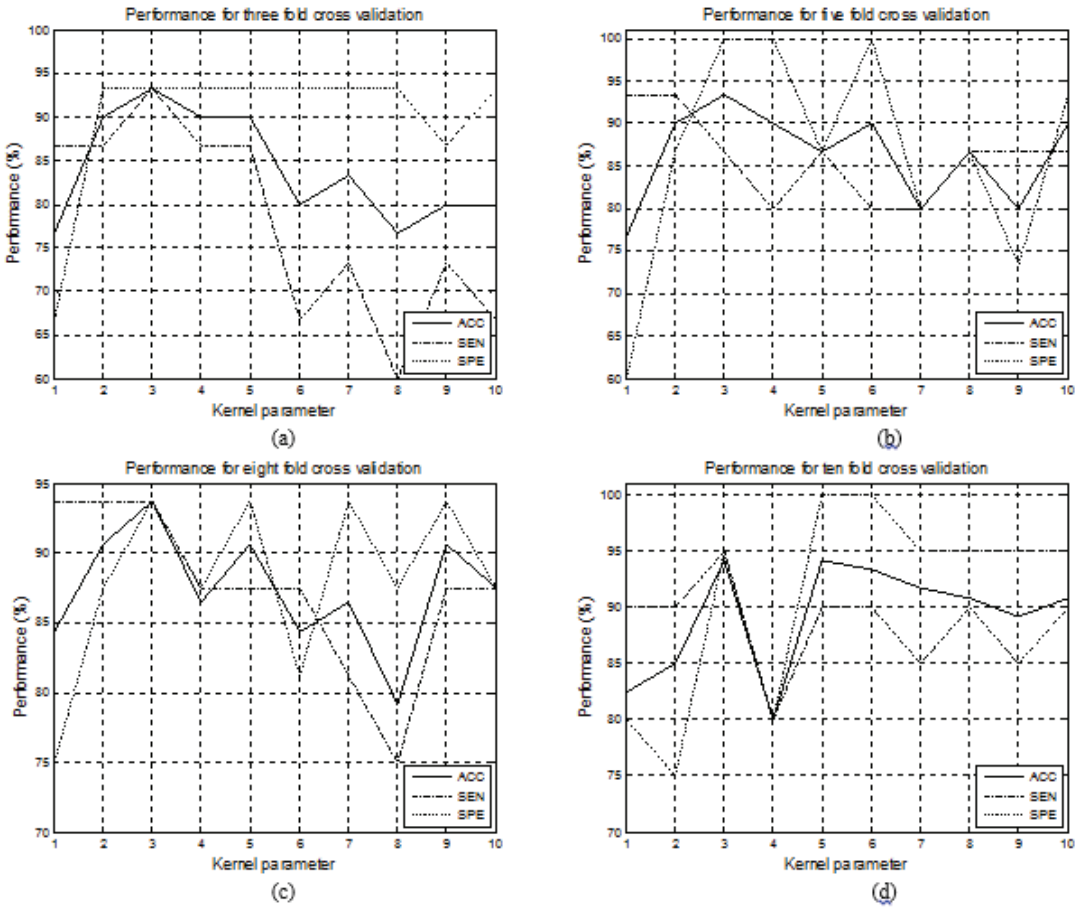


Fig.2: Plot of performance versus kernel parameter for cross validation (a) Three, (b) Five, (c) Eight and (d) Ten

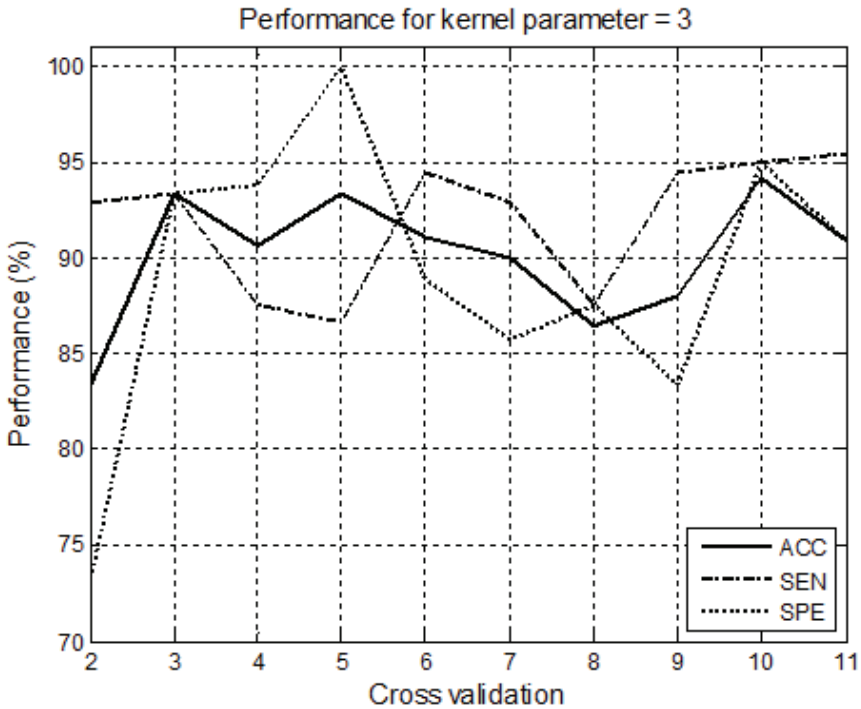


Fig.3: Plot of performance versus cross validation using proposed methodology

The extracted features also fed to different types of classifiers using weka soft-ware to compare the performance of the proposed methodology. It is clear from the Table 2 that the selected SVM classifier for the proposed methodology is found suitable.

Table 2: Performance using different classifiers

Comparison	**Accuracy (%)**		
Classifiers	3 FCV	5 FCV	10 FCV
Naive Bayes	73.33	76.67	76.67
Random Forest	76.67	80	80
Logistic Regression	73.33	83.33	83
OneR	73.33	73.33	83
Multilayer Perceptron	66.66	83,33	90
Support Vector Machine	93.33	93.33	94.17

FCV-Folds cross validation

Discussion

Glaucoma detection using 2DVMD from fundus images is presented in this paper. The obtained performances have been validated and compared with the existing methods for tenfold cross validation using public image database.[16] A comparison has been given in Table 3.

Kolar[7] extracted FD and power spectral features with SVM and obtained an accuracy of 74%. Bock[1] extracted features from FFT and B-spline coefficients and fed to SVM obtained accuracy, specificity and sensitivity of 80%, 85% and 73% respectively. Acharya[8] extracted new types of texture and HOS features and classified by SVM. They reported an accuracy of 91%. It was a good accuracy. Dua[9] extracted energy features using DWT and classified by SVM. They reported an accuracy of 93%. Yadav[10] extracted texture feature with ANN and reported an accuracy of 72%. Raja[11] used WPD. They extracted entropy and energy features and fed to ANN which yielded accuracy of 85%. Gajbhiye[12] proposed a method for glaucoma detection using WPD and moment features. Extracted features were normalized and fed to SVM. They reported an accuracy of 86.57%. Ghosh[13] extracted grid colour moment features and BPNN. The reported accuracy, sensitivity and specificity are 87.47 %, 88 % and 87.45 % respectively for tenfold cross validation. Maheshwari[14] proposed glaucoma diagnosis method. They extracted correntropy features using 2DEWT. The features are classified using SVM. They reported an accuracy of 80.66 % form 505 images. Kirar[15] proposed a new glaucoma diagnosis approach using third level 2D DWT. Six histogram features namely mean, variance, skewness, kurtosis, energy and entropy were extracted and fed to LS-SVM. They reported an accuracy of 88.3 %.

State of the art methods explained and listed in Table 3 are less accurate due to interference, distortion and redundancy.

Table 3: Comparison of methods based on accuracy (%) for tenfold cross validation

Authors / Ref.	Methods description	ACC
Yadav,[10]	Texture feature & ANN	72
Kolar,[7]	Power spectral features & SVM	74.00
Bock,[1]	FFT, PCA & SVM	80.00
Maheshwari,[14]	2DEWT, correntropy & LS-SVM	80.66
Raja,[11]	WPD, entropy, energy & ANN	85
Gajbhiye,[12]	WPD, moment feature & SVM	86.57
Gosh,[13]	Color moment features & BPNN	87.47
Kirar,[15]	2D-DWT & histogram features	88.30
Acharya,[8]	HOS features & RF	91.00
Dua,[9]	DWT, texture features & SVM	93.00
Proposed method	2DVMD, hybrid features, SVD and LS-SVM	94.17

This paper presented a novel variational computer based glaucoma detection using 2DVMD from fundus images.

Our proposed method yielded accuracies of 93.33%, 93.33%, and 94.17% for 3, 5 and 10 fold cross validation respectively.

The obtained results found better than the existing and compared methods as depicted in Table 3. This shows that our method detects glaucoma more accurately and hence it out performed over state of art methods.

Conclusion

This paper presented a novel approach of glaucoma detection using 2DVMD from fundus images. The green channel image is extracted from the fundus images and decomposed using 2DVMD. LS-SVM classifier with RBF kernel used to classify images. The obtained accuracies are 93.33%, 93.33%, and 94.17% for 3, 5 and 10 fold cross validation respectively. The obtained glaucoma detection accuracy is better for tenfold cross validation with kernel parameter = 3 and 9 features.

Glaucoma, serious eye disorder worldwide may be treated if detected at an early stage. The presented method is effective for glaucoma detection. Obtained results have been listed in Table 1 and Table 3 confirmed that this approach is better than state of-the-art methods.

The proposed methodology requires testing for huge image database. In upcoming research it is planned to implement it on other disease like diabetes and retinopathy with deep learning.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Clearance: None (because method is implemented on publically available dataset)

References

1. Bock R, Meier J, Nyúl LG. et al. Glaucoma risk index: automated glaucoma detection from color fundus images. Med. Image Anal. 2010; 14: 471–481.
2. Tham YC, Li X, Wong TY, Quigley HA, Aung T, Cheng CY. Global prevalence of glaucoma

and projections of glaucoma burden through 2040: a systematic review and meta-analysis. Ophthalmology. 2014 Nov; 121(11): 2081-90.

3. Types of glaucoma. Accessed 25 .04.2018. Available from https://www.glaucoma.org/glaucoma/types-of-glaucoma.php
4. Javitt JC. Preventing blindness in americans: the need for eyehealth education. Survey of ophthalmology. 1995; 40(1): 41–44.
5. Mary MCVS, Rajsingh EB, Naik GR. Retinal fundus image analysis for diagnosis of glaucoma: a comprehensive survey. IEEE Access. 2016; 4: 4327–4354.
6. Faust O, Acharya UR, Ng EYK, Ng KH, Suri JS. Algorithms for the automated detection of diabetic retinopathy using digital fundus images: a review. J Med Syst. 2012; 36(1):145–157.
7. Kolar R, Jan J. Detection of glaucomatous eye via color fundus images using fractal dimensions. Radio Engineering. 2008; 17(3): 109–114.
8. Acharya UR, Dua S, Du X, Sree, SV, Chua CK. Automated diagnosis of glaucoma using texture and higher order spectra features. IEEE Transactions on Information Technology in Biomedicine, 2011; 15(3): 449–455.
9. Dua S, Acharya UR, Chowriappa P, Sree SV. Wavelet based energy features for glaucomatous image classification. IEEE Transactions on Information Technology in Biomedicine. 2012 Jan; 16 (1): 80–87.
10. Yadav D, Sarathi MP, Dutta MK. Classification of glaucoma based on texture features using neural networks. in: Contemporary Computing (IC3). 2014 7th International Conference on IEEE. 109–112.
11. Raja C, Gangatharan N. Appropriate sub-band selection in wavelet packet decomposition for automated glaucoma diagnoses. International Journal of Automation and Computing. 2015; 12(4): 393-401.
12. Gajbhiye GO, Kamthane AN. Automatic classification of glaucomatous images using wavelet and moment feature. In: Proc. of Annual IEEE India Conference (INDICON). 2015.1-5.
13. Ghosh A, Sarkar A, Ashour AS, Balas-Timar D, Dey N, Balas VE. Grid color moment features in glaucoma classification. International Journal of Advanced Computer Science and Applications (IJACSA). 2015; 6 (9): 99-107.
14. Maheshwari S, Pachori RB, Acharya UR. Automated diagnosis of glaucoma using empirical wavelet transform and correntropy features extracted from fundus images. IEEE Journal of Biomedical and Health Informatics. 2016; 21(3):803-813.
15. Kirar BS, Agrawal DK. Glaucoma diagnosis using discrete wavelet transform and histogram features from fundus image. International Journal of Engineering & Technology(UAE). 2018; 7(4): 2546-2551.
16. RIM-One fundus image database of medical image analysis group. 2015. Accessed 25.02.17. Available from http://medimrg.webs.ull.es.
17. Zuiderveld K. Contrast limited adaptive histograph equalization. Graphic Gems IV. San Diego. Academic Press Professional, 1994; 474–485.
18. Gonzalez RC, Woods RE, Eddin SL. Digital image processing using MATLAB. 2nd ed. New Delhi: TataMcgrawhill; 2009.
19. Dragomiretskiy K, Zosso D. Two-dimensional variational mode decomposition. EMMCVPR Hong Kong, LNCS2015; 8932:197-208.
20. Kirar BS, Agrawal DK. Comparison between empirical and variational mode decomposition based on percentage variation in entropy feature from glaucoma image. Indian Journal of Public Health Research and Development. 2018; 9(9): 10-15.
21. Saki F, Tahmasbi A, Zadeh HS, Shokouhi SB. Opposite weight learning rules with application in breast cancer diagnosis. Comput. Biol. Med. 2013; 43(1): 32-41.
22. Hu MK. Visual pattern recognition by moment invariants. IRE transactions on information theory.1962; 8(2); 179-187.
23. Xunkai Wei, Chip histogram. Histogram features. Accessed 11.03.18. Available from https://in.mathworks.com/matlabcentral/fileexchange/17537-histogram-features-of-a-gray-level-image?focused=5094859&tab=function
24. Zhang Y, Lenan W. An MR brain images classifier via principal component analysis and kernel support vector machine. Progress In Electromagnetics Research. 2012; 130: 369-388.
25. Haralick RM, Shanmugam K, Dinstein I. Textural features for image classification. IEEE Transactions

on Systems, Man, and Cybernetics, SMC-3 1973; 610-621.

26. Uppuluri A. GLCM_Features4. Accessed 15.04.18. Available from https://in.mathworks.com/matlabcentral/fileexchange/22354-glcm-features4-m--vectorized-version-of-glcm-features1-m--with-code-changes-
27. Elferink WO. Gray level run length matrix (GLRLM). Accessed 11.03.18. Available from https://in.mathworks.com/matlabcentral/fileexchange/52640-gray-level-run-length-image-statistics
28. Moghaddam RF. Modified Haussdorf fractal dimension. Accessed 16.04.18. Available from https://in.mathworks.com/matlabcentral/fileexchange/50790-modified-haussdorf-fractal-dimension
29. Kim JK, Park HW. Statistical textural features for detection of microcalcifications in digitized mammograms. IEEE Trans. Med. Imag. 1999; 18: 231-238.
30. Kononenko I. Estimating attributes: analysis and extensions of RELIEF. Springer, Berlin, Heidelberg. 1994; 171–182.
31. Stewart GW. On the early history of the singular value decomposition. SIAM Review. 1993; 35(4): 551-566.
32. Suykens J, Gestel TV, Brabanter JD, Moor B, Vandewalle J. Least squares support vector machines. World Scientific Publication, Singapore. 2002; 4.
33. Khandoker AH, Lai DTH, Begg RK, Palaniswami M. Wavelet based feature extraction for support vector machines for screening balance impairments in the elderly. IEEE Transactions on Neural Systems and Rehabilitation Engineering. 2007; 15(4):587– 597.
34. Sharma R, Pachori RB, Acharya UR. Application of entropy measures onintrinsic mode functions for the automated identification of focal electroencephalogram signals. Entropy. 2015; 17(2): 669–691.

Influence of Deciduous Molar Hypomineralization on Molar Incisor Hypomineralization – A Systematic Review

Himali P Solanki[1], Aditi Mathur[2], Ananth Kamath[3], Vishwas Patil[4]

[1]Pediatric and Preventive Dentist, [2]Reader, Department of Pediatric and Preventive Dentistry, Dr.D.Y.Patil Vidyapeeth, Pimpri, Pune, Maharashtra, India, [3]Pediatric and preventive dentist, Private Practitioner, [4]Professor, Department of Pediatric and Preventive Dentistry, Dr.D.Y.Patil Vidyapeeth, Pimpri, Pune, Maharashtra, India

Abstract

Aim & Background: Developmental anomalies of enamel like Molar Incisor Hypomineralization(MIH) and Deciduous molar hypomineralization(DMH) affect first permanent molars and the second primary molars respectively. The aim of this systematic review is to determine the probability of developing MIH in children with DMH.

Results: From 271 studies, 9 were included in this systematic review and the mean of the co-occurrence of DMH and MIH ranges from 2.4 % to 77%.

Conclusion: According to the present systematic review, the presence of DMH is indicative of MIH. The identification of demarcated opacities of the enamel on the primary molars is predictive of an increased risk of MIH.

Keywords: *Deciduous molar hypomineralization, Molar incisor hypomineralization , Hypomineralized second primary molar, Dental enamel hypoplasia*

Introduction

Along with decline in caries prevalence, there still persists a subgroup of children in whom an accelerated caries progression is seen, particularly affecting the first permanent molars (FPM). These children present with large developmental defects during or soon after the eruption of the affected teeth. Developmental defects of dental enamel are classified into hypomineralization and hypoplasia. The qualitative defect is known as enamel hypomineralization [(1)] and those molars have been referred in literature as non-fluoride hypomineralization, non-endemic mottling of enamel or cheese molars.[(2)]

The phenomenon, known as molar incisor hypomineralization (MIH) was first recognized in 2001 and defined as hypomineralization of one to four FPM often in combination with affected permanent incisors.[(3)] Subsequently, MIH-like lesions have been recognized in second primary molars leading to the description of hypomineralized second primary molars (HSPM)[(4)] also called deciduous molar hypomineralization (DMH).[(5)]

The prevalence of MIH varies considerably throughout the world ranging from 2.5 – 40.2 % [(6,7)] and that of DMH ranges from 4.9% - 6.9%.[(8,9)] The reported prevalence of MIH in India ranges from 6.3% to 9.46%.

The severity of MIH and DMH varies between patients, but also within a patient. Opacities being the mildest form of MIH and DMH, and atypical extractions the most severe manifestation.[(3)] MIH can cause serious pain due to post-eruptive enamel loss, and rapid caries progression. Other challenges in patients with MIH are hypersensitivity, anxiety, difficulties with anesthesia, poor aesthetics, fast progressing carious lesions and pain during restorative treatment.[(10,11)] It is essential to diagnose MIH at the earliest to reduce the vulnerability of the MIH-affected molars by focusing on their restorative and preventive needs.[(12)]

Corresponding author:
Himali P Solanki BDS
(MDS Pediatric and Preventive Dentistry)
Dr.D.Y.Patil Vidyapeeth, Pimpri , Pune- 411018
Maharashtra, India

Currently as there is no particular identified cause and no risk prevention actions are adopted. The development of the second primary molars starts at around the same time as the development of the FPM and permanent incisors, but the maturation of the permanent teeth occurs more slowly. If a risk factor occurs during this overlapping period, hypomineralization might occur in the primary as well as in the permanent dentition. [13] Some authors hypothesized that HSPM could be predictive for MIH.[9,12] Therefore as DMH/HSPM can serve as a useful risk marker for MIH. As there is lack of concrete evidence regarding the relationship between DMH and MIH, the purpose of this study was to evaluate clinically if DMH can be used as a predictor for MIH.

Material and Method

A detailed search of literature published from 2000 to May 2018 was conducted. This systematic review was conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA Statement) checklist.

Selection criteria:

Based on the following inclusion and exclusion criteria articles were selected for this systematic review.

Inclusion criteria

- Articles in English.
- Studies pertaining to co-existence or influence of DMH or HSPM and MIH.

Exclusion criteria

- Review, case reports, abstracts, letters to editors, editorials and in vitro studies were excluded.
- Studies with other developmental or environmental enamel defect.

Information source:

Dental literature on risk of MIH associated with DMH/HSPM was reviewed. The Databases used for the search were PubMed and Google scholar. The terms (hypomineralized AND second AND primary AND molars) OR (deciduous AND molar AND hypomineralization) OR HSPM) OR (molar AND incisor AND hypomineralization) OR (demarcated AND opacities) OR (MIH) were entered into the search fields. Hand search of dissertations and journals related to the topic of interest was performed. All cross reference lists of the selected studies were also screened.

Data collection process:

The data was collected and analyzed from each article by the same investigators that selected them and a standard data extraction sheet was prepared using spreadsheet (Excel 2010, Microsoft).

Result

Selection of studies was done initially by reading the title and abstracts of the articles obtained from each database. From 271 potentially eligible studies, 231 studies were selected on the basis of title. Twelve out of 231 studies were selected on the basis of the abstract. Out of which nine articles were selected for full text analysis and all nine were included in the systematic review. Cross-sectional, cohort studies and questionnaire surveys were included. The selection process involved two independent investigators and a consensus decision was made with a third evaluator to shortlist the articles for the systematic review. The sample size of the included studies ranged from 134 to 6161 participants, a total of 12627 included children from all the studies. Descriptive characteristics of the nine studies are shown in Table 1.

Table 1: Description of included studies.

Author	Design	Sample size	Age of Participants	Diagnostic criteria	Prevalence analysis		Co-occurrence of MIH and HSPM
					HSPM / DMH	MIH	
Elfrink et al.,2012 (14)	Prospective cohort study	6161	5- 6yrs	EAPD	9.00%	8.70%	27%
Ghanim et al.,2012 (10)	Cross sectional study	809	7- 9 yrs	EAPD	6.60%	18.60%	39.60%
Costa-Silva et al.,2013 (20)	Cohort study	134	4- 6 yrs	EAPD	20.14%	15.67%	30.40%
N. Mittal , B. B. Sharma ,2015 (18)	Cross sectional survey	978	6- 8 yrs	EAPD	5.60%	7.40%	32.73%
Temilola et al, 2015 (16)	Questionnaire survey	563	3- 5 yrs (327), 8-10 yrs(236)	Kemoli et al's Criteria	4.60%	9.70%	34.80%
Mittal et al., 2016 (19)	Cross sectional study	1109	3-5yrs (223), 6-12yrs (886)	EAPD	4.88%	7.11%	48%
Oyedele et al.2016 (21)	Cross sectional study	496	8-10 yrs	EAPD	5.80%	-	77%
Negre-barber et al., 2016 (22)	Cross sectional study	414	8-9 yrs	EAPD	14.50%	24.20%	11.10%
da Silva FS et al., 2017 (23)	Cross-sectional study	1963	6-11yrs	EAPD	6.48%	14.69%	2.43%

Discussion

This review focuses on the co-relationship between MIH and DMH. In the past years various studies have been performed to analyze the related risk factors and conceivable determinants of MIH.[14] This helps early diagnosis and prompt management of MIH. Because the second primary molars erupt four years earlier than the FPM, DMH might be a clinically useful predictor for MIH and hence the need for more research into the relationship between DMH and MIH. The present study summarized the prevalence of co-occurrence of MIH and DMH/HSPM globally.

In 2003, European Academy of Pediatric Dentistry (EAPD), proposed a criteria for epidemiological studies of MIH.[4] It also considered the potential of development of MIH- like hypomineralized defects to occur on primary molars.[4] Later in 2009 EAPD updated the diagnostic criteria of MIH so as to add demarcated opacities, PEB, atypical restorations and extractions of permanent molars and /or incisors. Whereas for HSPM similar criteria was used with the inclusion of "atypical caries" along with atypical restorations.[8] The criteria developed for MIH and HSPM are currently considered to be a standard and validated criteria for diagnosing and recording MIH and HSPM.

Ghamin et al pointed out that the rationale behind adapting the EAPD evaluation criteria was to allow demarcated lesions to be recorded in their different clinical presentations and hence gain a better understanding of the association between primary and permanent teeth lesions.[9] All studies included in this review except one [15] employed the EAPD criteria with some variations with respect to HSPM scoring. Study done by Temilola et. al in 2015 used the criteria suggested by Kemoli et. al[16] Out of nine, in four studies [9,15,17,18] teeth were viewed as sound when the lesion were less than two mm in diameter and in the other four studies [19,20,21,22] teeth were considered sound when the defect was one mm or less whereas one study [12] did not specify the same.

In the study done by Elfrink and his colleagues[12],Temilola et. al.[15] and Mittal R. et. al[18] photographs were used for identification of the defects, while the other researchers directly examined the oral cavity for the defects using the mouth mirror and the probe. The use of intraoral photographs for scoring HSPM has been presumed to be substantial for epidemiological studies.[6] It ought to be contemplated that varying examination conditions impact the reported prevalence. There may be underestimation of defects when natural light intensity is low. In most studies, the teeth were cleaned before examination and were moist while examination.

Elfrink and colleagues recently recommended standardization of studies on HSPM and MIH as there was a lot of discrepancy in recording of restorations or carious lesions.[23] All studies except one [12] reported that mild HSPM (opacities without PEB, caries, atypical restorations or crown) were more frequent than severe forms. However, Elfrink and colleagues reported higher prevalence of severe HSPM than mild HSPM.[12] A study done by Rakesh Mittal et. al. [18] concluded that mandibular molars were more affected than maxillary molars while all the other studies reported a greater prevalence of DMH/HSPM in maxillary arch.

The most favourable age for examination of HSPM would be five years, owing to greater cooperation of the child and complete eruption of second primary molars. [23] And that for MIH, as suggested by EAPD experts it is around eight years pertaining to the presence of FPM as well as the permanent incisors.[23] On the other hand, there is a risk of camouflaging hypomineralization with other defects like dental caries if the examination occurs too late. Even exposure to masticatory forces there is a greater possibility of increasing the severity rating of defects due to PEB. In this systematic review the included studies have a wide age range from five – twelve years.

Risk of developing MIH was more likely in the case of mild HSPM (without PEB) than severe HSPM. The present study summarized the prevalence estimations of co-occurrence of MIH and HSPM globally ranging from 2.4 % to 77%.Whereas the individual prevalence of MIH is ranging from 7.11% to 24.20% and that of DMH/ HSPM the range is 4.60% to 20.4%. Cross-sectional studies done by Mittal et al. [18] and Oyedele et al. [20] have estimated the co-relationship between MIH and DMH was > 40 %. Two Indian studies included in this review done by N. Mittal , B. B. Sharma (2015) [18] and Mittal et al. (2016) [17] showed a co-occurrence percentage of 32.73% and 48% respectively. The results of this review are in agreement with another systematic review by Elsa Garota which stated that the weighted mean of the co-occurrence of HSPM and MIH prevalence was 19.94% globally.[23]

As we know that the calcification of the second primary molar starts earlier than the first permanent molar, at four months in-utero and at birth, respectively. [25] The second primary molar and first permanent molar have a shared period of development and mineralization. Hence if a risk factor occurred during this overlapping period, hypomineralization might occur concurrently in the primary and permanent dentition.[12] Mittal and colleagues have hypothesized that the etiological insult causing milder hypomineralization defects on second primary molars must have occurred during latter stages of mineralization/maturation, overlapping with earlier phases of active mineralization of FPM when the ameloblasts are most active.[16] As the number of primary molars affected by hypomineralization increases the greater the risk for developing MIH.[12] It was found that the presence of single hypomineralized primary molar was not associated with MIH while subjects with more than two hypomineralized second primary molars had significantly higher MIH.

Limitations:

1. All articles indexed and published only in PubMed & Google scholar were selected other search engines were not selected like Cochran, Medlilne, Embase.

2. Subjective clinical indices are used for the diagnosis of enamel defects. Hence to strengthen the investigations of MIH and HSPM there should be development of quantitative methods for precise determination of the such deformities.

Future goals:

It is essential to improve the recognition of this particular dental enamel defect. Data from round the world and from different birth cohorts are important not only for future dental planning but also in helping the search for understanding the etiological factors involved in MIH and HSPM.

Conclusion

According to the present systematic review, the presence of DMH/HSPM is predictive for MIH. The association between these defects appears even more important in the presence of mild HSPM. Thus, the identification of demarcated opacities of the enamel on the primary molars is predictive of an increased risk of MIH, allowing anticipation of the risks of tissue damage caused by the MIH and establishment of an early preventive regimen for PEB and sensitivity, if necessary. Indeed, by targeting patients likely to develop MIH and providing them with the information needed to manage this anomaly at an early age, one could perceive a marked reduction in the problems caused by these enamel defects.

Ethical Clearance: Taken from the Dr. D.Y.Patil Dental College and Hospital ethical committee

Source of Funding: Self

Conflict of Interest: Nil

References

1 Jälevik B, Norén JG. Enamel hypomineralization of permanent first molars: a morphological study and survey of possible aetiological factors. International Journal of Paediatric Dentistry. 2000 Dec;10(4):278-89.

2 Weerheijm KL. Molar incisor hypomineralization (MIH). European Journal of Paediatric Dentistry. 2003 Sep;4:115-20.

3 Weerheijm KL, Jälevik B, Alaluusua S. Molar–incisor hypomineralization. Caries research. 2001;35(5):390-1.

4 Weerheijm KL, Duggal M, MejareI, PapagiannoulisL, Koch G, MartensLC, et al. Judgement criteria for molar incisor hypomineralization (MIH) in epidemiologic studies: a summaryof the European meetingon MIH held in Athens. EurJPaediatr Dent. 2003;4(3):110–3.

5 Elfrink ME. Deciduous molar hypomineralization, its nature and nurture. 2012.

6 Elfrink ME, Veerkamp JS, Aartman IH, Moll HA, Ten Cate JM. Validity of scoring caries and primary molar hypomineralization (DMH) on intraoral photographs. European Archives of Paediatric Dentistry. 2009 Nov 1;10(1):5-10.

7 Jälevik B. Prevalence and diagnosis of molar-incisor-hypomineralization (MIH): a systematic review. European Archives of Paediatric Dentistry. 2010 Apr 1;11(2):59-64

8 Elfrink ME, Schuller AA, Weerheijm KL, Veerkamp JS. Hypomineralized second primary molars: prevalence data in Dutch 5-year-olds. Caries research. 2008;42(4):282-5.

9 Ghanim A, Manton D, Marino R, Morgan M, Bailey D. Prevalence of demarcated hypomineralization defects in second primary molars in Iraqi children. International journal of paediatric dentistry. 2013 Jan;23(1):48-55.

10 Jälevik B, Klingberg GA. Dental treatment, dental fear and behaviour management problems in children with severe enamel hypomineralization of their permanent first molars. International Journal of Paediatric Dentistry. 2002 Jan;12(1):24-32.

11 Elhennawy K, Schwendicke F. Managing molar-incisor hypomineralization: A systematic review. Journal of dentistry. 2016 Dec 1;55:16-24.

12 Elfrink ME, Ten Cate JM, Jaddoe VW, Hofman A, Moll HA, Veerkamp JS. Deciduous molar hypomineralization and molar incisor hypomineralization. Journal of dental research. 2012 Jun;91(6):551-5.

13 Aine L, Backström MC, Mäki R, Kuusela AL, Koivisto AM, Ikonen RS, Mäki M. Enamel defects

in primary and permanent teeth of children born prematurely. Journal of oral pathology & medicine. 2000 Sep;29(8):403-9.

14 Alaluusua S. Aetiology of molar-incisor hypomineralization: a systematic review. European Archives of Paediatric Dentistry. 2010 Apr 1;11(2):53-8.

15 Temilola OD, Folayan MO, Oyedele T. The prevalence and pattern of deciduous molar hypomineralization and molar-incisor hypomineralization in children from a suburban population in Nigeria. BMC Oral Health. 2015 Dec;15(1):73.

16 Kemoli AM. Prevalence of molar incisor hypomineralization in six to eight year-olds in two rural divisions in Kenya. East African medical journal. 2008;85(10):514-20.

17 Mittal N, Sharma BB. Hypomineralized second primary molars: prevalence, defect characteristics and possible association with Molar Incisor Hypomineralization in Indian children. European archives of paediatric dentistry. 2015 Dec 1;16(6):441-7.

18 Mittal R, Chandak S, Chandwani M, Singh P, Pimpale J. Assessment of association between molar incisor hypomineralization and hypomineralized second primary molar. Journal of International Society of Preventive & Community Dentistry. 2016 Jan;6(1):34.

19 Costa-Silva CM, Paula JS, Ambrosano GM, Mialhe FL. Influence of deciduous molar hypomineralization on the development of molar-incisor hypomineralizarion. Brazilian Journal of Oral Sciences. 2013 Dec;12(4):335-8.

20 Oyedele TA, Folayan MO, Oziegbe EO. Hypomineralized second primary molars: prevalence, pattern and associated co morbidities in 8-to 10-year-old children in Ile-Ife, Nigeria. BMC oral health. 2016 Dec;16(1):65.

21 Negre-Barber A, Montiel-Company JM, Boronat-Catalá M, Catalá-Pizarro M, Almerich-Silla JM. Hypomineralized second primary molars as predictor of molar incisor hypomineralization. Scientific reports. 2016 Aug 25;6:31929.

22 da Silva FS, Jose M, Ribeiro AP, dos Santos-Pinto LA, de Cassia Loiola Cordeiro R, Cabral RN, Leal SC. Are Hypomineralized Primary Molars and Canines Associated with Molar-Incisor Hypomineralization?. Pediatric dentistry. 2017 Nov 1;39(7):445-9.

23 Elfrink ME, Ghanim A, Manton DJ, Weerheijm KL. Standardised studies on molar incisor hypomineralization (MIH) and hypomineralized second primary molars (HSPM): a need. European Archives of Paediatric Dentistry. 2015 Jun 1;16(3):247-55.

24 Garot E, Denis A, Delbos Y, Manton D, Silva M, Rouas P. Are hypomineralized lesions on second primary molars (HSPM) a predictive sign of molar incisor hypomineralization (MIH)? A systematic review and a meta-analysis. Journal of dentistry. 2018 May 1;72:8-13.

25 AAPD, Dentalgrowth and development, Pediatr. Dent. 39 (2017) 456.

Junk Food is the Danger of Future Generation – Review for a Decade

V.Surya[1], M. Arul[2], A.Arockiaraj[3]

[1]Ph.D. Research Scholar (Part Time) (External), Department of Business Administration, Annamalai University, Chidambaram, [2]Director, Directorate of Distance Education, Annamalai University, [3]Assistant Professor and Head, Department of Business Administration, Jawahar Science College, Neyveli, Tamilnadu, India

Abstract

The present paper is emphasizing the revealed aspects of junk food dangers to the future generation. The present paper will help future researchers in the field of junk food markets. The suggestion and the core problems of junk food will help the consumers and the general public. This article will create awareness among the public to avoid the junk food eating habits and educate the diseases are creating through the high amount of consuming sugar, fates, and salts inherent on junk foods. The junk foods are commonly taking foods unusually with high sugar, fats, and salts in any form of solid, semi-solid, liquid and dry food, even vegetarian or non-vegetarian foods. The junk foods are most common in a few types of foods like carbonated sugar beverages, salty preserved foods, oily food, fast food, and dry fishes. These are creating certain diseases like obesity, cardiovascular disease, uncontrollable adolescent growth, stomach cancer, and infertility.

Keywords*: Carbonated Sugar Beverages; Salty Preserved Foods; Oily Food; Fast Food; Obesity; uncontrollable adolescence growth; Stomach Cancer;and infertility.*

Introduction

The world health organization is responsible to control all the diseases created from the mass production of junk foods in the international market. The developed countries are much interested to produce junk foods and fetching the rural and village markets throughout the world. The continuous research on junk food stringencies has not been helped to society. The producers and belonging countries are looking the same as their business motives. The restrictions of junk food are the need of the hour due to increasing the diseases day by day is uncontrollable. It requires separate insurance to the people while consuming junk foods or a caution statement (along with pictures) "consuming junk foods are harmful to health" is required like Tobacco, Alcoholic and Drugs products consumptions. The present paper is emphasizing the revealed aspects of junk food dangers to the future generation. The present paper will help future researchers in the field of junk food markets. The suggestion and the core problems of junk food will help the consumers and the general public. This article will create awareness among the public to avoid the junk food eating habits and educate the diseases are creating through the high amount of consuming sugar, fates, and salts inherent on junk foods. The junk foods are commonly taking foods unusually with high sugar, fats, and salts in any form of solid, semi-solid, liquid and dry food, even vegetarian or non-vegetarian foods.

Junk Food Definition

Junk food defined as "pre-prepared or packaged food that has low nutritional value". It is a noun. The word junk food has been used after 1952. It has many of definitions such as "food that is high in calories but low in nutritional content", and "something that is appealing or enjoyable but of little or no real value"[1]. "Junk food is unhealthful food that is high in calories from sugar or fat, with little dietary fiber, protein, vitamins, minerals, or other important forms of nutritional value.[2]Precise definitions vary by purpose and over time. Some high-protein foods, like meat prepared with saturated fat, may be considered junk food.[3] The term HFSS food (high in fat, salt and sugar) is used synonymously.[4] Fast food and fast food restaurants are often equated with junk food,

although fast foods cannot be categorically described as junk food.[5] Most junk food is highly processed food. Concerns about the negative health effects resulting from a junk food-heavy diet, especially obesity, have resulted in public health awareness campaigns, and restrictions on advertising and sale in several countries."[6]

CAUTION OF JUNK FOOD AND EFFECTS

Continuous of taking junk food will store the excess fatcarbohydrates, and processed sugar contents to increase the risk of obesity, cardiovascular disease, and many other chronic health conditions.[7] "A case study on consumption of fast foods in Ghana suggested a direct correlation between consumption of junk food and obesity rates. The report asserts that obesity resulted in related complex health concerns such upsurge of heart attack rates.[8] Studies reveal that as early as the age of 30, arteries could begin clogging and lay the groundwork for future heart attacks.[9] Consumers also tend to eat too much in one sitting, and those who have satisfied their appetite with junk food are less likely to eat healthy foods like fruit or vegetables.[10]Testing on rats has indicated negative effects of junk food that may manifest likewise in people. A Scripps Research Institute study in 2008 suggested that junk food consumption alters brain activity in a manner similar to addictive drugs like cocaine and heroin. After many weeks with unlimited access to junk food, the pleasure centers of rat brains became desensitized, requiring more food for pleasure; after the junk food was taken away and replaced with a healthy diet, the rats starved for two weeks instead of eating nutritious fare.[11] A 2007 study in the British Journal of Nutrition found that female rats that eat junk food during pregnancy increased the likelihood of unhealthy eating habits in their offspring.[12]"

REVIEW OF LITERATURE A SYSTEMATIC META-ANALYSIS

Review Table

(Revealed after 2011 to 2020)

Year	Name of the Author(s)	Findings/Conclusion	Problem Identified
2020	Michael Stark1	About 10% of people who have diabetes have type1 diabetes, or insulin-dependent diabetes. Type 1 diabetes has also been called juvenile diabetes because it usually develops in children and teenagers. But people of all ages can develop type 1 diabetes. Diabetes is a serious condition that causes higher than normal blood sugar levels. Diabetes occurs when your body cannot make or effectively use its own insulin, a hormone made by special cells in the pancreas called islets (eye-lets). Insulin serves as a "key" to open your cells, to allow the sugar (glucose) from the food you eat to enter. Then, your body uses that glucose for energy. But with diabetes, several major things can go wrong to cause diabetes.	Health issues to children
2019	Piyush Gupta et al2	Harmful effects of juncs food are given Overweight/Obesity, Cardiometabolic Risk, High Blood Pressure, Behavioral Symptoms, Dental Caries, Adverse effects from Caffeinated Energy Drinks, and the like.	Health Issues
2018	Christopher Thomas et al3	participants with obesity did, on average, report seeing one extra HFSS broadcast advert per week - a further indication that broadcast marketing could be nudging young people towards harmful long-term weight increases	Advertisement (Health Issues)

Cont... **REVIEW OF LITERATURE A SYSTEMATIC META-ANALYSIS**

	Pankaj Kumar Sahu and Bishnu Ram Das4	General awareness about the ill effects of junk food amongst the adolescents was average and there was gap between their knowledge and practice in eating behaviour due to poor impact of education and awareness campaign in school curriculum, lack of knowledge amongst parents.	lack of knowledge amongst parents (Health Issues)
	Aashish. C. I and Divya. M. S5	Majority of Industrial youngsters agreed to prefer diet food if their income is raised and people who already purchased diet food wants to increase the quality and quantity of diet food if their income is raised.	Purchasing power and quality and quantity (Health Conscious)
2017	Sivakumar. A and Manoj. K6	The junk food is consumed by the teenagers because of its taste, variety etc., and they are partially aware about the junk food safety level and nutrient factors.	Television Advertisement (Health Conscious and Awareness)
	Ankita Jain and Ritu Sharma7	Working population who do not have time and energy to cook food opt to go in for ready-to-eat food products. But it can be dangerous if they continue this practice in a long run. As these food items contain good amount of preservatives which is hazardous for our health	Working People do not have time to cook (Health Issues)
2016	Saranya, P.V. Shanifa, N. Shilpa Susan8	Association between knowledge of adolescents regarding the effects of junk food on health and the selected demographic variables. The result revealed that 13% of adolescents had inadequate knowledge, 69% has moderate knowledge and 18% has adequate knowledge regarding effects of junk food on health.	Awareness (Health Issue)
	Priya Keshari and Mishra C. P.9	Urbanization, changing, economy and market forces have resulted in radical dietary shifts with unprecedented rise in consumption of fast foods. The adverse consequences of such dietary are profound. There is a need and scope of behavioural modification in this regard.	legislative, service and educational inputs are needed to curtail the menace of consumption of fast foods
	Vidya, Damayanthi M. Sharada, Shashikala Manjunatha10	The family, friends, schools, and community resources in a child's environment reinforce lifestyle habits regarding diet and activity.	Children (Awareness on Health Conscious)
	Muthukumar E and Bhuvaneswari R11	Eating junk food causes many ill effects to the health to the customers but the consumer eats the food for change and not because of their nutritional value. Based on the culture adopt the change in eating habits. Today both the parents are working so they give packet money for her children because they have no time to prepare snacks it becomes convenient to purchase for junk food and sometimes the taste impressed by the customer it becomes the intention to buy the junk food. But health wise it is not safe by eating a lot. Traditional way of eating food is good for health and also people accept that is the fact also.	Working parents, Convenient Purchase (Health Issues)
	British Heart Foundation12	An unhealthy diet high in sugar also increases the risk of developing tooth decay. Children are also eating too much salt which increases the risk of high blood pressure, which in turn increases the risk of heart disease and stroke later in life.	Children (Health Issues)
2012	Ashakiran and Deepthi R13	Unfortunately, today's world has been adapted to a system of consumption of foods which has several adverse effects on health. Lifestyle changes has compelled us so much that one has so little time to really think what we are eating is right! Globalisation and urbanisation have greatly affected one's eating habits and forced many people to consume fancy and high calorie fast foods, popularly known as 'Junk foods'.	(Globalisation and urbanisation have greatly affected one's eating habits and forced many people to consume fancy and high calorie fast foods, popularly known as 'Junk foods')

From the above reviews, author has revealed most of the studies are involved in the advertisement, awareness, brand, celebrity, children attitude, consumer satisfaction, taste, and quality, health awareness, marital and gender difference, Socio-cultural Impact, Television Advertisement and taste, production methods, environmental impact, quality, price, health safety, attractiveness of packing, curiosity, and prestige. Hence, the future generation will affect based on the side effects of junk foods. The habitual of the younger generation seldom accept the consequences of junk food effects while they are younger. The elder people pieces of advice to the younger, they won't accept the benefits of avoiding junk foods. It is noticed by the developed countries, they are (65 countries) prohibited the manufacturing and sales of Snicker brand of chocolate. Kukure, lays, bingo, cheetos, jelly, boomer, kinder joy, cream biscuits, 5 star, dairy milk, kit kat, perks, perks, munch, snickers. These are very harmful due to they contain large MSG (MonoSodium Glutamate) that will cause bone and teeth damages.

Affecting Factors of Future Generation's Health

"Other research has been done on the impact of sugary foods on emotional health in humans and has suggested that consumption of junk food can negatively impact energy levels and emotional well-being.[13]In a study published in the European Journal of Clinical Nutrition, the frequency of consumption of 57 foods/ drinks of 4000 children at the age of four and a half were collected by maternal report. At age seven, the 4000 children were given the Strengths and Difficulties Questionnaire (SDQ), with five scales: hyperactivity, conduct problems, peer problems, emotional symptoms, and pro-social behavior. A one standard deviation increase in junk food was then linked to excessive hyperactivity in 33% of the subjects, leading to the conclusion that children consuming excess junk food at the age of seven are more likely to be in the top third of the hyperactivity scale. There was no significant correlation between junk food and the other scales."[14]

Findings

1.There is a need for the advertisement for awareness about junk food effects and health impacts particularly children who affect more through media promotions.

2.The schools and colleges should conduct the campaign against junk foods, which will help and save the student community from various diseases.

3.In India, the health conscious nesses are decreased even in the rural and village, the migration level of urbanization is taking into consideration of cultural changes and unpracticed rural culture will affect the future generation.

4.Most of the studies are given fruitful findings to beware of the health-conscious.

5.The present article is also giving health-conscious to the future generation.

Conclusion

From the above discussion, authors have concluded that junk foods will harmful to the health of human being, it is not necessarily taking in the leisure time. The natural food and customary practices of homemade snacks will save our health and do the physically fit conditions as well. The future generation is the asset of every nation. Their fertile capability is a must for developing the nation's future achievement. The parents, government, and WHO should not favour the junk food manufacturer. The health should be kept in safe mode and the prevention of diseases is the responsibility of the nation. The consequences of taking junk food will give a more adverse impact on future society. The research reviews about the study will help the decision-maker in the field of conscientiousness to human life.

Ethical Clearance : Completed

Source of Funding : Self

Conflict of Interest : Nil

References

1. Merriam-Webster. (n.d.). Junk food. In *Merriam-Webster.com dictionary*. Retrieved February 15, (2020), from https://www.merriam-webster.com/dictionary/junk%20food
2. *O'Neill, Brendon "Is this what you call junk food?". BBC News. Retrieved June 29, (2010)*
3. *Scott, Caitlin "Sustainably Sourced Junk Food? Big Food and the Challenge of Sustainable Diets". Global Environmental Politics. (May 2018).* ***18***

(2): 93–113.

4. *Parks, Troy* "WHO warns on kids' digital exposure to junk-food ads". *American Medical Association. (16 Dec 2016).*
5. *Smith, Andrew F. Encyclopedia of Junk Food and Fast Food. Greenwood Press(5 September 2000). p. x.* ISBN 978-0313335273.
6. Saranya PV, Shanifa N, Shilpa Susan, "Adolescent's knowledge regarding the Effects of junk food on Health", International Journal of Current Medical Research, 2016; 5(3):406-409.
7. Keshari P, Mishra CP, "Growing menace of fast food consumption in India: time to act", International Journal of Community Medicine and Public Health (2016); Vol. 3, Issue 6, Pp 1355-1362.
8. Vidya B, Damayanthi MN, Sharada R, Shashikala Manjunatha, "Junk Food Consumption Pattern and Obesity among School Going Children in an Urban Field Practice Area- A Cross Sectional Study", Journal of Evidence based Medicine and Healthcare, (2015)2(12)23:1796-1801.
9. Muthukumar E and Bhuvaneswari R, "Changing the Behaviour of Eating Habits Relates to Junk Food among College Students", International Journal of Business and Administration Research Review, Vol.2, Issue.7, Oct - Dec, (2014), pp 151-155
10. British Heart Foundation, "Fight for Every Heartbeat", Children Food's Campaign, bhf.org.uk, www.childrensfood.org.uk,(2014), pp 1-4
11. Ashakiran, Deepthi R, "Fast Foods and their Impact on Health", Journal of Krishna Institute of Medical Sciences University, (2012)ISSN 2231-4261 1(2):7-1

Morphological Study of Placenta in Low Birth weight Infants

Shekhar Sharma[1], Sangita Singhal[2], Yogesh Kumar Goel[3], Shivani Bansal[4]

[1]PG student III year Department of Paediatrics, Muzaffarnagar Medical College, Muzaffarnagar, U.P [2]Professor and Head Department of Paediatrics, Muzaffarnagar Medical College, Muzaffarnagar, U.P , [3]Professor Saraswati Institute of Medical Sciences, Hapur,U.P [4]Senior Resident Department of paediatrics, Muzaffarnagar Medical College, Muzaffarnagar, U.P

Abstract

Objective: To study placental morphological changes in low birth weight neonates

Material and Methods : This prospective case-control study was carried out on 100 cases at Muzaffarnagar Medical College, Muzaffarnagar. Placentas of Low Birth Weight term babies were collected from department of gynaecology and obstetrics during the period from March 2016 to May 2017.Placental morphological changes were studied.

Conclusion: The mean placental weight, thickness and diameter for the case group was lower than the control group.Also the mean placental thickness and diameter of case group was found to be lower than in control group.Highest placental weight in both cases and control was found in 18-22 years age group mothers.However highest neonatal weight in both cases and control was found in 28-32 years age group mothers

Keywords:*PET and eclampsia, APH, Idiopathic IUGR*

Introduction

Low birth weight is defined by W.H.O as birth weight < 2500 grams. This is based on epidemiological observations that neonatal mortality in infants weighing less than 2500 g was 20 times more than in heavier babies.[1]

Perinatal mortality and morbidity is highest among LBW babies and babies who have survived are at increased risk of long term physical and intellectual impairment. In developed countries, the incidence is 4-8% and in developing countries it is about 6-30%.[2] It was estimated that 20 million infants worldwide (15.5%) were LBW and 95.6% of these infants were born in developing countries.[3]

IUGR or small for gestational age (SGA) is defined as birth weight below tenth percentile of estimated gestational age. In India 15-30% of babies born at term are ‘’small for date’’, under nutrition and toxaemia of pregnancy are considered to be important maternal causes. In India, about 6-8% of the pregnancies belong to the high risk category.[4]

Since 19th century, basic understanding of the cell biology, molecular biology, biochemistry, physiology, pharmacology and immunology of the placenta has increased almost exponentially. There are later studies to suggest that placental volume in the second trimester can predict birth weight and newborn anthropometry and identify the fetus in danger of being LBW.[5]

Asian Indian newborns may be classified as SGA because of ethnic, physiological factors more so than pathological factors; thus, we hypothesized that infants of Asian Indian origin classified as SGA would be less likely to have increased morbidity compared with SGA White infants and less likely to be admitted to a special care nursery setting. Previous studies have shown that despite the increased incidence of LBW and SGA in Asian Indian infants, no corresponding increased risk of neonatal mortality was reported compared with White infants.[6,7]

Factors for low birth infants can be divided in to maternal and placental.

Maternal Factors are: Pregnancy with medical diseases, Diseases related to pregnancy, Obstetrical conditions & miscellaneous factor[8]

Placental Causes: Infarction, Premature separation of placenta, haemangiomas, thrombosis of fetal vessels, presence of single umbilical artery and vascular terminal villi. Human placenta is hemochorial and it is the only organ in the body which contains maternal and fetal tissues. The study of placenta is an opportunity to obtain information about the two individuals, the mother and fetus. [8]

Medical diseases are hypertension, chronic renal diseases, heart diseases, diabetes, venereal diseases, infections like rubella, herpes simplex, toxoplasmosis. The diseases related to pregnancy include Toxaemia, Eclampsia, Anaemia, Rh incompatibility and obstetrical conditions like Placenta praevia, Abruptio placentae, multiple pregnancy and post maturity. Miscellaneous factors- smoking, alcoholism, inadequate maternal nutrition, teratogenic drugs, radiation, genetic defects and chromosomal disorders. [8]

. **Objectives**

- To study the spectrum of placental changes associated with LBW infants.
- To enumerate possible etiological factors responsible for low birth weight in view of placental abnormalities.

Material & Method

This prospective case-control study was carried out on 100 cases at Muzaffarnagar Medical College, Muzaffarnagar.Placentas of Low Birth Weight term babies were collected from department of gynae and obstetrics College name during the period from March 2016 to May 2017 .

Study Design: Prospective case-control Study

Study Location: This is a tertiary care teaching hospital based study done in Department of gynae and obstetrics at Muzaffarnagar Medical College, Muzaffarnagar College name , India.

Study Duration: March 2016 to May 2017

Sample size: 100 patients (75 cases & 25 controls)

Statistical analysis

Data was analyzed using Statistical Package for Social Sciences, version 23 (SPSS Inc., Chicago, IL). Results for continuous variables are presented as mean ± standard deviation, whereas results for categorical variables are presented as number (percentage). Student test (two tailed, independent) or Chi-square/Fisher's exact test has been used to find the significance of study parameters on categorical scale between groups. The level $P < 0.05$ was considered as the cutoff value or significance.

Inclusion criteria:

- Gestational age ≥ 37 weeks & Appropriate for gestational age.
- All placentas delivered to mothers with Low birth weight infants (birthweight<2500 grams)

Exclusion criteria:

- Multiple pregnancy (twins, triplets etc.)
- Not consenting to participate in the study

Observations

Mothers of 13 (17.3%) infants were the patient of PET &Eclampsia, 11 (14.7%) were the patient of Essential Hypertension, 11 (14.7%) were Anaemia patient, 8 (10.7%) were the patient of APH and 32 (42.7%) suffered due to Idiopathic IUGR.

Table I -Distribution of patients on the basis of various etiological factors

Various factors (n=75)	Frequency (%)
PET &Eclampsia	13 (17.3)
Essential Hypertension	11 (14.7)
Anaemia	11 (14.7)
APH	8 (10.7)
Idiopathic IUGR	32 (42.7)

Gross placental parameters in control group as well as in cases group was recorded in the table. While mean Placental Weight (grams) in cases was 386.4±24.06 grams. the same was 503.7±16.5 grams. in control group. Likewise the mean Placental Thickness (cm) in cases was 1.76±0.19 cm. the same was 2.47±0.22 cm. in control group. Further the mean Placental Diameter (cm) in cases was16.73±0.63 cm. the same was19.3±0.65 cm. in control group.

- **Table II-Gross morphology of placenta in case group and control group**

Placental Parameters	Case(n=75)(mean±SD)	Control (n=25) (mean±SD)	P value
Weight (grams)	386.4±24.06	503.7±16.5	<0.001
Thickness (cm)	1.76±0.19	2.47±0.22	<0.001
Diameter (cm)	16.73±0.63	19.3±0.65	<0.001

Comparison of Placental weight of both cases as well as control groups on the basis of mother's age was made and mentioned in the table. Whereas for mothers under cases in the age group of 18-22years, Placental weight (gram) was 401.2±19.9, the same was502±9.4 gram for mothers under control group. For mothers under cases in the age group23-27years, Placental weight was 403.9±6.8 (gram), & the same was 520.7±13.1 gram for mothers under control group. For mothers under cases in the age group 28-32years, Placental weight was 377.58±19.9(gram), & the same was 498.1±18.1 gram for mothers under control group and for mothers under cases in the age group of >32years, Placental weight was 363.03±21.1(gram),& the same was 491.25±13.2 gram for mothers under control group.

Table III-Comparison of Placental weight (gram) of both groups on the basis of mother's age

Mother's Age (in years)	Case (n=75) (%)	Mean Placental weight (gram)	Control (n=25) (%)	Mean Placental weight (gram)	P value*
18-22	20 (26.7)	401.2±19.9	8 (32.0)	502±9.4	<0.001
23-27	16 (21.3)	403.9±6.8	6 (24.0)	520.7±13.1	<0.001
28-32	24 (32.0)	377.58±19.9	7 (28.0)	498.1±18.1	<0.001
>32	15 (20.0)	363.03±21.1	4 (16.0)	491.25±13.2	<0.001

P value*= Mean placental weight (case & control)

Comparison of neonatal weight (gram) between both cases as well as control groups on the basis of mother's age was made and mentioned in the table. Whereas for mothers under cases in the age group of 18-22years, neonatal weight (gram) was 1945±336.4, the same was 3025±291.5 gram for mothers under control group. For mothers under cases in the age group 23-27years, neonatal weight was 1893±276.8(gram),& the same was 2833±355.9 gram for mothers under control group. For mothers under cases in the age group 28-32years, neonatal weight was 2042±224.4(gram), & the same was 3157±257.3 gram for mothers under control group and for mothers under cases in the age group of >32years, neonatal weight was 1953±247.5(gram), & the same was 2975±359.4 gram for mothers

under control group.

Table IV-Comparison of neonatal weight (gram) of both groups on the basis of mother's age

Mother's Age (in years)	Case (n=75) (%)	Mean neonatal weight±SD (gram)	Control (n=25) (%)	Mean neonatal weight (gram)	P value*
18-22	20 (26.7)	1945±336.4	8 (32.0)	3025±291.5	<0.001
23-27	16 (21.3)	1893±276.8	6 (24.0)	2833±355.9	<0.001
28-32	24 (32.0)	2042±224.4	7 (28.0)	3157±257.3	<0.001
>32	15 (20.0)	1953±247.5	4 (16.0)	2975±359.4	<0.001

P value*= Mean neonatal weight (case & control)

Result and discussion

• In our study, out of 75 cases, there were maximum 32 (42.7%) cases of Idiopathic IUGR followed by 13 (17.3%) of PET & Eclampsia while 11 (14.7%) of Essential Hypertension & Anaemia each and least patients was 8 (10.7%) of APH.Maximum number of cases i.e. 32% were between 28-32 years age group, 26.7% were in 18-22 years, 21.3 % were in 23-27 years & 20.0% were in >32 years group as compared to maximum ie 32% in 18-22 years & 28 % in age group of 28-32 years & 24% were in 23-27 years and only 16% of cases were in >32 years age group among controls**.** Mean placental weight in every age group of case group was less than mean placental weight in control group i.e. 401.2 gms, 403.9 gms, 377.58 gms and 363.03 gms in case group in comparison to 502.0 gms, 502.7gms, 498.1 gms and 491.25 gms in control group. In these entire group P values were statiscally significant (P value <0.05).Mean foetal weights in every age group was less than mean foetal weight in control group i.e. 1945 gms, 1893 gms, 2042 gms and 1953 gms in Case group in comparison to 3025 gms, 2833 gms, 3157 gms, 2975 gms in control group, P values were statistically significant in all age group.(P value <0.05).Similar findings was reported by Acharya V[4]et al i.e maximum number of cases i.e. 72% were between 21-30 years age group, 20% were in 15-20 years & 8% were between 31-35 years in IUGR group as compared to maximum cases ie 58% in 21-25 years & number of cases in age group of 15-20 years & 26-30 years were almost equal i.e. 18% & 20% and only 4% of cases were between 31-35 years. Mean placental weight in every age group was less than mean placental weight in control group i.e. 422.5gms, 405gms, 411.11gms and 350gms in IUGR group in comparison to 496.11gms, 501.03gms, 502gms and 525gms in control group. In these entire group P values were statistically significant (P value <0.05).Mean foetal weights in every age group was less than mean foetal weight in control group i.e. 2090gms, 2120gms, 2150gms and 2000gms in IUGR group in comparison to 2930gms, 2870gms, 2980gms, 3150gms in control group, except in age group 15-20 years, P values were statistically significant (P<0.01)

• Findings in our study were similar to that of Dawson L et al[9] and according to them there in an adverse-effect on the new born at both extremes of child bearing age. Highest incidence of low birth weight has been found among mothers under age of 20 years and incidence falls, as the age of mother increases and incidence of LBW increases after the age of 30-35 years. Placenta is said to be affected by ageing process, because as the age advances pregnant women are more prone to develop hypertensive disease, chronic vascular diseases, PET, Eclampsia and anaemia and these affect placenta in their turn causing IUGR. Various diseases like hypertension,

• Diabetes, PET and Eclampsia, which are related to advanced maternal age may cause placental ischemia and cause reduced placental blood flow leading to chronic hypoxia and chronic subnutrition to fetus, Donald[10]

• In our study, the mean placental weight ± standard deviation (SD) for case group was 386.4±24.06 in grams while for controls was 503.7±16.5 in grams and the difference between them was statistically significant. ($p<0.05$), placental thickness ± standard deviation (SD) of case group was 1.76±0.19 in cms while in control group it was 2.47±0.22 in cms.Placental diameter ± standard deviation (SD) of case group was 16.73±0.63 in cms while in control groups 19.3±0.65 in cms.The difference between case & control was statistically significant. ($p<0.05$). Similarly, these placental findings were similar to findings of Londhe P S et al[11], they reported that mean placental weight ± standard deviation (SD) was 321.2 ± 63.7 g in SFA group (case group) and 388.9 ± 54.1 g in normal weight/ control group. The mean placental surface area ± SD was also lower in SFA group (cases) (184.0 ± 61.6 sq.cm) than control group (219.7± 41.6 sq.cm) and the difference was statistically significant. Londhe P S et al study shows that placental diameter and thickness measurements are valuable parameters for predicting low birth weight infants.

• In this study, neonatal weight ± standard deviation (SD) was observed 1966±273.8 in grams for case group while 3008±313.5 in grams of control group**.** Londhe P S et al[11] it was reported 2833±234 in grams of control group while 2131±293 in grams of case group. This was statistical different from both groups. In another study, Ranga SS[12] et al reported the mean birth weight of neonates of case group (hypertensive group) was 2.5 ± 0.7 kg while the mean birth weight of babies of control (non-hypertensive) group was 2.9±0.4 kg.Udainia et al[13], Majumdar S et al[14], Rosana R.M. et al[15] and Abdul HafeezBaloch et al[16]observed similar finding in the birth weight of neonates.

• **Source of Funding:** Nil

• **Conflicts:** None

• **Ethical Clearance:** Permitted by the Ethical committee

References

[1] Barclay EG, Krantz M, Shrestha S.S., Tiwari K. Reduction of low birth weight: a south Asia priority. United Nations Children's Fund. UN: Regional Office for South Asia; 2002

[2] Bregman J. Developmental outcome in very low birth weight infants - current status and future trends. PediatrClin N Am. 1998 Jun;45(3):48-51.

[3] World Health Organization. Report of the director general. In: WHO, eds. The World Health Report. Geneva: WHO; 1996: 14-15

[4] Acharya V, Naruka N, Sarkar D, Nag P. P., Mathur A. J of Evolution of Med and Dent Sci/ eISSN- 2278-4802, pISSN- 2278-4748/ Vol. 3/ Issue 29/July 21, 2014

[5] Thame M, Osmond C, Wilks R, Bennet FI. Second trimester placental volume and infant size at birth. Am J ObstetGynecol 2001; 98: 279-83.

[6] Gould JB, Madan A, Qin C, Chavez G. Perinatal outcomes in two dissimilar immigrant populations in the United States: a dual epidemiologic paradox. Pediatrics 2003;111(6 pt 1):e676–e682

[7] Alexander GR, Wingate MS, Mor J, Boulet S. Birth outcomes of Asian Indian Americans. Int J GynaecolObstet 2007;97:215–220

[8] Barker DJP, Gulkman PD, Godfrey KM, Harding JE. Fetal and infant growth rates and adult pathology. In: Williams P, Furgusson M. Gray's Anatomy. London: ELBS, Churchill Livingstone 1995; pp.1-100.

[9] Dawson L, Vijay Lakshmi S, Salham B. Histopathological changes in cases of IUGR. (Indian J PatholMicrobiol. 1999;42:216-17

[10] Donald Ian. Practical Obstetric problems.5th edition, Lloyd Luke London, 1979; Pg.932.

[11] Pradeep S Londhe and Abhay B Mane. Morphometric study of placenta and its correlation in normal and hypertensive pregnancies. International Journal of Pharma and Bio Sciences, 2011; 2(3):B429-B437.

[12] Ranga SS., Adaline M.K, Thangam. T.F, Vasantha M.C. Mallika, M.V. Indira. Morphological And Histological Variations Of Human Placenta In Hypertensive Disorders

Of Pregnancy. Int J Anat Res 2017;5(1):3591-3598. DOI: 10.16965/ijar.2017.115

[13] Udaina.A, Bhagwat SS,, Mehta CD, Relation between placental surface area, infarction and foetal distress in pregnancy induced hypertension with its clinical relevance. J AnatSocInd 2004;53;1:27-30

[14] Majumdar S, Dasgupta H. A Study of Placenta In Normal And Hypertensive Pregnancies. . J AnatSocInd 2005;54:1-9.

[15] Rosana RM Correa, Daniel B. Gilio, Camila L. Cavellani, Marina C. Paschoini, Flávia A. Oliveira, Luís C. Peres, Marlene A. Reis, Vicente P. A. Teixeira and Eumenia C. C. Castro Placental morphometrical and histopathology changes in the different clinical presentations of Hypertensive Syndromes in Pregnancy. Arch Gynecolobstr 2008;277(1):201-206.

[16] Abdul HafeezBaloch, Salma FarrukhMemon, Asmat Kamal Ansari.Comparison of Placentae from Hypertension Associated Pregnancies and Normal Pregnancies .JLUMHS January-April 2012;11(01).

Awareness on Tuberculosis and Factors Determining it among Migrant Brick Kiln Workers in a Rural Area in South India

Vanishree Shriraam[1], Srihari. R[2], Gayathri.K[3], Lakshmi Murali[4]

[1]Associate Professor, Department of Community Medicine, [2]Demonstrator, Department of Physiology, [3]Senior Lecturer in Statistics, Dept. of Community Medicine, Sri Ramachandra Medical College & Research Institute, Chennai, [4]Deputy Director of Medical Services (TB) District TB Centre, Poonamallee, Tiruvallur District

Abstract

Background: Awareness of the subjects on Tuberculosis is an important factor in early reporting by symptomatics as well as early case finding by the program.

Aim: The current study was done to find out the awareness of migrant brick kiln workers, a key population as per RNTCP, on various parameters of Tuberculosis.

Method: This was a cross sectional study conducted among all migrant brick kiln workers working in the brick kilns in the field practice area of the Rural Health Centre of a medical college hospital. A pretested structured questionnaire was used for the interview. SPSS version 16.0 was used for analysis.

Results: Among 580 brick kiln workers, the mean age was 36.47. The awareness on TB was as follows – germs as cause -8.3%, cough and sputum as main symptoms – 21%, that TB spreads – 28%, availability of free treatment for TB – 19% and TB is preventable – 16%. Their educational status was directly associated with their knowledge. ($p<0.05$)

Conclusion: The awareness on TB is very low among this population. Targeted health education will have a positive impact on the migrants' health as well as overall public health by reducing transmission.

Keywords: *Brick kiln workers; migrant; awareness; Tuberculosis*

Introduction

According to International Organization for Migration (IOM), "Tuberculosis is not simply an infectious disease – it is also a disease of poverty, social vulnerability and marginalization".(1) The Revised National Tuberculosis Control Programme (RNTCP) in its "National Strategic Plan for Tuberculosis 2017-2025"(NSP) for the control and elimination of TB in India by 2025, has emphasised on reaching undiagnosed TB cases in high-risk migrant workers.(2) Migrant Brick kiln workers are one such population who are not only a key population who are at a high risk for development of TB, but also a frequently missed out one by the health sector and programs for treatment, surveillance and prevention services.

The Advocacy, Communication and Social Mobilisation document of RNTCP, stresses on performing a situational analysis of priority population, reasons for low case detection and identifying the target audience for implementation. Lack of information and awareness, cultural beliefs, stigma associated with TB, poor service availability are quoted as reasons for low performance of the program.(3)

Awareness on the symptoms, modes of transmission and availability of free treatment to cure TB in

Corresponding author:
Dr. Vanishree Shriraam
Associate Professor, Department of Community Medicine Sri Ramachandra Medical College & Research Institute, Porur, Chennai
vanishree.s@sriramachandra.edu.in
Phone no: 9841790094

Government hospitals is very important in early reporting by symptomatics as well as early case finding by the program. This will decrease morbidity and mortality due to TB in any population. A systematic review on health seeking for Tuberculosis shows that awareness of the subjects on Tuberculosis is an important factor in early care seeking. (4) In this context, the current study was done to find out the awareness of migrant brick kiln workers on various parameters of Tuberculosis.

Method

This was a population based cross sectional study conducted among migrant brick kiln workers working in the brick kilns in the field practice area of the Rural Health and Training Centre of a medical college hospital in South India. A study by National Institute of Research in Tuberculosis (NIRT) among brick kiln workers has shown that 66% of them were not aware of the mode of spread of Tuberculosis.(5) Thus taking the awareness as 34%, a relative precision of 15% of prevalence, a sample size of 332 was arrived at.

Study Population:

Brick kiln workers both males and females who were more than 18 years of age were included in the study. There were 12 brick kilns, with 30-50 workers in each and all were contacted for for participation in the study.

Ethical Considerations:

The study was approved by the Institutional Ethics Committee of Sri Ramachandra University. (IEC-NI/16/AUG/55/66). Permission was obtained from Brick kiln Association of Thiruvallur district as well as the owners of the brick kilns. Written informed consent was obtained from all the participants after explaining the purpose of study and before administering the questionnaire.

Data Collection:

Information on background demographic characteristics, their living conditions, type and duration of work and their awareness on various aspects of Tuberculosis namely the cause, mode of spread, common symptoms, treatment, prevention were collected using a pretested structured questionnaire. Awareness on the three questions - cough as a symptom of TB, that TB spreads through air and treatment can cure TB was taken as Sufficient Knowledge on TB and the results cross tabulated.

Statistical Analysis

Descriptive statistics namely proportion, mean, standard deviation, range etc. were calculated for the quantitative variables. Test of significance for difference in proportion among groups was found using Chi-square test and p value < 0.05 was considered as statistically significant. SPSS Inc. 16.0 was the statistical software used for analysis.

Results

There were 580 brick kiln workers included in this study. The mean age of the participants was 36.47 (SD 11.45). Nearly 40% were <30 years of age, whereas there were 30% each in the 31-40 years and >40 years group respectively. There was an almost equal distribution of males and females (52% vs 48%).

More than half of the brick kiln workers were illiterates (52%) and only a small proportion (4%) had studied more than 10th standard. A higher proportion of females (57%) were illiterate compared to males (46%). The duration of work was 5-15 years in 46.5% of subjects. Two-thirds (66%) of them were in the moulding job. Table 1 gives the details of background characteristics of the study population.

Table no.1: Background Characteristics of the Study Population:

Background Characteristics		**N (%)**
Age	Upto 30 Years	222 (38.3)
	31-40 Years	186(32.1)
	>40 Years	172(29.7)

Cont... **Table no.1: Background Characteristics of the Study Population:**

Sex	Male	284(49)
	Female	296(51)
Educational Status	Illiterate	299(51.6)
	Primary	99(17.1)
	High School	158(27.2)
	HSC/ Diploma/ Graduate	24(4.1)
Duration Of Work (N=577)	<5 Years	201(35.6)
	6-15 Years	262(46.5)
	>15 Years	101(17.9)
Nature Of Work	Carriage And Placement	144(24.8)
	Moulding	381(65.7)
	Baking	35(6.0)
	Others Specify	20(3.4)

Awareness on TB among brick kiln workers:

The disease by name Tuberculosis was familiar among less than a third (31.7%) of the study population. (Table no.2)

Table no.2: Awareness on various aspects of TB among migrant brick kiln workers (n=580)

Awareness on various aspects of TB	**No. (%)**
Cause of TB	
Germs	48(8.3)
TB spreads from one person to another	161(27.8)
By cough/sneeze	123(21.2)
Diagnosis of TB	
Sputum test	93(15.9)
Blood test	41(7)
X ray	8(1.4)
Treatment for TB	
6 months or more	28(4.8)
As long as symptoms persist	71(12.2)
Free treatment is available for TB	109(18.7)
TB is curable	108(18.5)

Germs as cause for TB was known by 48 (8.3%) of the workers. The commonest misconceptions on causation were smoking, 55 (9.5%) and exposure to dust, 37(6.4%).

Even though 161(27.8%) people felt that TB spreads from one person to another, only 123 (21.2%) knew coughing or sneezing by a patient to spread the disease. Here again there were misconceptions like TB spreads by touching, sharing things, water etc though the numbers were limited. A majority of the study population felt that TB spreads by stamping on someone's sputum 152(26.2%).

Around 16% of the workers were aware of sputum test for diagnosis of TB. But only 5% of them knew the duration of the treatment as 6 months or more. The awareness on availability of free treatment in Government hospitals for TB was present in less than a fifth of the people (19%).

Among the workers, 131 (22.6%) were aware of one of the symptoms of TB athough cough and sputum were the ones known by majority of them. (Figure 1) The other symptoms that were known were breathlessness 7(1.2%), weakness 6(1%), wheeze 4(0.7%), vomiting 3(0.5%), headache 2(0.4%), chest pain, loss of appetite, giddiness, sleeplessness, increased sweating, death by 1 each (0.2%).

Figure 1: Awareness of the brick kiln workers on common symptoms of TB

TB is preventable was known by 93 (16%) workers. The modes of prevention commonly mentioned were closing mouth while coughing (14%) and proper disposal of sputum (12%). (Figure 2)

Figure 2: Awareness of brick kiln workers on prevention of TB

Knowledge on all the three namely - Cough is a symptom of TB , TB spreads by airborne route and TB is curable with treatment was considered as sufficient knowledge and was present among 69 (11.9%) brick kiln workers. Its association with background characteristics is given in table no.3.

Table no.3: Association of background characteristics with knowledge on TB

Background Characteristics		**N**	**No. of workers who were aware (%)**	**P value**
Age	upto 30 years	222	29(13.1)	.369
	31-40 years	186	17(9.1)	
	>40 years	172	23(13.4)	
Sex	Male	284	31(10.9)	0.475
	Female	296	38(12.8)	
Educational Status	Illiterate	299	30(10)	0.009*
	Primary	99	11(11.1)	
	High school	158	20(12.7)	
	HSC/ Diploma/ Graduate	24	8(33.3)	

Cont... **Table no.3: Association of background characteristics with knowledge on TB**

Duration of work	Less than 5 years	201	21(10.4)	0.125
	6-15 years	262	28(10.7)	
	16 and above years	101	18(17.8)	
Nature of work	Carriage and placement	144	19(13.2)	0.045*
	Moulding	381	42(11)	
	Baking	35	2(5.7)	
	Others	20	6(30)	

*P < 0.05 – statistically significant

There was no difference in the awareness level on TB between different age groups as well as between males and females. But the level of awareness increased as the educational level increased.. ($p<0.01$)

The duration of work in brick kiln did not affect the level of awareness of TB. But the nature of work did and this difference was statistically significant ($p<0.05$).

Discussion

Current study is a Cross-Sectional study to assess the level of awareness on Tuberculosis among 580 migrant brick kiln workers in South India. The key findings are just 31.7% of the respondents had heard of TB and a meagre 12% had sufficient knowledge on TB. The knowledge on TB increased as the educational status increased. Those involved in core work such as moulding, baking, carriage had lesser knowledge compared to others such as drivers, managers etc.

India being the country with the highest TB burden and mortality in the world,(6) it was really tragic that only a third of the study population have heard of Tuberculosis. This is much lower in comparison to that of studies done in urban slums in Puduchery (94%), as well as school and university students. (7,8,9)male and female were 68.2 % and 31.8 % respectively. Most of the students (94.4 %

The knowledge on how TB spreads (28%) was much lower than the finding (66%) among brick kiln workers in a study by NIRT. (5) However the misconceptions that TB spreads by touching, sharing and through water was similar to other populations.(7,10) But many of the respondents in this study 26% believed that TB spreads by stamping on one's sputum which is not reported much in literature.

More people thought TB to be caused by smoking or dust than germs (8.3%). Studies found that most people in urban and rural areas and students knew it to be due to germs(7,10,8) but in few others done among backward population a similar pattern was observed (11,5,12)

Cough as a symptom of TB was known among 21% respondents and that TB is curable with treatment and free treatment is available in all government facilities was known among 19% of the study population only. This is an important factor determining the health seeking behaviour and choice of facility. Studies show that the awareness on these aspects are better among students, general population, TB symptomatics as well as patients who are admitted for other illnesses.(8, 9male and female were 68.2 % and 31.8 % respectively. Most of the students (94.4 %, 7, 10, 13). In-spite of the great efforts taken by RNTCP towards advocacy and communication, awareness on these has not percolated to the people in the difficult to reach areas such as the brick kilns.

There was no difference in knowledge between males and females unlike in few studies where males had better knowledge. (14,15) But the finding that higher the educational status, better the awareness was similar to other study findings. (12,16,17,18,19Jijiga y Harar. DISEÑO: Entre julio y noviembre de 2008,

382 pacientes sospechosos de tuberculosis y fueron entrevistados mediante un cuestionario estructurado. Los datos se analizaron mediante estadística descriptiva y regresión logística ordinal. RESULTADOS: Sólo seis (1,6%,20)

The low level of awareness among the brick kiln workers might be attributed to their low level of literacy (less than 50% were literates compared to general population where it is 80% as per census 2011 in Tamilnadu),(21) social isolation for six to eight months in a year while working in brick kilns and also less targeted interventions by the people of the health sector.

Poor knowledge of TB symptoms, diagnostic tests, duration of treatment, misconceptions of costs have been identified as barriers for effective TB control. (3) So it is high time we reach these migrant brick kiln population at regular intervals and empower them by raising their overall health consciousness as well as improve their disease specific knowledge. This is expected to improve TB case finding as well as when initiated on treatment, treatment completion.

Conclusion

The awareness of the migrant brick kiln workers on various parameters of TB was very low. Efforts focussed on health promotion and disease prevention among these internal migrants will not only impact their health positively but also the overall public health by reducing the transmission among surrounding communities and the communities of origin.(22)

Conflict of Interest: Nil

Financial Assistance: TB Association of India

References

1. Tuberculosis in Migrants and Crisis - Affected Populations. 2015; IOM Migration Health Division. https://www.iom.int/sites/default/files/our_work/DMM/Migration-Health/MP_infosheets/H3_TB_IOM%20TB%20in%20emergencies_%20finalAUGUST_2015.pdf
2. National Strategic Plan for Tuberculosis. March 2017; Revised National Tuberculosis Control Programme, Central TB Division, Directorate General of Health Services. https://tbcindia.gov.in/WriteReadData/NSP%20Draft%2020.02.2017%201.pdf
3. Operational Handbook on Advocacy, Communication, and Social Mobilization (ACSM) for RNTCP. Central TB Division, Ministry of Health and Family Welfare. 2014;(March). http://www.nrhmhp.gov.in/sites/default/files/files/l%20Handbook%20on%20ACSM%20%202014_04_02.pdf
4. Samal J. Health Seeking Behaviour among Tuberculosis Patients in India : A Systematic Review. J Clin Diagn Res. 2016 Oct; 10(10): LE01–LE06. doi: 10.7860/JCDR/2016/19678.8598
5. Thomas BE, Charles N, Watson B, Chandrasekaran V, Kumar RS, Dhanalakshmi A, et al. Prevalence of chest symptoms amongst brick kiln migrant workers and care seeking behaviour: A study from South India. J Public Heal (United Kingdom). 2014;37(4):590–6.
6. India TB report 2018. Revised National TB Control Program. Annual Status Report. https://tbcindia.gov.in/showfile.php?lid=3314.
7. Chinnakali P, Gurumurthy J, Ramakrishnan J, Vasudevan K, Upadhyay R, Panigrahi K. Level of awareness about tuberculosis in urban slums: Implications for advocacy and communication strategy planning in the National program. Lung India [Internet]. 2013;30(2):139. Available from: http://www.lungindia.com/text.asp?2013/30/2/139/110422
8. Renuka M, Murali D. Knowledge and awareness of tuberculosis among high school students of Mysore City. Al Ameen J Med Sci. 2012;5(October):333–6.
9. Rana M, Sayem A, Karim R, Islam N, Islam R, Zaman TK, et al. Assessment of knowledge regarding tuberculosis among non-medical university students in Bangladesh: A cross-sectional study. BMC Public Health [Internet]. 2015;15(1):1–7. Available from: http://dx.doi.org/10.1186/s12889-015-2071-0
10. Charles N, Thomas B, Watson B, Raja Sakthivel M, Chandrasekeran V, Wares F. Care seeking behavior of chest symptomatics: A community based study done in south india after the implementation of the RNTCP. PLoS One. 2010;5(9):1–6.
11. Maske AP, Sawant PA, Joseph S, Mahajan US, Kudale AM. Socio-cultural features and help-seeking preferences for leprosy and turbeculosis : a cultural epidemiological study in a tribal district of

Maharashtra , India. Infect Dis Poverty [Internet]. 2015;1–14. Available from: http://dx.doi.org/10.1186/s40249-015-0064-y

12. Yadav SP, Mathur ML, Dixit AK. Knowledge And Attitude Towards Tuberculosis Among Sandstone Quarry Workers In Desert Parts Of Rajasthan . Indian J Tuberc 2006; 53:187-195 .
13. Rathore MS, Jain J, Dixit M. A cross sectional study to assess the knowledge , attitude and practice regarding tuberculosis among the patients at GMCH , Udaipur (Rajasthan). Int J Com Med Public Health 2017;4(11):4272–6. DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20174842
14. Advocacy, communication and social mobilization for TB control: a guide to developing knowledge, attitude and practice surveys. WHO/HTM/STB/2008.46;1–68. Available from: https://apps.who.int/iris/bitstream/handle/10665/43790/9789241596176_eng.pdf;jsessionid= 0B2C58B0EC8A6AA B99FC0E0EB9581556?sequence=1
15. Konda SG, Melo CA, Giri PA. Knowledge , attitude and practices regarding tuberculosis among new pulmonary tuberculosis patients in a new urban township in India. Int J Med Sci Public Health. 2016; 5(3): 563-569 doi: 10.5455/ijmsph.2016.01112015185
16. Jangid VK, Agrawal NK, Yadav GS, Pandey S. Knowledge And Awareness Of The Tuberculosis In Tuberculosis Patients At A Tertiary Care Centre In North West Rajasthan, India. Natl J Community Med. 2016; 7(4): 262-268.
17. Hassan AO, Olukolade R, Ogbuji QC, Afolabi S, Okwuonye LC, Kusimo OC, et al. Knowledge about Tuberculosis: A Precursor to Effective TB Control—Findings from a Follow-Up National KAP Study on Tuberculosis among Nigerians. Tuberc Res Treat [Internet]. 2017;2017:1–8. Available from: https://www.hindawi.com/journals/trt/2017/6309092/
18. Esmael A, Ali I, Agonafir M, Desale A, Yaregal Z, Desta K. Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in Eastern Amhara Regional State, Ethiopia: Cross-sectional study. Am J Trop Med Hyg. 2013;88(4):785–8.
19. Abebe DS, Biffa D, Bjune G, Ameni G, Abebe F. Assessment of knowledge and practice about tuberculosis among eastern Ethiopian prisoners. Int J Tuberc Lung Dis. 2011;15(2):228–33.
20. Solliman MA, Hassali MA, Al-Haddad M, Hadida MM, Saleem F, Atif M, et al. Assessment of knowledge towards tuberculosis among general population in North East Libya. J Appl Pharm Sci. 2012;2(4):24–30.
21. http://censusindia.gov.in/2011-prov-results/data_files/tamilnadu/3.Tamil%20Nadu_PPT_2011-BOOK%20FINAL.pdf
22. World Health Organization Regional Office for the Western Pacific. Tuberculosis Control in Migrant Populations: Guiding Principles and Proposed Actions. 2016;24.

A Study on the Prevalence of Diarrhoeal Disease among The Under 5 Age Children In Urban Area of Sangareddy, Telangana

Humera Abida[1], Batchu Naga Gayathri[2]

[1]Assistant Professor, [2]Assistant Professo, Department of Community Medicine, Mahavir Institute of Medical Sciences, Vikarabad, Telangana, India

Abstract

Background: Diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than is normal for the individual) [1]. Diarrhoea can last several days, and can leave the body without water and salts that are necessary for survival. In urban setting, diarrhoea is more common in the slum dwelling children who live in an environment with poor sanitary facilities and polluted water [2]

Aim and Objective: To estimate the prevalence of acute diarrhoeal diseases among the children below 5 years of age.

Material and Methodology: Cross sectional type of study conducted in children of 0-5 years of age using pre designed, pretested structured questionnaire. 402 children were selected for the study using convenient sampling technique. Study area was 5 Urban slum pockets in Urban Health and Training Centre(UHTC), Sangareddy, Department of Community Medicine, MNR Medical College, Telangana.

Results: Prevalence of acute diarrhoeal diseases was 15.7% among 402 under-fives children from the urban slum, over a recall period of 2 weeks. Among them 207 children were males and 195 were females, of which prevalence of diarrhea was observed more in females 33 (16.9%) when compared to males 30 (14.5%). About 90% of study participants belonged to nuclear family of which most of them belonged to class IV (upper lower) according to Modified Kuppuswamy scale[3]. Socio environmental conditions of these families were poor.

Conclusions: The study brought light on the unmet needs regarding poverty, sanitation, proper disposal of waste water and daily supply of safe potable drinking water and health care delivery.

Keywords: *Prevalence, diarrhoea, under 5 age children, environment.*

Introduction

Globally, four billion episodes of diarrhea were estimated to occur each year, with > 90% occurring in developing countries. Diarrhoeal disease is an important public health problem among children in developing countries.

According to WHO[4], 'Human faeces remains one of the most dangerous pollutant, spreading microbes causing various diseases like enteric fevers, diarrhoea etc. Rotavirus and Escherichia coli, are the two most common etiological agents of moderate-to-severe diarrhoea in low-income countries. Infection is more common when there is a shortage of adequate sanitation and hygiene and safe water for drinking, cooking and cleaning.

Diarrheoea can also spread from person-to-person, aggravated by poor personal hygiene. Food is another major cause of diarrhoea when it is prepared or stored in unhygienic conditions .Unsafe domestic water storage and handling is also an important risk factor.

In India especially poor sanitary conditions was the most important cause for most of ADD episodes. Health education on the etiology, prevention and management

of the diarrhoea has the potential to establish productive contact between the health services and the community, to increase the capability of the families to recognize the danger signs of diarrhoea in children and to encourage appropriate and early care seeking.

There is an imperative need to know about prevalence of diarrhoea and to assess the existing gap between knowledge and practice such as hand washing and use of sanitary toilet. There is also a need for supply of safe drinking water and maintenance of clean environment through provision of sanitary latrine and proper disposal of refuse. This is more important in case of mothers with under five children, in whom the morbidity and mortality to diarrhoea is very high.

Method

A community based cross sectional type of study conducted for a period of 12 months(January 2016-December 2016) . Study area is Urban slum area by name Marxnagar selected randomly from urban field practice area of Sangareddy. Out of 5245 population in urban slum, 681 under 5 age children are expected to be available to draw the adequate number of study population.

Out of 681 children only 402 children were taken for the study as per the calculations by using the formula for fixing the sample size as mentioned below n = (Z)2pq/ d2.

Where **Z**= percentage point corresponding to significance level. For significance level 5%, Z is1.96. **p** prevalence of diarrhea among under 5 children is 30%[5] q=100-p=70%

d is corresponding maximum error and is 15%. Hence n=1.96x1.96x30x70/4.5x4.5=398 i.e. rounded to 402 children < 5 yrs.

Data Collection:

Informed written consent was taken from the study participants prior to the start of the study. A pre designed, pre tested questionnaire was made as per guidelines given in basic biostatistics by A. Indrayen and L. Sathyanarayana . Pretesting of questionnaire was done in 40 samples selected randomly in 4 streets in the respective area of Sangareddy.

Data Analysis:

Statistical analysis was done using SPSS version 17.0 and the details regarding mother's knowledge and attitude regarding diarrhoea prevention was obtained. Data was summarized in percentages and proportions. Statistical associations was done using Chi square test wherever necessary with $p<0.05$ and considered statistically significant.

Results

Table 1: Distribution according to age & sex of under 5 age children

Demographic Characteristics		**No. of children**	**Percentage (%)**
Age Group	0-12 months	75	18.66
	13-24 months	108	26.86
	25-36 months	90	22.39
	37-48 months	71	17.66
	49-60 months	58	14.43
Sex	Males	207	51
	Females	195	49
Prevalence of Diarrhoea	Males	30	14.5
	Females	33	16.9

From the table 1, it was observed that, out of 402 under 5 aged children 108 (26.86%) children were from the age group of 13-24 months followed by 90 (22.39%). In the above table, majority of children were males 207 (51%) while females were 195 (49%).It was observed that prevalence of acute diarrhoeal diseases was more in females 33 (16.9%) when compared to males 30 (14.5%).

Table 2: Distribution according to Socio Environmental conditions of the families (n=255) of under 5 age children

Socio Environmental Characteristics		**No. of families(n=255)**	**Percentage (%)**
Type of family	Nuclear	235	92.3
	Joint	14	5.7
	Three generation	6	2
Socio Economic status	Class I (Upper)	5	1.96
	Class II (Upper middle)	31	12.15
	Class III (Lower middle)	56	21.96
	Class IV (Upper lower)	136	53.33
	Class V (Lower)	27	10.58
Source of drinking water	Municipal tap water	178	70
	Borewell water	77	30
Type of house	Kutcha	145	57
	Semi pucca	76	30
	Pucca	34	13
Sanitary facility	Present	41	16
	Absent	214	84
Garbage Disposal	Garbage pit	158	62
	House to house collection	18	7
	No facilities	79	31
Fly breeding	Yes	226	89
	No	29	11

From the table 2, it was observed that, majority of the families belonged to nuclear family 235(92.3%) and then followed by joint families (14%). Modified Kuppuswamy scale[6] was used to determine the socio economic status of the study population .Based on that majority of the families belonged to class IV (53.33%) followed by class III (21.96%).

Out of 255 families surveyed 178(70%) houses were receiving municipal tap water whereas 77(30%) houses were still receiving borewell water. Majority of the houses were kutcha type145(57%) followed by semipucca houses76(30%). Only a handful of houses 41(16%) had the sanitary facilities available.

Garbage pit was the major source of Garbage Disposal(62%) in the present study. Fly breeding was seen in approximately 90% of the houses.

Discussion

The present study was conducted in the urban field practice area of department of community medicine of MNR Medical College, Sangareddy, Telangana. For the purpose of study total 255 families were taken which had 402 under five age group children, who were enrolled in the study. The findings in this study document the prevalence of Diarrhoea among the under-five population of urban slum of Sangareddy.

Prevalence of diarrhoea in under five children in this study was found to be 15.7% .Similar findings were seen in studies conducted by Mishra CP[6] and Sudipta Basa[7].The study done in Aligarh of Uttar Pradesh by Ansari et al[8] has reported a prevalence of 16% which is comparable to our study.

In the present study it was observed that, males belonging to 13-24months age group was higher(30.9%) in number. Females belonging to 37-48months age group were higher (25.6%) in proportion than other age groups A cross-sectional study conducted to assess the prevalence of under-five diarrhea and socioeconomic factors by A.M. Elizabeth and Sherin Raj[9], the percentage of children suffering from diarrhea was highest among children aged 6-23 months (20.2%-20.6%) and lowest in the age group of 48-59 months (3.6%).

It was observed that sex ratio of the under five children in this study was 955 females /1000 males and it is slightly higher than the national average of 940/1000(NHFS-4).Prevalence of diarrhoea among under-five females was higher i.e. 33(15.9%) when compared to under-five males 30(14.5%) which is similar to study done by Sudipta Basa[10]

Majority of the under five children were from nuclear family 235(92.3%) and from joint family 14(5.7%). The majority of population was from urban areas and nuclear family culture was mainly followed in such part of country. It may be due to higher number of nuclear families in our study. A similar study done in Rural Community in the Jordan Valley by Abdelhakeem Okour, Ziad Al-Ghazawi, Muntaha Gharaibeh[11] showed no differences in diarrhoea due to type of family.

Source of drinking water in majority of houses 178(70%) was by municipal tap water followed by bore water i.e 77(30%). Among the 70% of water supplied by Corporation 75% were through corporation Lorries to the respective slums in the corporation council wards. Only 25% of the houses were supplied with regular water supply through taps. In a study done by Katharina Diouf[12], public taps were the most common source of drinking water (29.4%; n=162), which is similar to our study.

Out of 255 study families,136 (53.3%)families were belonging to class IV of Modified Kuppuswamy socioeconomic classification followed by 27(10.5%)%) families were of class V. Majority of children with diarrhea were from lower socioeconomic class with 35 children being affected from diarrhoea from class IV . Diarrhoea was higher in lower socio economic groups. It was found that there is a significant relation between socio economic status and prevalence of diarrhoea. ($p<0.05$) Similar findings were also reported by Sudipta Basa[10] in their study, with maximum number of study subjects 312 (44.8%) belongs to socio-economic class IV followed by class V 203(29.2%) which is statistically significant.

From Table no.2 which shows the environment of study area, the types of houses are mostly Kutcha houses(57%) and about 30% were Semi pucca. Only 13% were pucca houses . The environment around the Kutcha houses was poor with inadequate drainage facilities and the housing floor was in surface with street. About 84% of houses have no sanitary latrines and they are using either sulabh public toilet complexes or open air defecation. 40% of mothers said their family members use the near by play ground for open air defecation. Among 16% of houses having sanitary toilets, only 6% has latrine with adequate water supply. Refuse disposal by most of households 62% were into garbage pits or cabin .About 88.81% of mothers complained about fly nuisance in their houses and they accepted it was due to improper refuse disposal. In a study done in Turkey[13] it was found that the association between family environment and diarrhoea is statistically significant (median 1.48+-0.12). The association between key health care practices and

family environment in prevention of diarrhea .Village-level and township-level care were sought for childhood diarrhea by 67.02% of the caretakers[14].

Conclusion

Diarrhea is still the major killer of children under 5 years of age group, although its toll has dropped by a third over the past decade. It killed more than 1600 children under 5 years of age every day in 2012[15]. Hence, along with creating awareness regarding prevention and control of diarrhoeal episodes there is also a need for supply of safe drinking water and maintenance of clean environment through provision of sanitary latrine and proper disposal of refuse.

Ethical Clearance- Proposal presented in SRM College of Occupational therapy, SRMIST.

Source of Funding- Self

Conflict of Interest –Nil

(Note to Editor: This study is a part of a larger study of which a part has been published in IJCMPH Volume 6, Issue 7, 2019)

References

1. K.Park. Park's textbook of preventive and social medicine. 21st edition; Bhanot publishers; 2015;pg 236-242
2. KB .Banerjee – National program for control of diarrhoel diseases; Indian J Pediatrics.1985 Sep-Oct ,PMID:4077194
3. Tulika singh; Socio economic status scales updated for 2017; IJRMS 2017 jul;5(7):3264-3267
4. WHO Rajagopan S, Shifmann MA: Guide to simple sanitary measures for control of enteric diseases; WHO 1974 Pg:47-51
5. S.C. Tivari, Y. Saraf, G. Nambiar. Study of diarrhoeal diseases in 0-5 years old children and practices of oral rehydration solution, Bhopal, Madhya Pradesh in Conference Proceedings of the 9 th Asian conference on diarrhoeal diseases and nutrition. Sep 28-30, 2001, New Delhi
6. Mishra CP, Kumar S, Tiwari IC, and Prasad DN: A study on diarrhoea related practices in urban Mirzapur. Indian J Public Health 1990 jan-mar; 34(1):6-10
7. Ahmad Komarulzaman ; Clean Water, Sanitation and Diarrhoea in Indonesia: Effects of household and community factors; NiCE Working Paper; 14-105
8. Ansari MA, Khan Z (2012) An Evaluation of Health Education Intervention on Hygienic Status of Food Handlers in Aligarh; 2:142. doi:10.4172/jcmhe.1000142
9. A.M. Elizabeth and Sherin Raj;impact of bio-social determinants on under 5 morbidity; Health and Population - Perspectives and Issues 35(4), 2012, 176-192
10. Sudipta Basa; Prevalence of Diarrhoea among Under-Five children and Health Seeking Behavior of their Mothers in an Urban Slum of Delhi; Asian Journal of Biomedical and Pharmacutical Sciences, 5(45), 2015, 08-11
11. Abdelhakeem Okour, Ziad Al-Ghazawi, Muntaha Gharaibeh; Diarrhea Among Children and the Household Conditions in a Low-Income Rural Community in the Jordan Valley ;J Med J 2012; Vol. 46 (2):108- 117
12. Katharina Diouf; Diarrhoea prevalence in children under five years of age in rural Burundi: an assessment of social and behavioural factors at the household level; Glob Health Action. 2014; 7: 10.3402
13. Aimee L. Webb,Usha Ramakrishnan,Aryeh D. Stein, Daniel W. Sellen,Moeza Merchant, and Reynaldo Martorell ;Greater years of maternal schooling and higher scores on academic achievement tests are independently associated with improved management of child diarrhoea by rural Guatemalan; Matern Child Health J. 2010 Sep; 14(5): 799–806
14. Turkey: Health ministry – state of mothers and children in turkey
15. WHO (2005), The treatment of Diarrhea, A manual for physicians and other senior health workers , Department of child and adolescent health and development, WHO.pg 9-14

Evaluvation of Sensory Responsiveness in Children with Autism Spectrum Disorder

U.Ganapathy Sankar[1], Monisha.R[1], Christopher Amalraj Vallaba Doss[2], R.M. Palanivel[3]

[1]Dean & Professor, SRM College of Occupational therapy, SRMIST, Kattankulathur, Chennai, [2]College of Medicine, Imam Abdulrahman Bin Faisal University, P. O. Box 1982, Dammam, Saudi Arabia, [3]Deanship of Quality and Academic Accreditation, Imam Abdulrahman Bin Faisal University, P. O. Box 1982, Dammam, Saudi Arabia

Abstract

Objective: To identify the sensory responsiveness pattern using Dunn's Sensory Profile and severity of social impairment using Social Responsiveness Scale in children with Autism Spectrum Disorder.

Methodology: Cross sectional quantitative study design with convenient sampling was used. This study involved 20 children diagnosed with Autism Spectrum Disorder aged 5-6 from special School in and around Chennai. Caregiver's Sensory profile and social Responsiveness Scale was administered in order to quantify the severity and pattern of sensory responsiveness.

Result: Significant relation were found between social responsiveness scores and each of the six sensory system profile scores for children with Autism Spectrum Disorder

Conclusion: Atypical sensory responsiveness pattern is predominant in children with Autism Spectrum Disorder.

***Key Words**: Sensory responsiveness, Autism Spectrum Disorder, Primary schools, special schools*

Introduction

Autism spectrum disorders (ASD) are complex neuro-developmental disorders that can cause problems with thinking, feeling, language and the ability to relate to others. The core feature includes persistent deficits in social communication and social interaction across multiple contexts, Restricted, repetitive patterns of behavior, interests, or activities which cannot be explained by intellectual disability and significantly impairs the functioning (DSM-5™ Diagnostic Criteria). Autism is known as a "spectrum" disorder because there is wide variation in the type and severity of symptoms people experience. ASD occurs in all ethnic, racial, and economic groups. Although ASD can be a lifelong disorder, treatments and services can improve a person's symptoms and ability to function[1].

Abnormalities at the level of synapses, including newly described genetic perturbations and autism susceptibility genes, have been implicated in the pathogenesis of autism (Simone Khaliifeh et al 2016). Non-invasive modalities like Diffusion Tensor Magnetic Resonance Imaging have identified white matter tract involvement in the brains of autistic individuals and socio-emotional processing[2].

Early and intensive intervention impact prognosis. Though no known medication relieves core symptoms of social and communication impairment, but fluoxetine is used to decrease anxiety and risperidone and aripiprazole are approved for irritability in autistic patient. Early identification and intervention with ABA(applied Behavior Analysis, speech, psychomotor and occupational therapies are crucial as is social integration .Early diagnosis and intervention with therapies remains the mainstay of insuring an improved outcomes and a better chance at full integration into society [3].

The sensory systems are the sources for a living being to acquire information about the world, which support that being in successfully responding and

adapting to the environmental demands(Claudia L. Hilton et al 2010).Sensory processing (SP) refers to the way that sensory information e.g. visual, auditory, vestibular or stimuli is processed and managed in the brain to generate adaptive responses to the environment and engagement in meaningful daily life activities (Johnson- Ecker &Parham 2000).SP theory suggests that optimal functioning in daily environments requires efficient reception and integration of incoming sensory stimuli and when this fails the individuals is unable to respond to sensory information with behavior that is regulated relative to the intensity of the input (Miller et al. 2007). Studies show that between 69% and 95% of individuals with an autism diagnosis experience sensory processing that is atypical (Ausderau, Baranek et al 2016). Sensory symptoms were first included as part of the ASD diagnosis in the most recent (2013) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and atypical sensory processing is now considered to be a core feature of Autism.

Dunn (1997) proposed a model for classifying patterns of dysfunction in SP according to individuals' behavioral response to stimuli and neurological thresholds, describing four patterns of SP dysfunction: Low Registration, Sensation Seeking, Sensory Sensitivity and Sensation Avoiding[4]. The most common atypical sensory processing that observed and studied in people on the autism spectrum are challenges with sensory modulation, where atypical responses to sensory stimuli make it difficult for the individual to function effectively within a particular environment(Hazen, Stornell et al 2014).

There are three types of atypical sensory modulation: (1).Sensory over- responsivity describes when an individual has an exaggerated negative response to sensory input, often leading to avoidance and hyper vigilance of the stimulus. (2). Sensory under-responsivity describes when an individual may seem to be unaware of, or slow to respond to, a stimulus that would typically be expected to elicit a response. (3). Sensory-seeking behavior describes when an individual has an unusual craving for, or preoccupation with, certain sensory experiences. Many people on the autism spectrum experience a combination of sensory under- and over-responsivity (Baranek 2002). In addition, their sensory-seeking behaviors are associated with both under- and over- reactivity[6,7]. (Lane, Baker et al. 2010.). Abnormalities occurs across all sensory domains, including tactile, vestibular, auditory and visual (Harrison and Hare 2004, Rogers 1998) and in the absence of known peripheral dysfunction such as a visual or hearing loss (Baranek 2002).

Methodology

Children diagnosed with Autism Spectrum Disorder aged 5-6 was selected from Child Therapy Service and special schools around Chennai. Twenty children diagnosed with ASD were recruited through the convenient sampling from the rehabilitation centers, hospitals and special schools in Chennai. All the participants were selected following physician diagnosis confirmed by the DSM-IV-TR criteria and Children with Intellectual Disability and other neurodevelopment disorder, visual and hearing impairment were excluded. The purpose of the study was explained to the caregivers of the children with ASD. Written consent form was obtained from the caregivers and duly filled and signed demographic details were obtained. After obtaining the written consent the participants were administered sensory profile in order to quantify the severity of sensory issues

Result

The Spearman rank correlation coefficient was used to compare the SP sensory raw scores with the SRS raw scores raw scores were also used to quantify the sensory responsiveness for each of the senses.

Table 1 Demographic DATA.

S. No.	Demographic Variables	Class	No. of Children	Percentage
1	Age	5 Years	9	20.7%
		6 Years	11	79.3%
2	Gender	Male	15	76.7%
		Female	5	23.3%

Table 2 : Sensory profile score for children with Autism Spectrum Disorder based on gender

S. No.	Domains of Sensory profile	Gender	Mean	SD
1	Auditory Processing	Male	20.11	5.122
		Female	35.13	5.555
2	Visual Processing	Male	32.40	4.233
		Female	34.15	4.532
3	Vestibular Processing	Male	40.12	3.747
		Female	43.11	3.847
4	Touch Processing	Male	72.21	18.748
		Female	70.22	14.384
5	Multi-Sensory	Male	22.35	4.648
		Female	25.34	4.748
6	Oral/Olfactory Sensory	Male	45.31	6.748
		Female	42.24	6.433

Discussion

Table 1 shows the characteristics of the participants based on the age and gender distribution. Most of the children were between the age of 5-6. Table 2 shows the mean scores of the following component of the sensory profile based on gender: auditory processing, visual processing, vestibular processing, and touch processing, multisensory and oral/olfactory processing. It displays the pattern of distribution of atypical sensory processing in various domains and shows very less difference in the scores between male and female children therefore indicating similar atypical sensory pattern in both the genders. Atypical sensory modulation is an important consideration in diagnosis and treatment of ASD. Difficulties in sensory responsiveness are often among the first indicators of autism noticed by parents, and therefore, may be useful to facilitate early diagnosis and intervention (Baker et al. 2008). The earlier a disorder

is recognized, the earlier a child is able to receive help, and the more effective outcomes of treatment can be achieved.

Additionally, the relationship between sensory modulation and other autistic traits seems more important than previously recognized and addressing sensory responsiveness issues in children with ASD may be more critical than previously understood. atypical scores from multisensory responsiveness, and responsiveness of the proximal senses of oral sensory/ olfactory and touch as the strongest predictors of greater social impairment in the participants. This study would increase the understanding of OT practitioner on differential associations of sensory responsiveness with autism and could contribute to development of intervention linking sensory processing with social, communication, and language functioning in children with autism. It would help OT practitioner in assessing sensory processing patterns in young children with autism for earlier identification of children with a poor prognosis for later social and/or communicative competence. This may offer sensory implications for diagnosis and intervention addressing social issues in children with ASD for OTs.

Conclusion

Atypical sensory responsiveness is often one of the first signs that parents notice in their children with autism, and therefore, may facilitate early diagnosis and intervention. Atypical responses to multi-sensory, touch, and oral sensory/olfactory stimuli were identified as possible predictors of social severity.

Conflict of Interest: NIL

Ethical Clerance: Proposal presented in SRM College of Occupational therapy, SRMIST.

Source of Funding: Self

References

1. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed. Washington, DC: American Psychiatric Association; 1994.
2. Dr.U.Ganapathy sankar, Monisha.R: Evaluation of Cardio-Vascular Risk in Children with Developmental Coordination Disorder in Indian Context- Pilot Study: Research J. Pharm. and Tech. 11(12): December 2018
3. Ganapathy sankar, Monisha.R .Life Impact of Developmental Coordination Disorder:Qualitative Analysis of Patient and Therapist Experiences. Biomedical & Pharmacology Journal, March 2019. Vol. 12(1), p. 491-494. http://dx.doi.org/10.13005/bpj/1666
4. Baranek GT, David FJ, Poe MD, Stone WL, Watson LR. The Sensory Experiences Questionnaire: Discriminating response patterns in young children with autism, developmental delays, and typical development. Journal of Child Psychology and Psychiatry. 2006;47:591–601.
5. Constantino JN, Gruber CP, Davis S, Hayes S, Passanant N, Przybeck T. The factor structure of autistic traits. Journal of Child Psychology and Psychiatry. 2004;45:719–726
6. Constantino JN, LaVesser PD, Zhang Y, Abbacchi AM, Gray T, Todd R. Rapid quantitative assessment of autistic social impairment by classroom teachers. Journal of the American Academy of Child and Adolescent Psychiatry. 2007;46:1668–1676
7. Brown C, Dunn W. Adolescent/adult sensory profile user's manual. San Antonio, TX: Psychological Corporation; 2002

Factors Associated with Work Fatigue in the Fuel Truck Drivers at Oil Company Padalarang

Aditiyana Eka Saputra[1], Budi Hartono[2], Dyan Nugrahaeni[3], Novie Mauliku[3]

[1]Postgraduate student of Public Health Sciences, Department of Environmental Health, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia, [2]Department of Environmental Health, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia, [3]Public Health Study Program, Health Science College of Jenderal Achmad Yani Cimahi

Abstract

Fatigue can affect work productivity. Based on data obtained from Oil Company Padalarang in 2013 had 16 fuel truck accidents, work fatigue factor ranks 4th (25%). This study aims to determine the factors associated with work fatigue in fuel truck drivers Oil Company in 2015. The research design used was analytic survey study with Cross Sectional research design. With the number of cases 60 respondents, sampling techniques using Quota Sampling. Data collection using reaction timer, questionnaires and interviews. Data analysis using univariate and bivariate (Chi-Square) analysis. The results showed a description of work fatigue 61.7%, age at risk (≥40 years) 65.0%, abnormal nutritional status 45.0%, work period (≥5 years) 63.3% and heavy workload 38.3 %. It is known that there is a relationship between fatigue and age with P Value (0.002), work period with P Value (0.001), workload with P Value (0.018) and there is no relationship between work fatigue and nutritional status with P Value (0.936). It is recommended to provide a resting place for fuel truck drivers, making a policy to regulate the distance of fuel delivery between drivers who are old and young, do a health check before and after sending fuel and maintain a pattern of rest or sleep for fuel truck drivers.

Keywords: *Work Fatigue, Fuel Truck Drivers, Oil Company, Reaction Timer.*

Introduction

Fatigue is a condition that is often found in every worker, fatigue is one of the causes most often felt or experienced by each worker. Fatigue can occur anywhere and anytime, and in various kinds of work. Work exhaustion cannot be clearly defined but can be felt by workers [1]. Fatigue also has significant consequences for society. Several studies have showed that fatigue sustained for a long time can predict future morbidity and mortality [2]. Fatigue also can result in declines in worker productivity due to the debilitating nature of fatigue [3].

Corresponding author:
Aditiyana Eka Saputra
Address: Faculty of Public Health, Universitas Indonesia, Campus UI Depok 16424, Indonesia
E-mail: aditiyanaputra@gmail.com

Based on the International Labor Organization (ILO) in 2013, every year as many as two million workers die from workplace accidents caused by fatigue. The study stated that of the 58,115 samples, 32.8% of them or about 18,828 samples suffered from fatigue. Data from the Ministry of Manpower and Transmigration of Indonesia (DEPNAKERTRANS) about workplace accidents in 2004, in Indonesia every day there were 414 workplace accidents, 27.8% due to high fatigue, 9.5% or 39 people experiencing disabilities. Data from the Indonesian Central Bureau of Statistics (BPS) in 2012 has occurred 117,949 cases of workplace accidents with a total death of 25% and it is predicted that this number does not include the types of work accidents that are not reported (http://bps.go.id, obtained on April 5, 2015).

Fatigue experienced by workers is caused by a variety of factors, both internal self-factors (age, nutritional status) and external factors (work period, workload). Factors that affect work fatigue are internal factors and external factors. Which includes internal

factors include: somatic factors or physical factors, nutrition, gender, age, knowledge and lifestyle. Whereas external factors are physical conditions of the work environment, including: noise, temperature, lighting, chemical factors, biological factors, ergonomic factors, occupational categories, nature of work, company discipline or regulations, wages, social relations and work position or position [4]

A number of previous studies have indicated that fatigue is one of the most significant factors that contribute to accidents on the job: people who are tired often fail to take safety precautions [5]. A comprehensive study of accidents showed that 58 percent of commercial vehicle crash were caused by fatigued workers in the workplace.[6]

Data obtained from Oil Company Padalarang (2013) that there have been 105 truck accidents in the working area of Oil Company Padalarang 2010-2013. The data shows that the number of truck accidents at Oil Company Padalarang ranks third (11%) of 22 Fuels terminals managed by Oil Company throughout Indonesia. Reports in 2013 showed that there had been 16 oil truck accidents which caused 6 people to be injured and 2 people died from fatigue factors ranked 4th (15%) after human error, vehicle conditions, and road factors as well as temporary cost losses of Rp. 73,089,750.

The results of a preliminary study of work fatigue using Lakassidaya's L77 Reaction Timer were carried out on 10 fuel truck drivers Oil Company Padalarang in 2015, of which 10 drivers were carrying out work fatigue with an average score above 300,0 milliseconds and 3 others did not experience work fatigue.

Method

This study uses a cross-sectional design and was conducted in May 2015 at Oil Company in the Padalarang. The respondents in this study were fuel truck drivers. The population was 152 drivers and in this study 60 drivers were used as research samples. The cross sectional design used in this study aims to link work fatigue associated with internal factors (age, nutritional status) and external factors (work period, workload) on fuel trucks drivers at Oil Company Padalarang in 2015. In sampling the researcher used quota sampling technique that is sampling technique by setting a certain amount as a target that must be met in sampling from the population [7].

This study uses the Chi-Square test and uses the significance limit of α (alpha) = 0.05 and 95% convidence interval. The primary data of work fatigue is measured by the Reaction Timer, which is to measure fatigue in BBM truck drivers by looking at the driver's excitement towards sound and light stimuli from the Reaction Timer tool. Age by asking the respondent directly and by looking at his identity card (KTP). To measure the nutritional status of the fuel truck drivers based on Body Weight and Height using set of scales and microtoa. To measure the workload of fuel truck drivers by calculating the driver's heart rate/pulse in one minute or by using a digital tensimeter that directly displays the driver's heart rate.

Result

The results of the research are the relationship of internal factors (age, nutritional status) and external factors (work period, workload) with work fatigue on fuel trucks drivers at Oil Company Padalarang using univariate analysis to see an overview of frequency distribution and percentage, and bivariate to see the relationship between independent variables and dependent variables using Chi-Square analysis.

Table 1. Frequency Distribution of Factors Associated with Work Fatigue in The Fuel Truck Drivers at Oil Company Padalarang

Variable	Frequency (N)	Percentage (%)
1. Work Fatigue • Fatigue • Not fatigue	 37 23	 61,7 38,3
Total	60	100

Cont... **Table 1. Frequency Distribution of Factors Associated with Work Fatigue in The Fuel Truck Drivers at Oil Company Padalarang**

2. Age • At risk (≥40) • Not at risk (<40)	39 21	65,0 35,0
Total	60	100
3. Nutritional Status • Abnormal • Normal	27 33	45,0 55,0
Total	60	100
4. Work period • ≥5 years • <5 years	38 22	63,3 36,7
Total	60	100
5. Workload • Heavy • Thin	23 37	38,3 61,7
Total	60	100

Based on table 1. It was found that fuel truk drivers who experienced fatigue were 37 people (61.7%). Drivers of trucks over 40 years old were 39 people (65.0%), while overcrowded fuel truck drivers (overweight) were 27 people (45.0%). Fuel truk drivers who worked more than 5 years were 38 people (63.3%), while the Fuel truk drivers whose workload was heavy were 23 people (38.3%).

Table 2. Result Relationship between Age, Nutritional Status, Work Period and Workload with Work Fatigue in The Fuel Truck Drivers at Oil Company Padalarang

	Work Fatigue				Total		OR (95% CI)	P Value
	Fatigue		Not Fatigue					
	n	%	n	%	N	%		
Age								
1. At risk (≥40 yrs)	30	76,9	9	23,1	39	100	2,308 (1,231-4,328)	0,002
2. Not at risk (<40 yrs)	7	33,3	14	66,7	21	100		
Total	37	61,7	23	38,3	60	100		

Cont... **Table 2. Result Relationship between Age, Nutritional Status, Work Period and Workload with Work Fatigue in The Fuel Truck Drivers at Oil Company Padalarang**

Nutritional Status								
1.	Abnormal	16	59,3	11	40,7	27	100	0,931 (0,621-1,937)	0,936
2.	Normal	21	63,6	12	36,4	33	100		
Total		37	61,7	23	38,3	60	100		
Work Period									
1.	≥5 Years	30	78,9	8	21,1	38	100	2,481 (1,317-4,674)	0,001
2.	<5 Years	7	31,8	15	68,2	22	100		
Total		37	61,7	23	38,3	60	100		
Workload									
1.	Heavy	19	82,6	4	17,4	23	100	1,698 (1,161-2,484)	0,018
2.	Light	18	48,6	14	51,4	37	100		
Total		37	61,7	23	38,3	60	100		

Based on table 2 the relationship between the age of fuel truck drivers and the work fatigue occurs was found that as many as 30 fuel truck drivers (76.9%) over the age of 40 experienced work fatigue, based on the results of statistical analysis, the OR value = 2,308 (95% CI: 1,231-4,328) means that the fuel truck drivers aged over 40 years have a risk of 2.3 times experiencing work fatigue compared to fuel truck drivers aged under 40 years.

The relationship between nutritional status of fuel truck drivers and work fatigue was obtained by 16 fuel truck drivers (59.3%) who were abnormally weight, the results of statistical tests show no relationship (P = 0.936) between fuel truck drivers with the nutritional status.

The relationship between work period of fuel truck drivers and the work fatigue was found that as many as 30 fuel truck drivers (78.9%) who worked more than 5 years and above experienced work fatigue, based on the results of statistical analysis, the OR value = 2.481 (95% CI: 1,317-4,674) means that fuel truck drivers who work more than 5 years and above risk 2.4 times experiencing work fatigue compared to fuel truck drivers who work under 5 years.

The relationship between workload of fuel truck drivers and work fatigue was obtained that as many as 19 fuel truck drivers (82.6%) who had a heavy workload experienced work fatigue, based on the results of statistical analysis, the value of OR = 1,698 (95% CI: 1,161-2,484) means that fuel truck drivers with heavy workloads have a risk of 1,6 times experiencing work fatigue compared to fuel truck drivers with light workloads.

Discussion

Based on the results showed fuel truck drivers who experienced fatigue were obtained as many as 37 drivers and 23 drivers did not experience fatigue in work. Fuel truck drivers who experience fatigue in work are caused

by several factors including age, nutritional status, work period and workload, besides that there are other factors that influence it also to cause the occurrence of work fatigue as a condition of poor drivers caused by lack of rest, suffer from certain diseases, the distance of sending BBM/Fuel is far enough to be delivered plus road conditions that allow to increase driving fatigue (quite long congestion, damaged road conditions, etc.), weather conditions. Drivers often do not realize the fatigue they experience and the longer they are left to have a negative impact, namely the occurrence of chronic fatigue, this is possible because of their minimal level of knowledge about occupational safety and health and allows for accidents to occur at work. Tiredness, although a synonym for fatigue, may not encompass all aspects of fatigue (e.g. weakness or cognitive fatigue).[8]

Age has a significant relationship with work fatigue. The results of the analysis of the relationship between the age of fuel truck drivers and work fatigue on 60 respondents found that, as many as 30 drivers over the age of 40 experienced work fatigue. The results of the analysis prove that the driver of a fuel tank truck with an age of more than 40 years is very risky for the occurrence of work fatigue, because the more a person's age increases, the ability of his organs will also decrease. The results of this study are in line with age directly influences strength muscle which then affects physical ability labor to work. Muscle strength in men and women around the age of 25-35 [9]. Also, Study found that almost 30% of the participants in Chinese study population had experienced fatigue, and fatigue is associated with age, marital status, employment status, regular exercise, number of self-reported chronic diseases, number of individual's children and hospitalization in the last year in middle-aged and elderly males [10].

Nutritional status does not have a meaningful relationship with work fatigue. The result of the analysis of the relationship between the nutritional status of fuel truck drivers and work fatigue was found that as many as 16 drivers who were abnormally heavy experienced work fatigue. The researcher argues that nutritional status is not related to the occurrence of fatigue due to the results of BMI which shows that the majority of respondents were normal nutritional status and experienced fatigue. Another factor, which is when the driver starts shipping, looks tired and most of the driver does not rest properly when finished sending. This research is in line with the research conducted by [11] on factors related to work fatigue in sewing workers in the sewing section at CV. Aneka Garment Gunungpati Semarang, the results showed that nutritional status was not related to work fatigue, normal nutritional status was 25 (80.6%). Also, Nutritional status may influence fatigue levels [12]Korea. Fatigue was measured using Piper's Fatigue Scale (PFS, but The high level of work fatigue is only experienced by workers with energy intake in the less category [13]it will affect of the worker's health condition. Work fatigue can be affected by several factors, some of which are energy intake and nutritional status. Objective: The aim of this research was to analyze the correlation between the adequacy of energy intake and nutritional status with the level of work fatigue. Methods: This study was an analytic observational, used cross sectional study with 33 sample from 48 workers of cocoa powder production PT. Multi Aneka Pangan Nusantara Surabaya selected by simple random sampling. Data were collected by food recall 2X24 hours for energy intake, measuring weight and height for nutritional stastus and Industrial Fatigue Research Committee (IFRC. And in other studies explained older adults with undernourishment in the present study were not experiencing tiredness in activities of daily living [14]the information regarding the association between nutritional status and physical performance does not provide a complete picture. Most studies used limited or self-reported measures to evaluate physical performance. The objective of this study was to examine the correlation between nutritional status and comprehensive physical performance measures among undernourished older adults who reside in residential institutions.\\n\\nMETHODS: Forty-seven older adults (26 males, 21 females.

The work period has a significant relationship with work fatigue. The results of the analysis of the relationship between the working period of fuel truck drivers and work fatigue obtained that as many as 30 drivers who worked more than 5 years and over experienced work fatigue. The results of the analysis prove that fuel truck drivers with long working periods will easily experience work fatigue, although many argue that the longer a person's work is, the better their skills will be, but according to the researchers it shows the influence of the length of work of workers with fuel truck driving that are carried out tend to be monotonous so that they will affect the physical and muscle conditions that work statically. The results of this study are in line with working period has a significant effect on work fatigue, which means that the working period increases it will increase work fatigue. Work period is the accumulation of time the worker has

held the job [9]. Also, work period may affect workers both positively and negativel. A longer work period could have a positive impact through the greater amount of experience the worker gains, while conversely it could have a negative impact through causing increased fatigue and boredom [15].

Workload has a meaningful relationship with work fatigue. The results of the analysis of the relationship between the workload of fuel truck drivers and work fatigue was found that as many as 19 drivers who had a heavy workload experienced work fatigue. The analysis proves that fuel truck drivers with heavy workloads will be more susceptible to work fatigue, according to researchers, this is influenced by physical environmental conditions that tend to be hot and also affected by road / traffic conditions such as congestion and others that can cause work fatigue. The results of this study are in line with the physical workload is significantly related to general, physical and mental fatigue but the association was weakest with mental fatigue. This suggests that physical workload primarily affects the physical experience of tiredness and fatigue [16]9.05 (SD 3.36. And Also, workload increased over the working week and the rating of workload was associated with fatigue which in turn was associated with higher risk of an incident as indicated by the HSE risk Index [17].

Conclusion

Based on the results of research and discussion about factors related to work fatigue in fuel truck drivers at Oil Company Padalarang 2015, conclusions were obtained that there was a significant relationship between age, work period and workload with work fatigue and in this study nutritional status had no effect on work fatigue.

Acknowledment: In this study I was assisted to be loaned by the Reaction Timer tool by Ms. Dr. Gurdani Yogisutanti, SKM., M.Sc. This Study uses personal funds and there are no sponsors from any party.

Ethics Approval: The study protocol was approved by the Ethics Committee of Public Health Faculty, Universitas Indonesia, Depok, Indonesia.

Conflict of Interest: No conflict interests.

References

1. Grandjean K&. Fitting the Task to the Human. fourth. Group T& F, editor. London & New York: Taylor & Francis Group; 2005. 191 p.
2. Jason L, Corradi K, Gress S, Williams S, Torres-Harding S. Causes of death among patients with chronic fatigue syndrome. Health Care Women Int. 2006;27(7):615–26.
3. IJ Kant, U Bültmann, K A P Schröer, A J H M Beurskens LGPM van A, Swaen GMH. An epidemiological approach to study fatigue in the working population. Occup Environ Med. 2003;60 Suppl 1(April 2016):i54–61.
4. Suma'mur PK. Higiene Perusahaan dan Kesehatan Kerja. Jakarta: Sagung Seto; 2014.
5. Azwar A, Susilowati IH, Dinar A, Indriyani K, Wirawan M. Impact of Work-related and Non-work-related Factors on Fatigue in Production/ Shift Workers. KnE Life Sci. 2018;4(5):213.
6. Williamson A, Lombardi DA, Folkard S, Stutts J, Courtney TK, Connor JL. The link between fatigue and safety. Accid Anal Prev [Internet]. 2011;43(2):498–515. Available from: http://dx.doi.org/10.1016/j.aap.2009.11.011
7. Nugrahaeni, D K & Mauliku N. Metodologi Penelitian Kesehatan. 1st ed. Cimahi SAY, editor. Cimahi: Cimahi Press; 2011.
8. Susan E Hardy and Stephanie A Studenski. Author Manuscript Fatigue and Function over Three Years among Older Adults. J Gerontol. 2009;63(12):1389–92.
9. Lusiana D, Zahroh S, Baju S. Penyebab Kelelahan Kerja pada Pekerja Mebel Factors Caused Fatigue among Furniture Workers. J Kesehat Masy Nas. 2014;8(8):386–92.
10. Lin WQ, Jing MJ, Jie-Tang, Wang JJ, Zhang HS, Yuan LX, et al. Factors associated with fatigue among men aged 45 and older: A cross-sectional study. Int J Environ Res Public Health. 2015;12(9):10897–909.
11. Januar Atiqoh, Ida Wahyuni DL. Faktor-Faktor yang Berhubungan dengan Kelelahan Kerja pada Pekerja Konveksi Bagian Penjahitan di CV. Aneka Garment Gunungpati Semarang. J Kesehat Masy Nas. 2014;02(1):13–20.
12. Yang YH. Relationship Between Fatigue and Nutritional Status in Patients with Cancer Undergoing Radiotherapy. J Korean Acad Nurs. 2003;33(4):478.
13. Arini Rahmatika Sari, Lailatul Muniroh. Hubungan Kecukupan Asupan Energi dan Status Gizi dengan Tingkat Kelelahan Kerja Pekerja Bagian Produksi

(Studi di PT. Multi Aneka Pangan Nusantara Surabaya). Amerta Nutr. 2017;1(4):275–81.

14. Singh DKA, Abd Manaf Z, Shahar S, Yusoff NAM, MUHAMMAD NA, Phan MF. Correlation between nutritional status and comprehensive physical performance measures among older adults with undernourishment in residential institutions. Clin Interv Aging. 2014;1415.
15. Saftarina F, Mayasari D, Vilia A. Analysis of Factors Correlated to Work Fatigue of Hospital Nurses in Bandar Lampung. KnE Life Sci. 2018;4(4):375.
16. Remmen LN, Herttua K, Riss-Jepsen J, Berg-Beckhoff G. Fatigue and workload among Danish fishermen. Int Marit Health. 2017;68(4):252–9.
17. Andrew P. Smith and Hugo N. Smith. Workload, fatigue & performance in the rail road industry. United Kingdom: Springer International Publishing AG 2017;

Health and Safety Risk Analysis in the Fertilizer Industry

Ana Islamiyah Syamila

Lecturer, Department of Public Health, University of Jember, Indonesia

Abstract

Background: There are high risks and potential hazards in the process of making Zwavelzuur Kalium (ZK) fertilizer. The risk varies according to the chemical used in the process. Identification of potential hazards and risks is required periodically to control the risks

Objectives: To identify the potential hazards and risks in the process of making ZK fertilizer and to control the risk

Methodology: This study is an observational study to observe the process of making ZK fertilizer and to conduct occupational health and safety risk management

Results: There are various hazards can occur in ZK production including chemical hazards such as hazardous, toxic, reactive, irritant, and corrosive as well as physical or mechanical hazards which include altitude, machinery, equipment, noise, and temperature

Conclusion: The highest risk assessment results on ZK production are in the reactor unit, which causes the risk of explosion. Risk control refers to the principle of the control hierarchy

***Keyword**: fertilizer, risk, potential hazard, safety, and health risk management*

Introduction

The production of ZK fertilizer is through several stages, which are quite long: raw material preparation, reaction process, cooling and neutralization, bagging, scrubber, or absorber.

ZK fertilizer produces with raw material is 98% liquid Sulfuric acid (H_2SO_4) and Potassium chloride (KCl) powders. The raw material is mixed in a reactor and heated in a furnace that operates at 500^0C. The reaction from mixing the two raw materials is $2KCl + H_2S0_4 \rightarrow K_2S0_4 + 2\ HCl$. So the product from the mixing of raw materials is K_2SO_4 or ZK fertilizer, and the by-product is liquid hydrochloric acid (HCl).

The Globally Harmonized System of Classification and Labeling of Chemical (GHS) and the Department of Transportation (DOT) classify sulfuric acid in transport pictograms as class 8 hazardous substances, corrosive. The definition of corrosive is where the chemical causes damage to the wound to the skin tissue with an exposure time of fewer than 4 hours, or the chemical can cause corrosion in equipment either steel or aluminum with an area of more than 6.25 mm per year at 55^0C.

The International Agency for Research on Cancer (IARC), the International Agency for Research on Cancer, has concluded that there is sufficient evidence that fog-containing sulfuric acid exposure is carcinogenic in humans[1].

Another raw material in making ZK fertilizer is Potassium chloride (KCl) in the form of white powder. These chemicals are classified as health hazards with code number 1 by NFPA 704, which means that KCl can irritate, even with minor injuries. In the process, KCl move through a bucket elevator and conveyor belt to the reactor mixing between raw materials.

ZK fertilizer that comes out of the furnace with a temperature of 300^0C will be cooled by jet ejector cooler to 50^0C by contacting ZK with water. ZK fertilizer is then transported by bucket elevator and entered in the sieving stage (screener) separate between oversize and on size products. Oversized products will be included in the crusher to be mash into products that are on size. K_2SO_4 or ZK fertilizer has the same danger as Potassium

chloride (KCl), which irritates.

ZK products which are on size will be neutralized to produce ZK, which is free acid with the supporting material, namely Sodium carbonate (Na_2CO_3). Na_2CO_3 has the same danger as KCl and K_2SO_4 that is irritating. NFPA 704 classifies it into health hazards with code number 2, prolonged and repeated exposure can cause residual injury.

Furthermore, the finished ZK fertilizer will store in a silo before being packaged in a bagging unit. Semi-automatic packaging equipment is used where workers simply place the bag under the scales and handle the bag during sewing. Surely there are dangers in the packaging area where workers can be exposed to ZK dust or expose to the worker's body parts.

The side product of the ZK Plant is Hydrochloric acid (HCl), which is liquid and colorless and has a pungent odor typical of hydrochloric acid. Chloride acid has the same classification as sulfuric acid, according to GHS, which include in Transport Information Class 8 (corrosive). NFPA 704 also classifies the same health hazard between hydrochloric acid and sulfuric acid, plus the special code for hydrochloric acid, corrosive.

HCl coming out of the furnace will be cool by graphite cooler, which will change the original temperature of 400^0C to 50^0C by contacting HCl with water before the HCl enters the scrubber. Scrubber sulfuric trace removal has the function of capturing a mixture of HCl gas and SO_3 exhaust gas from the reactor. After that, the HCl that enters the absorber will be absorbed again by the gas to get HCl liquid. Pumps are used to pump water into the scrubber, which will be used to absorb HCl vapor. HCl scrubber reabsorbs the HCl gas fume before releasing it into the atmosphere. The absorber reabsorbs HCl, which still escapes. HCl concentrations of 33-40% are collected in HCl containers before the product pump into a distribution vehicle.

The chemical properties of the raw materials and the products produced have each hazard characteristics that can threaten the safety and health of the workforce, so it needs to consider properly. Appropriate identification and control with the existing hazards will give good results too.

Risk management is a coordinated activity to direct and control an organization in managing risks[2]. OHS risk management is an effort to manage OHS risk to prevent unwanted accidents in a comprehensive, planned, and structured manner in a good system. OHS risk management is related to hazards and risks that exist in the workplace that can cause losses for companies[3].

According to AS/NZS 4360 Risk Management Standard, risk management is the culture, process, and structures direct towards the effective management of potential opportunities and adverse effects [4].

The first step in the risk management process is to identify workplace hazards or places that are likely to suffer damage[5].

Hazards identification is a process that can be done to recognize all situations or events that have the potential to cause workplace accidents and diseases that may arise in the workplace[6].

Risk is a possibility of an accident or loss at a certain period of time or a certain operating cycle while the level of risk is a multiplication between the frequency and frequency (consequence) of an event that can cause loss, accident, or injury and illness that may arise from exposure to a hazard in the workplace[7].

Risk assessment is part of the activities of the risk management process, which includes the entire process of analyzing risks in the form of activities using information that is available systematically to determine the level of frequency an event might occur and the impact or influence that will arise, while risk evaluation is a process that used to determine the priorities used by risk management by comparing the level of a risk with standards, targets or other criteria predetermined by management[8].

The steps for conducting a risk assessment are[6]: estimates of the frequency or frequency of accidents or occupational illnesses, estimate the severity of the accident, determining the level of risk using a risk matrix. After determining the level of risk, the risk priority scale must make for each potential hazard identified to prepare a risk control plan.

Risk control must be implemented to reduce risk to acceptable limits based on applicable rules, regulations, and standards. In introducing a risk control tool, one must consider whether the risk control tool is applicable and can provide benefits to each workplace

The hierarchy of risk control sequentially starts from elimination, substitution, engineering control,

administrative control, and personal protective equipment.

Material and Method

Data collection at the time of this research was carried out by two methods, namely primary data and secondary data. Primary data such are preliminary observations about the general condition of the company, observation regarding hazard identification, risk assessment and risk control in the production area, and interviews with relevant workforce such as employees in the safety department and safety officer in the production area

Secondary data collection is a general description of the company and data on Occupational Safety and Health. A literature study was also carried out to complete the standard implementation of the identification of potential risk hazards.

Findings

Health and Safety Risk Management start from the identification of potential hazards and risks, which are then assessed to determine the control plan that is appropriate to the level of risk that has been obtaining. The author divides the dangerous areas in making ZK fertilizer into six areas which are discussed in detail one by one as follows

Reactor Unit

Risks that occur from natural gas and diesel fuel are burning or exploding. The risk of explosion certainly has a greater impact than burning. Determining the scale of the measurement of the impact of the risk of explosion is 5 (catastrophic), that is, the impact is very significant or very large on labor or humans (death). But for the opportunity is determined by a scale of 1 (rare) because the possibility of occurrence is very slight or rare (0-1 times occur every year).

The risk level is high, which means that control must be carried out to the ALARP stage or as low as possible. Control that can do is to regularly check the vacuum of the burner chamber or hallway, check line leakage, and administratively perform safety permits correctly.

Determining the scale of the measurement of the impact of fire is 3 (moderate), the moderate impact on labor or humans (injury and unable to work). The probability of a fire occurring in this unit is impossible (2), which is the likelihood that it will be small or occasional The level of risk is the medium and efforts that make at Petrochemicals in addition to equipment maintenance efforts are the availability of fire hydrants, and fire extinguisher is also carried out to cope if a fire occurs.

The risk of inhalation of H_2SO_4 vapor occurs in workers who clean or repair H_2SO_4 tanks. The danger from these chemical vapors is corrosive to the respiratory tract, which is characterized by coughing and shortness of breath. Corrosive effects can also occur in the nasal passages with epistaxis or nosebleeds if workers expose for prolonged, repeated or high concentrations.

Workers can also be inhaled H_2SO_4 vapor when opening the storage tanks, and the worker does not use the mask correctly. Petrochemical has provided masks to every worker, which is a chemical cartridge that can clean gases or vapors by flowing air containing toxic gases or vapors through the cartridge.

Control efforts that can do are the availability of exhaust ventilation to keep the concentration of exposure below the threshold. The provision of eyewash and safety shower in the work area contained H_2SO_4. Other efforts are the use of masks that are correct and appropriate and training of employees for the first countermeasures if there is a risk in the area.

The risk of splashing or splashing of H_2SO_4 can occur in workers working in the area around the tank and leaking piping. This risk has a more immediate effect because it hits the limb directly and can cause burns. For this reason, the first control effort is to carry out routine maintenance of all equipment used to avoid leakage. If a spill occurs, the spill can neutral with a solution of soda or lime before being doused with water.

The process of transporting KCl using bucket elevators and conveyor belts has the risk that workers can be inhaled by KCl dust, exposed to the skin, and exposed to the eye. The control effort that can do is to make engineering efforts by closing the belt conveyor area and providing local exhaust ventilation to keep KCl dust exposure below the threshold. The area must also equip with an eyewash or safety shower. Besides that, another effort is the use of dust counter correctly and correctly. Other risks related to safety are also present in this process including being sandwiched into a conveyor belt. Control efforts that can do are the installation of safety on the tool.

The next process is the reaction between raw materials in the reactor that has the risk of heat, burning, or explosion. Controlling efforts that can do is to check the burner chamber or hall routinely, pre-start a safety review must be carried out, and check the feed ingredients to avoid the inclusion of flammable materials into the reactor. Also, fire protection systems, such as fire hydrants and fire extinguishers, must provide. Related to drinking water also must be considered for workers in the furnace area to avoid destruction and heat stroke.

Ejector Refrigerator

The risk that can occur in this unit is the temperature of heat produced by K_2SO_4 coming out of the furnace with a temperature of 500^0C. Transporting that must do is routine maintenance of ships or pipelines that transport K_2SO_4 before entering the refrigeration unit. The risk of noise can also occur due to engine noise. Repairing with a personal protection device such as earmuffs must be done besides caring for the engine to reduce approval. Petrochemical has implemented this regulation in which every area with more than 25 dB approval is given a safety sign for mandatory use of earmuffs, and every worker equips with the PPE.

Screening and Crusher

At this stage, the most visible risk is the presence of ZK dust due to machines that are not completely closed. Potassium sulfate has the same dangerous properties as potassium chloride, which causes minor irritation. The control is including the availability of exhaust ventilation in the area to keep the air concentration below the threshold value. So, workers must give dust masks, and their use must be appropriate and correct.

Neutralizer

At this stage, there is a process that produces a supporting material, namely sodium carbonate or potassium carbonate, to produce acid-free ZK products. The addition of this product also has advantages caused by dust due to its powder form. The dust of these two chemicals contains properties with potassium chloride or potassium chloride, which cause health effects in the form of minor irritations. Although the impact caused is quite small, of course, repairs must be made to protect workers from dust.

Silo and Bagging Units

ZK fertilizer that has become a finished product is then stored in a silo or temporary tank before the packaging process is carried out. The danger in this area is due to using opened tanks or ZK products coming out of the tank for the packaging process. The packaging process uses a semi-automatic packaging unit that still uses workers to install the machine sewing process. The main danger that arises is that workers can be sewn at any time if the worker is too slow or not concentrating on the work. The control that can do is shift work and rest 10 minutes every 1 hour to work for freelancers

Graphite Cooler, Scrubbing System and HCl Tank

Hydrochloric acid has special properties with sulfuric acid, which functions as a corrosive, so controlling what to do is the same as controlling sulfuric acid chemicals. Workers can be inhaled HCL vapor, which will release into the air in a scrubbing system. Workers can also get the splash or splash hydrochloric acid during the process of loading and unloading into the transport truck. Work at heights that are at risk Workers above if they do not use appropriate protective equipment that is utilizing the entire body.

Providing education related to the hazards that exist in each production process is needed so that workers know the dangers and that there are. If the worker understands, there will be more vigilance from the worker. Training against the use of personal protective equipment must also carry out so workers can use it properly and appropriately.

Conclusion

Based on the identification of hazards that have been carried out, then a risk analysis is carried out using the risk matrix. Petrochemical refers to the Australian Standards / New Zealand Standards 4360 qualitative risk analysis techniques. The risk assessment determines by determining the risk impact criteria and risk opportunities on a scale of 1-5. The highest risk assessment results on ZK production are in the reactor unit, which causes the risk of explosion.

Risk control refers to the principle of the control hierarchy, starting from elimination, substitution, engineering, administration, and personal protective equipment.

Conflict of Interest: None

Source of Funding: None

Ethical Clearance: Not required, as the research article is based on health and safety of fertilizer production and not an experiment or human research.

Reference

1. OSHA. Chemical sampling information sulfuric acid. United State Department of Labor. Internet. 2018. Available from: https://www.osha.gov/chemicaldata/chemResult.html?RecNo=624
2. International Standard. ISO 31000: Risk management-principles and guidelines. Geneva: ISO. 2009
3. Ramli, S. Pedoman praktis manajemen resiko dalam prespektif k3 ohs risk management. Jakarta: Dian Rakyat Publisher. 2010: 32-38
4. AS/NZS 4360 Australian standards and New Zealand standards. Risk management guidelines. Sidney: NSW. 2004: 52-55
5. Suardi. Sistem manajemen keselamatan dan kesehatan kerja Jakarta: PPM publisher. 2005
6. Tarwaka. Keselamatan dan kesehatan kerja: manajemen dan implementasi k3 di tempat kerja. Surakarta: Harapan Press. 2014
7. ABS. Risk assessment applications for the marine and offshore oil and gas industries. New York American Bureau of Shipping. 2005: 2; 13-17
8. Ramli, S, 2010. Sistem manajemen keselamatan dan kesehatan kerja OHSAS 18001. Jakarta: Dian Rakyat Publisher. 2010: 27-37.

Maternal Behavior of Child Malocclusion Dental Treatment in Gayungan Health Center Surabaya

Ananda Firman Putranto, Thalca Hamid[2], Gilang R. Sabdho Wening[3], Dinna Fitria Greisya[4], Amalia Wimarizky[4], Aisyah Marwah[4], Muhammad Faisal[5]

[1]Lecturer, [2]Professor, Department of Orthodontic, Faculty of Dental Medicine Universitas Airlangga Surabaya-Indonesia, [3]Lecturer, [4]Post Graduate Dental Student, [5]Dental Student, Departement of Public Health, Faculty of Dental Medicine Universitas Airlangga, Surabaya-Indonesia

Abstract

Context: based on Gayungan Health Center Surabaya's patient visit data obtained from April-June 2018 primary teeth persistence is the most common dental case, with percentage 42.6% in April, 20.8% in May and 48.6% in June. The most common cause of primary teeth persistence is the absence of successor permanent teeth. It has connection with the physiological process of primary tooth shed and change to permanent teeth, which occurs to the school-age children, and requires more attention from parents to take care of their children's dental health.

Aims: To determine the effect of maternal behavior and sociodemographic factors on child malocclusion dental treatment in area of Gayungan Health Center Surabaya.

Methods and Material: This research is an analytic-observational study. Using instruments in the form of questionnaire that developed from the Theory of Planned Behavior. Results: poor maternal knowledge of dental health may results to not to bring the child to get malocclusion treatment.

Results: poor maternal knowledge of dental health may results to not to bring the child to get malocclusion treatment

Conclusions: perceived control of orthodontic treatment history (perceived control that characterized by history of orthodontic treatment?), maternal's level of knowledge, usage of health insurance, and maternal's perceptions of the child's dental condition have the opportunity to influence the maternal behavior to make dental visit to get malocclusion treatment.

Key-words: *maternal behavior, child malocclusion, Gayungan Health Center, Theory of Planned Behavior*

Introduction

The results of the 2013 Basic Health Research (RISKESDAS), the percentage of people who have dental and mouth problems according to Riskesdas in 2007 and 2013 increased from 23.2% to 25.9%. This can be caused by several factors, one of which is the lack of public knowledge and awareness of the importance of maintaining oral and dental hygiene.[1]

Based on data from the Gayungan Surabaya Health Center, monthly patient visits were obtained from April to June 2018. From these data it can be seen that persistence is the most frequently encountered case at the Puskesmas, with a percentage of 42.6% in April, 30 , 8% in May and 48.6% in June. Based on preliminary survey data conducted on 151 children at SDN Gayungan 1 Surabaya, the highest percentage of persistence was found to be 37%. The second most common problem encountered is caries which is 69.58%. The last problem most frequently encountered was pulp disease and periapical tissue by 28.22%.

Corresponding Author:
Ananda Firman Putranto
Jl Prof Dr Moestopo No 47 Surabaya
E-mail: anandafirman2019@gmail.com

Persistence of deciduous teeth is a condition where deciduous teeth are not has the ability to exfoliate when it's time to exfoliate, but the permanent teeth that will replace the deciduous teeth have erupted[1]. In some cases persistence can cause clinical problems such as periodontitis, deep caries, ankylosis and even malocclusion.[1]

In connection with the physiological process of turning primary teeth into permanent teeth that takes place during school-age children, it requires more attention from parents in the dental and oral health care of their children. Until now, the knowledge that parents have about oral health is still relatively low. Parents do not apply the maintenance of children's dental and oral health properly, a reason that is often cited is because of the lack of access to information about dental and oral health maintenance, parents' busy work, high costs and so forth. Even though the behavior of parents who maintain good dental and oral health of children can affect the growth and development of permanent teeth and children's quality of life.[3]

One model used to predict behavior, including malocclusion treatment behavior is Theory of Planned Behavior , theories of attitude that is widely used in behavior. The Planned Behavior Theory is a prediction of good behavior because it is balanced by the intention to carry out the behavior[4]. In Planned Behavior Theory, the behavior displayed by individuals arises because of the intention to behave. The emergence of intention to behave is determined by three determinants, namely: (1) attitude towards behavior; (2) subjective norms; and (3) perceived perception control.[5]

Based on the survey results and background above, the author's interest arises to examine the influence of maternal sociodemographic and behavioral factors on the behavior of child malocclusion treatment to dentists in the Gayungan Public Health Center in Surabaya. Hypothesis of this research is there are influences on maternal sociodemographic and behavioral factors on the behavior of child malocclusion treatment to dentists in the Gayungan Health Center

Subjects and Methods

This research is an analytic-observational study with a cross sectional study design. The population in this study was the mother of Gayungan I Elementary School students in the Gayungan region, Surabaya city as many as 151 people. Sampling using simple random sampling method. Research subjects were asked questions by questionnaire method to find out the factors that influence the behavior of mothers bringing children to dental and oral health services in the Keputih area, Surabaya City. The questionnaire was developed based on the Theory of Planned Behavior which contains questions that contain closed ended questions. As supporting data, a check on the prevalence of malocclusion in children. Then the data obtained is processed data and results.

Findings

The research data were obtained from epidemiological studies on 18 and 20 August 2018 at SDN Gayungan 1 Surabaya. Data was collected by dental examination and questionnaires for students in grades 1-4 with an age range of 7-12 years at SDN Gayungan 1 Surabaya. The sample of this study was 151 students selected by simple random sampling.

Based on data, there is information that there is no tendency for a relationship between risk factors in academic level with orthodontic visit experience. This is indicated by the p value of $p = 0.078$. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with higher education and the lowest is the risk factor group with primary education

Based on data, there is information that there is no tendency for a relationship between risk factors in job status with orthodontic visit experience. This is indicated by the p value of $p = 0.091$. In the table illustrated, both of risk factor has the same percentage of orthodontic visit experience.

Based on data, there is information that there is tendency for a relationship between risk factors in daily working hour with orthodontic visit experience. This is indicated by the p value of $p = 0.007$. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with scheduled working hour and the lowest is the risk factor group with unscheduled working hour.

Based on data, there is information that there is tendency for a relationship between risk factors in shift working hour with orthodontic visit experience. This is indicated by the p value of $p = 0.003$. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with morning

shift working hour and the lowest is the risk factor group with afternoon shift working hour.

Based on data, there is information that there is tendency for a relationship between risk factors in salaries with orthodontic visit experience. This is indicated by the p value of p = 0.005. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with well paid salaries and the lowest is the risk factor group with under paid salaries.

Based on data, there is information that there is no tendency for a relationship between risk factors in residential with orthodontic visit experience. This is indicated by the p value of p = 0.076. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group in sub-urban residential and the lowest is the risk factor group in urban residential.

Based on data, there is information that there is no tendency for a relationship between risk factors in insurance with orthodontic visit experience. This is indicated by the p value of p = 0.098. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with covered by insurance and the lowest is the risk factor group with uncovered by insurance.

Based on data, there is information that there is tendency for a relationship between risk factors in mother orthodontic treatment experience with orthodontic visit experience. This is indicated by the p value of p = 0.000. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with mother with orthodontic treatment experience and the lowest is the risk factor group with mother wih no orthodontic treatment experience.

Based on data, there is information that there is tendency for a relationship between risk factors in family orthodontic treatment experience with orthodontic visit experience. This is indicated by the p value of p = 0.001. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with family with orthodontic treatment experience and the lowest is the risk factor group with family with no orthodontic treatment experience.

Based on data, there is information that there is tendency for a relationship between risk factors in children orthodontic treatment experience with orthodontic visit experience. This is indicated by the p value of p = 0.000. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with children with no orthodontic treatment experience and the lowest is the risk factor group with children with orthodontic treatment experience.

Based on data, there is information that there is tendency for a relationship between risk factors in dental alignment with orthodontic visit experience. This is indicated by the p value of p = 0.002. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with bad dental alignment and the lowest is the risk factor group with good dental alignment.

Based on data, there is information that there is no tendency for a relationship between risk factors in total children in family with orthodontic visit experience. This is indicated by the p value of p = 0.076. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with total children in family is 1 and the lowest is the risk factor group with total children in family more than 1.

Based on data, there is information that there is tendency for a relationship between risk factors in orthodontic treatment need basic knowledge with orthodontic visit experience. This is indicated by the p value of p = 0.004. In the table illustrated from the results of the highest orthodontic visit experience in the risk factor group with family with good orthodontic treatment need basic knowledge and the lowest is the risk factor group with bad orthodontic treatment need basic knowledge.

Discussion

The Planned Behavior Theory is a prediction of good behavior because it is balanced by the intention to carry out the behavior. In this theory, a behavior is influenced by several variables, namely attitudes that are influenced by the strength of beliefs about the behavior, subjective norms that are influenced by social pressures that motivate individuals to behave, and perceptual controls that take into account ease and difficulty factors in carrying out the behaviour [10]. In this research, it is known that actions are not influenced by intention but are directly influenced by perception control. Based on Theory of Reasoned Action (TRA) that connects beliefs, attitudes, intentions and behavior. Intention is the best predictor of behavior, meaning that if you want to know

what someone will do, the best way is to know that person's intentions. However, one can make judgments based on completely different reasons (not always based on intention).[2]

An important concept in this theory is the focus of attention (salience), which is to consider something that is considered important, namely control of perception. More simply, this theory says that a person will take an action if he views the action positively and if he believes that he can do the action. Knowledge has a direct influence on perceptual control and on behavior. The characteristics that have an influence on perception are the condition of the child's teeth, insurance, history of child stirrup, history of maternal stirrup and family stirrup history.

In this epidemiological study begins with a preliminary study to determine the severity of malocclusion in Gayungan I Public Elementary School Surabaya in the Gayungan Surabaya Public Health Center area by using the Angle classification. The number of research subjects was 151 students from classes I to IV at SDN Gayungan I Surabaya. The severity of malocclusion can be influenced by many things such as parental income, ability to buy services and participation in health insurance.

Based on the results of research and data analysis found that mothers who have insurance and do not have insurance do not visit the dentist. This is because orthodontic treatment is not included in the BPJS dependents and therefore mothers have or do not have insurance must continue to pay orthodontic treatment costs so that there is no difference with mothers who don't have insurance. History is an event that someone has experienced in interacting with their environment. An unfavorable history is soon forgotten, if it is pleasant it will become an imprint in mental emotions and eventually form a positive attitude in his life[9]. Based on the results of research and data analysis, it was found that mothers who had no history of orthodontic treatment did not visit the dentist to treat their malocclusion teeth. That is because there is no encouragement from the nearest party, namely the family to take care because of the low level of knowledge about the dentist.

Based on the results of research and data analysis, it was found that mothers who had children with poor dental conditions as much as 58.3% did not come to the dentist, while mothers who had children with good dental conditions as many as 100% did not visit the dentist. This is caused by the perception of parents who assess the child's dental condition is good, and does not require a visit to the dentist. Based on the results of research and analysis obtained results that mothers with poor knowledge of 73.3% did not visit the dentist while mothers with good knowledge of 53.8% did not visit the dentist. If parents have good knowledge, it will be directly proportional to their behavior. Parents who have high knowledge will show positive behavior in performing dental care, including treatment of malocclusion. A theory revealed that before having a behavior, a person must pass through the stages of awareness, interest, evaluation, trial and adoption[10]. Malocclusion care behavior of children by mothers to dentists based on theory of planned behavior is associated with attitudes, subjective norms, perception control perceptions, intentions and actions of mothers towards pediatric malocclusion treatment to dentists. Attitudes, subjective norms, perception control perception, positive intention will produce positive behavior.

Conclusion

From this study it can be concluded that the perception of perception control with the characteristics of the mother's orthodontic treatment history, the level of maternal knowledge, the use of health insurance, and the mother's perception of the condition of the child's teeth have a chance of influencing the behavior of the mother's visit to perform treatment of children's malocclusion in the dentist.

Ethical Clearance taken from Ethical Committee Faculty of Dental Medicine Airlangg University

Source(s) of Fundings: Faculty of Dental Medicine, Airlangga University

Conflicting Interest (If present, give more details): The authors declare that there is no conflict of interest

References

1. Bamanikar S. Knowledge, Attitude and Practice of Oral and Dental Healthcare in Pregnant Women. Oman Med J. 2013;28(4): 288-91
2. Hasibuan S. Perawatan dan Pemeliharaan Kesehatan Gigi dan Mulut pada Masa Kehamilan. 2004. USU Digital Library. 1-6
3. Agueda A, Echevarria A, Manau C. Association between periodontitis in pregnancy and preterm

or low birth weight: Review of the literature. Med Oral Patol Oral Cir Bucal 2008;13(9):609-15

4. Krejci CB, Bissada NF. Women's health: Periodontitis and its relation to hormonal changes, adverse pregnancy outcomes and osteoporosis. Oral Health Prev Dent 2012;10(1):83-92.
5. Annan B, Nuamah K. Oral pathologies seen in pregnant and non-pregnant women. Ghana Med J 2005;39(1):24-7.
6. Page RC, Kornman KS. The pathogenesis of human periodontitis: An introduction. Periodontol 2000 1997;14:9-11.5.
7. American Academy of Periodontology. The Pathogenesis of Periodontal Diseases, Chicago: The American Academy of Periodontology; 1999.
8. Rai B, Kharb S, Anand SC. Is periodontal disease a risk factor for onset of preclampsia and fetal outcome? Adv Med Dent Sci 2008;2:16-9.
9. American Academy of Periodontology, Committee on Research, Science and Therapy. Periodontal Disease as a Potential Risk Factor for Systemic Diseases, Chicago: The American Academy of Periodontology; 1998.
10. D'Onofrio, C.N. (1992) Theory and Empowerment of Health Education Practitioners. Health Education Quarterly 19:385-403.

Analysis of Platelet Counts and Platelet-Derived Growth Factor-Bb Levels in Platelet Rich Plasma Produced with Edta as Anticoagulant in Three Different Centrifugation Methods

Andi Munawirah[1], Tenri Esa[2,3], Uleng bahrun[1,2,4]

[1]Clinical Pathology laboratory, Hasanuddin University Hospital, Makassar, Indonesia, [2]Department of Clinical Pathology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia, [3]Clinical Pathology laboratory, Siloam Hospital, Makassar, Indonesia, [4]Clinical Pathology laboratory, Wahidin Sudirohusodo Hospital, Makassar, Indonesia

Abstract

Background: *Platelet rich plasma* (PRP) is an autologous product made of whole blood through centrifugation process producing high platelet concentrate in a small volume of plasma. This high platelet concentrate can lead to high growth factor levels that play important roles in the nature of thrombosis, hemostasis and wound healing. PRP has been widely used in clinical setting, however standardized procedure of PRP production has been lacking, mainly the procedure related to duration and speed of centrifugation, and also anticoagulant used.

Aim: To analyze the difference between platelet counts and PDGF-BB levels in PRP produced from various preparation methods (centrifugation speed and duration), using *Ethylenediaminetetraacetic Acid* /EDTA as anticoagulant.

Method: This study used experimental laboratory design, involving 34 healthy volunteers that met inclusion criteria. These subjects were divided into three groups with different centrifugation methods that adopted from previous study.

Results: The platelet counts was found in group 1, 2, and 3 with an increase of, 2,69, 3,69, and 2,53 times from the initial platelet counts respectively and there was significant difference between platelet counts before and after treatment on three groups that used EDTA (p=0,000, p=0,003, and p=0,002 for group 1, 2 and 3 respectively). PDGF-BB levels in this group was also higher than the remaining groups.

Conclusion: The highest platelet counts and PDGF-BB levels was found in PRP with EDTA produced from first spin at 2800 RPM in five minutes, and second spin at 3800 RPM in seven minutes. This study suggests further research on qualitative assessments of platelets and PDGF-BB resulted from various preparation methods (centrifugation and anticoagulant usage).

Keywords: *Platelet, Platelet Derived Growth Factor-BB, Platelet Rich Plasma, centrifugation, Ethylenediaminetetraacetic Acid*

Introduction

Platelets are megakaryocyte cytoplasmic fragments that are formed in the bone marrow and have a diameter of about 1-4 µm. Platelets play an important role in the process of hemostasis and thrombosis.[1] Another function of platelets is to help the wound healing process. Growth factors on platelets can affect chemotaxis, differentiation, proliferation, and synthetic activity of cells, which regulate physiological remodeling and healing. The more growth factors that can reach the wound site, the greater the potential for improving the healing process.[2]

Corresponding author:
Andi Munawirah,
Phone : +6285242133939,
E-mail: munawirah.andi@yahoo.com

Platelet rich plasma (PRP) is an autologous product that is produced from whole blood through a process of centrifugation to produce high platelet concentrations in low plasma volumes. The number of growth factors contained in PRP can accelerate endothelial, epithelial and epidermal regeneration, stimulates angiogenesis, stimulates collagen synthesis, accelerates soft tissue healing, decreases scar tissue in the skin, accelerates the response of homeostasis to injury, thereby stimulating wound healing.[3]

Until now the process of making PRP has not been standardized. A systematic review by Chahla, Cinque, and Piuzzi[4] involving published research in 2006-2016 found that the existing PRP preparation protocols and PRP compositions used in clinical trials were inconsistent and were not standardized so that they produced different effects. Araki et al.[5] also mentioned that the non-standardization of PRP-making protocols for clinical trials makes the efficacy of PRP still debatable. Therefore, standardization of the PRP manufacturing process is needed to obtain platelet counts and levels of growth factors with certainty.[4,6] This standardization must consider factors that influence the quantity and quality of the PRP, including the number of centrifugation cycles (single or double), speed and length of centrifugation, temperature during the manufacturing process, anticoagulants used, and sampling techniques.[3, 4, 6]

The speed and duration of centrifugation is one of the very varied factors used in the preparation of PRP. The study by Nugraha et al. used 30 treatments employing a range of intervention (speeds and duration) of centrifugation. The study results found that the highest platelet increase was obtained at a speed of 1300 RCF for 5 minutes at the first centrifugation and a speed of 2300 for 7 minutes with a platelet increase of 4.11 times.[7]

The use of anticoagulants is also a very important factor in maintaining the function, integrity, and morphology of platelets. Some researchers argue that the use of Ethylenediaminetetraacetic Acid (EDTA) anticoagulants can damage platelet membranes, and recommend the use of Acid Citrate Dextrose (ACD). However, the study of Araki et al.[5] in 2012 showed that the use of EDTA anticoagulants increased platelet counts and PDGF levels showed higher results compared to the use of ACD anticoagulants. This is because the use of EDTA shows better effectiveness in preventing platelet aggregation compared to the use of ACD.[5] Based on the abovementioned phenomenon, this study aimed to identify the difference between platelet counts and PDGF-BB levels in PRP with different treatments (speed and length of centrifugation) using EDTA as the anticoagulant.

Methodology

(*Research Design, Ethical Aspect, Data Collection and Data Analysis*)

This study used an experimental laboratory research design. The study was conducted from August to September at the Clinical Pathology Laboratory of Hasanuddin University Hospital and at The Research Center of Faculty of Medicine of Hasanuddin University, which both were located in Makassar, South Sulawesi Province, Indonesia. The sample size of this study was determined by employing *Frederer Formula* of experimental laboratory study and it was obtain that the minimum sample per group of intervention was seven (7) subjects. The inclusion criteria for the research were: healthy individuals aged 18-40 years; individuals who had not taken any drugs that can affect platelets such as thrombolytic or Non-Steroid Anti-Inflammatory Drug (NSAID) at least 7 days before blood collection. The study included sample with initial platelet examination results of platelets in between 150,000 / µl and 400,000/ µl, while serum/plasma sample which were indicated jaundice, lipemic or hemolysis were excluded.

Regarding ethical aspects, this study had obtained permission by The Ethical Committee of Health Research, Faculty of Medicine of Hasanuddin University, which issued the Ethical Agreement No. UH19060359. Every volunteer filled and signed an informed consent sheet, and was allocated to each of experimental groups by using *simple random sampling*. After volunteer blood was collected, the blood would be assessed for initial hematology examination. Platelet count from this assessment is the number of platelet cells in blood cells, measured using the Sysmex XE800i® Hematology Analyzer expressed in units of µU/mL. The reference value for platelet counts is 150-400 x 103 / µL. From this initial assessment, platelet counts were obtained and were considered as the platelet counts *pre-intervention*. Subsequently, the blood was processed to produce PRP through different interventions. In details, there are three groups of intervention, any of which was different in speed and time of centrifugation as seen in table 1.

Table 1. Type of interventions included in the study

Intervention groups	1st Centrifugation	2nd Centrifugation	Anticoagulant
I	Speed of 1200 RCF (2700 RPM) in 5 minutes.	Speed of 2000 RCF (3500 RPM) in 6 minutes	EDTA
II	Speed of 1300 RCF (2800 RPM) in 5 minutes	Speed of 2300 RCF (3800 RPM) in 7 minutes	EDTA
III	Speed of 600 RCF (1900 RPM) in 10 minutes	Speed of 2000 RCF (3500 RPM) in selama 5 minutes	EDTA

After the second centrifugation, PRP was obtained and the platelet counts were also examined by using similar hematology examiner. The platelet counts obtained from this examination were considered platelet counts of *post-intervention*. In terms of growth factors measurement, PDGF-BB levels was measured by the Enzyme-Linked Immunosorbent Assay (ELISA) method using the human PDGF-BB ELISA kit (LifeSpan BioScience, Inc., China) and the units expressed in pg/mL. The detection range was 31.25-2000 pg/mL.

Results

The study involved 33 volunteers who met the inclusion criteria. The subjects aged 26-40 years old with an average of 32,88 years old with more female subjects than men, accounting for 24 people (72.7%) as seen in table 2.

Table 2. Sample characteristics

Characteristics	n	Mean±SD	Median (Min-Max)	p value	Ratio
Age (years)	33	32,88±3,69			
Gender Male Female	 9 24				
Platelet Counts (103/µL)					
Group 1 (pre)	11	323,18±51,46		0,000*	2,69
Group 1 (post)	11	868,90±257,84			
Group 2 (pre)	11	313,82±62,28		0,000*	3,69
Group 2 (post)	11	1277,36±835,39			

Cont... **Table 2. Sample characteristics**

Group 3 (pre)	11	346,27±76,57		0,000*	2,53
Group 3 (post)	11	877,09±423,00			
PDGF-BB Levels (pg/mL) Group 1	11	6905,68±3696,58	8271,63 (168,62-12189,67)		
Group 2	11	8330,86±6115,52	6238,44 (676,80-25691,57)		
Group 3	11	5206,75±1574,97	5362,00 (1609,41-7216,84)		

**paired t-test*

Table 2 shows the mean difference in the number of platelets counts (pre and post-treatment) of each group. Using *the paired t-test* it was found that platelet counts were significantly higher in all groups of PRP, compared to the baseline (group 1 (p=0,000), group 2 (p=0.000), and group 3 (p=0.000) respectively). Interestingly, the highest platelet counts was found in group 2, with an increase of 3.69 times from the initial platelet counts.

Table 3 depicts the mean difference of PDGF-BB levels in PRP from all groups of intervention. It is shown that there was no significant difference between PDGF-BB levels in all of the intervention groups. However, the highest PDGF-BB levels was found in group 2.

Table 3. PDGF-BB levels in all groups of intervention

	PDGF-BB Levels (pg/mL)			**p***
	Mean	**SD**	**Median (Min-Max)**	
Group 1	6905,68	3696,58	8271,63 (168,62-12189,67)	0.14
Group 2	8330,86	6115,52	6238,44 (3676,80-25691,57)	
Group 3	5206,75	1574,97	5362,00 (1609,41-7216,84)	

**Kruskal Wallis test*

Discussion

Among PRP produced from three different groups of intervention (centrifugation speed and duration of centrifugation), the highest platelet rise was found in group 2, with an increase in platelets counts as of 3.69 times compared to the baseline. This is in line with the studies of Hans et al. as cited Nugraha et al.,[7] showing the highest increase in platelets with speed and duration similar to the intervention conducted in this study, namely 1300 RCF for the first 5 minutes of centrifugation and 2300 RCF for 7 minutes in the second

centrifugation. Platelet increase in the studies of Hans et al was 4.11 times higher that the initial platelets.[7] The increase in platelet counts in group 2 was also in line with the research by Perez et al.[8] who found that PRP produced from double centrifugation can reach platelet counts three times more even up to five times if 2/3 of the plasma volume is removed.[8]

The benefit of PRP lies in the number of platelets it contains, but more than that can be seen from the level of growth factors released when activated.[9] These growth factors have the highest concentration in platelets and play a very important role in the process of wound healing.[2,10] Among many growth factors, PDGF-BB is one of the most important in the regeneration and healing of wounds or damaged tissue.[9,10]

PDGF-BB levels in the three groups showed no significant difference. The interesting fact from this study is that the mean of platelet counts found in such platelet rich plasma products was not directly proportional to the levels of PDGF-BB after platelet activation. This finding is supported by Sonker and Dubey[11] research that there is no correlation between platelet counts with PDGF-BB levels found, as well as correlations with other growth factors. This is supported by the results of the study of Singh et al who analyzed qualitatively differences in the morphology of platelets in some PRP products. The study found that platelets in EDTA tubes had the worst morphology so that the effect on PRP resulting from EDTA tubes had a low growth factor compared to other tubes.[12]

Platelet activation during the PRP preparation process can occur, which results in the early release of alpha granules which results in the loss of growth factors needed, depending on the preparation method.[11]. In terms of platelet Activation, when platelets are exposed to EDTA, platelets lose their discoid shape to "spiny-spheres" resulting in changes in the membrane surface structure and OCS (Open Canalicular System).[13] This change can cause early activation of PRP platelets in tubes that use EDTA anticoagulants and may result in early PDGF-BB growth factor release. Measurement of PDGF-BB levels is also strongly influenced by its half-life. Some studies report that the half-life of PDGF-BB is around 1.8 hours, [14] while Saik et al.[15] reported that the half-life of PDGF-BB is only about 30 minutes after activation.

Conclusion and Suggestion

This study concluded that there was a significant mean difference between platelet counts of PRP in all groups of intervention compared to the number of platelets in the baseline. The significance was as follow: group 1 (p = 0,000), group 2 (p = 0.000), group 3 (p = 0.000), and the highest platelet counts was found in group 2 in which PRP produced in a method of centrifugation as follow: speed of 1300 RCF (2800 RPM) in 5 minutes for the first centrifugation and speed of 2300 RCF (3800 RPM) in 7 minutes for the second centrifugation, resulting 3.69 times platelets compared to the initial platelets. This study also found that there was no significant difference in terms of PDGF-BB levels between the three groups, but PDGF-BB levels in group two (2) was higher than the other groups regardless. This study suggest further research that can identify qualitatively the function and morphology of platelets contained in PRP that are produced various method of preparation (speed and time of centrifugation). Further research that employ a variety of anticoagulants will also be needed to best understanding the best outcome of PRP products.

Ethical Clearance – Taken from The Ethical Committee of Health Research, Faculty of Medicine of Hasanuddin University, which issued the Ethical Agreement No. UH19060359.

Source of Funding - This research was self-funded.

Conflict of Interest – Nil

References

1. Catani MV, Gasperi V, Savini I, Domenico DP. Platelets and their disorders2015 15 April 2019. Available from: http://www.els.net.
2. Everts PAM, Knape JTA, Weibrich G, Schonberger JP, Hoffman J, Overdert EP, et al. Platelet-Rich Plasma and Platelet Gel: A Review. The Journal of The American Society of Extra-Corporeal Technology. 2006;38:174-87.
3. Dhurat R, Sukesh MS. Principles and Methods of Preparation of Platelet-Rich Plasma: A Review and Author's Perspective. Journal of Cutaneous and Aesthetic Surgery. 2014;7(4):18-197.
4. Chahla J, Cinque ME, Piuzzi NS. A call for standardization in platelet-rich plasma preparation protocols and composition reporting: a systematic review of the clinical orthopaedic

literature. The Journal of Bone and Joint Surgery. 2017;99(20):1769-79.

5. Araki J, Jona M, Eto H, Aoi N, Kato H, Suga H, et al. Optimized Preparation Method of Platelet-Concentrated Plasma and Noncoagulating Platelet-Derived Factor Concentrates: Maximization of Platelet Concentration and Removal of Fibrinogen. Tissue Engineering. 2012;18:176-85.
6. Bausset O, Giraudo L, Veran J, Magalon J, Coudreuse JM, Magalon G, et al. Formulation and Storage of Platelet-Rich Plasma Homemade Product. BioResearch Open Access. 2012;1:1-9.
7. Nugraha HK, Muljanti M, Nugraha J. Platelet Rich Plasma Preparation Protocols : A Preliminary Study. Indonesian Journal of Tropical and Infectious Disease. 2012;3:104-7.
8. Perez AGM, Lana JSD, Rodrigues AA, Luzo ACM, Santana HA. Relevant Aspects of Centrifugation Step in the Preparation of Platelet-Rich Plasma. Hindawi Publishing Corporation. 2014;10.
9. Duregger K, Peng A, Eblenkamp. Influence of storage conditions on the release of growth factors in platelet-rich blood derivatives. Current Directions in Biomedical Engineering. 2016;2(1):311-4.
10. Lee JW, Kwon OH, Kim TK, Cho YK, Choi KY, Chung HY, et al. Platelet-Rich Plasma: Quantitative assessment of growth factor levels and comparative analysis of activated and inactivated groups. Archieve of Plastic Surgery. 2013;40(5):530-5.
11. Sonker A, Dubey A. Determining the effect of preparation and storage: An effort to streamline platelet components as a source of growth factors for clinical application. Transfusion Medicine and Hemotherapy. 2015;2015(42):174-80.
12. Singh S. Comparative (quanttative and qualitative) analysis of three different reagents for preparation of platelet-rich plasma for hair rejuvenation. Journal of Cutaneous and Aesthetic Surgery. 2018;11(3):127-31.
13. Michelson AD, Cattaneo M, Frelinger A, Newman P. Platelets. 4th ed. USA: Elsevier; 2019.
14. Gay CG, Winkles JA. The half-lives of platelet-derived growth factor A- and B- chain mRNAs are similar in endothelial cells and unaffected by heparin-binding growth factor-1 or cycloheximide. Journal of Cellular Physiology. 1991;147(1):121-7.
15. Saik JE, Gould DJ, West JL. Covalently immobilized platelet-derived growth factor-BB promotes angiogenesis in biomimetic poly (ethylene glycol) hydrogels. Acta Biomaterialia. 2011;7(1):133-43.

Relationship Factor Enabling Giving Complementary Foods for Breast Milk with Baby Nutrition Status in Makassar City

Anto J. Hadi[1], Matius Rantesalu[2], Endang Maryanti[4], Erni Yetti R[3], Saskiyanto Manggabarani[4], Syamsopyan Ishak[4]

[1]Public Health Department, Faculty of Public Health, Universitas Aufa Royhan, Padangsidimpuan, Indonesia; [2]Nutrition Departement, Midwifery Academy of Sinar kasih Toraja, Tana Toraja, Indonesia; [3]Health Promotion Departement, Midwifery Academy of Sinar kasih Toraja, Tana Toraja, Indonesia; [4]Nutrition Department, Faculty of Public Health, Helvetia Health Institute, Medan, Indonesia

Abstract

Introduction: Poor nutritional status is a major nutritional problem in infants and has an impact on growth disorders and is a problem that needs to be addressed seriously, age 6-18 months is a very important period as well as a critical period in the process of growth and development both physically and intellectually. Therefore, every baby at this time must obtain nutritional intake according to their needs. Aim; to prove the relationship between enabling factors and infant nutritional status. **Methods:** type of research used analytical survey with a cross-sectional study approach. This research was carried out in Maccini Sawah Sub-District, Makassar Sub-District, Makassar City. The sample of this study was infants with exhaustive sampling with 62 samples. **Results:** The study found that the age of starting complementary food for breast milk was related to the nutritional status of the baby with a p-value (0,000), the type of complementary foods for breast milk related to the nutritional status of the baby with a p-value (0,015), the frequency of complementary foods for breast milk related to nutritional status with p-value 0.004), and the variation of complementary foods for breast milk administration is related to nutritional status with p-value (0.001).

Conclusion: It was found that there was a strong relationship between age, starting, giving, type, frequency, and variation of complementary feeding with infant nutritional status.

Keywords: *Nutritional Status, Complementary Food*

Introduction

Nutritional status in children is very important for their lives(1), growing and developing into healthy, productive adults who benefit the community, this is an international priority to improve children's nutritional status (2). The World Child Association (UNICEF) and the World Health Organization (WHO) state that good nutrition practices in children include the initiation of early breastfeeding, exclusive breastfeeding ages 0-6 months, the addition of adequate, safe nutrition, and complementary foods according to the breastfeeding period for 1 year (3,4). The prevalence of malnutrition in Indonesia is still high. One potential factor that contributes to the high prevalence of malnutrition is the inappropriate complementary diet and practice of breastfeeding (5).

Malnutrition during breastfeeding, especially the practice of exclusive breast milk for 6 months after birth is a risk factor for infant and child morbidity and mortality that can be corrected by providing complementary food (6). One intervention to prevent a more effective way to reduce 13-15% of child deaths is to apply exclusive breastfeeding supplemented with complementary foods that will prevent 19% of children's deaths (7). The impact during the child learning process is inactivity, intellectual disruption, decreased productivity, and development of social behavior (6).

Correspondence Author
Anto J. Hadi
Mobile: 085242877376
Email: irfandipap111@gmail.com

Improvement of maternal nutrition carried out before and during exclusive breastfeeding is one of the efforts to improve infant nutrition 0-6 months. This problem is very important and needs to be addressed seriously. The age of 6-18 months is a critical period due to malnutrition at the age of under two years, has an impact on decreasing brain development, physical growth, intellectual, and productivity, the impact of malnutrition is largely irreversible. Malnutrition in infants and children occur because of the food given is low in nutrition or energy. Additional food for babies in developing countries generally made of cereals or tubers tends to be powdery. At the age of one year, the proper administration of complementary foods for breast milk is expected to meet the nutritional needs of the baby, but it can also stimulate the baby's eating behavior which is usually liquid and then adapt to the types of porridge and biscuits [8].Premature babies are at high risk and really need adequate nutrition to increase proper growth [9]. The complimentary food program of breast milk is very important to give to babies in overcoming high nutrient deficiencies, based on the description above the authors feel interested in conducting research on the relationship of enabling factors for complementary food for breast milk with the nutritional status of infants. Aim; to prove the relationship between enabling factors and infant nutritional status.

Method

This research was conducted in 2017 with samples in the study, namely infants aged 6-11 months, using exhaustive sampling techniques as many as 62 infants. The type of research used is an analytical survey with the approach cross sectional study. The source of complementary food data is derived from the results of interviews with mothers and caregivers using questionnaires, nutritional status data obtained from weighing the baby's weight using Baby Scale the GEA brand with measurement accuracy of 0.05 Kg to 0.1 Kg followed by calculation of standard deviation using anthropometric methods (WHO Anthro Plus) and referring to the NCHS table. Data analysis using univariate, bivariate and multivariate analysis.

Results

Sample Characteristics:

Table 1 shows a description of the sex of the baby, the age of the baby, the level of education and the type of work the mother has on the case of infant nutritional status. The homogeneity test results between cases of abnormal nutritional status and normal nutritional status in the baby sex obtained a value of p = 0.77, the average age of the baby obtained a value of p = 0.87, the maternal education level obtained a value of p = 0.44 and work mother obtained p value = 0.73.

Table 1. Analysis of Sample

Characteristics	Infant Nutritional Status				Number of	p-values
	Normal		Normal			
	n	Percentage	n	Percentage of		
Gender for infants						0.77 *
Male	11	31.4	24	68.6	35	
Female	9	33.3	18	66.7	27	
Age of Infants						0.87 *
6 - 7 Months	6	42.9	8	57.1	14	
8 - 9 Months	6	35.3	11	64.7	17	
10 - 11 Months	8	25.8	23	74.2	31	
Mother's Education						0.44 *
Elementary	5	35.7	9	64.3	14	
Junior High School	3	25.0	9	75.0	12	
Senior High School	8	29.6	19	70.4	27	
Bachelor	4	44.4	5	55.6	9	
Mother's Work						0,73 *
not work	15	32,6	31	67,4	46	
contract	1	33,3	2	66,7	3	
employees	2	22,2	7	77,8	9	
government employees	2	50,0	2	50,0	4	

n: Number of Samples, * Homogeneity Test

Factors Enabling Complementary Foods : relationship between enabling factors and infant nutritional status is presented in Table 2. Based on table 2, age suitability in supplementary feeding does not have a significant relationship with infant nutritional status, age suitability in the process of providing complementary food for breast milk in cases of abnormal nutritional status is more 37.5 ± 22.7 compared with age suitability in the case of normal nutritional status 62.5 ± 77.3. Chi-square test between the two variables obtained p value = 0.23. There is a significant relationship between the consistency of the type of complementary food given with the nutritional status of the baby, where the consistency in the case of abnormal nutritional status is more 55.6 ± 14.3 compared to the consistency of food types in the case of normal nutritional status 44.3 ± 85.7 . The chi-square test between the two variables obtained p = 0.001. there is a significant relationship between the frequency of complementary feeding and the nutritional status of infants, where the frequency in cases of abnormal nutritional status is more 45.2 ± 19.4 compared to the frequency in cases of normal nutritional status 54.8 ± 80.6. The chi-square test between the two variables obtained a value of p = 0.03.

Table 2. Correlation Factors Enabling Food Complementary foods for breast milk with Infant Nutritional Status

Enabling complementary foods for breast milk	Infant Nutritional Status				Total	p-Value
	Not Normal		Normal			
	n	Percentage	n	Percentage		
Age Suitability						
Unsuitable	15	37.5	25	62, 5	40	0,234 *
Suitable	5	22.7	17	77,3	22	0,000 **
Type Consistency						
Inconsistent	15	55.6	12	44,4	27	0,001 *
Consistent	5	14,3	30	85,7	35	0.090 **
Frequency						
Less	14	45,2	17	54.8	31	0.030 *
Sufficient	4	19,4	25	80.6	31	0.021 **

* Chi-Square **Paired Test

Multivariate Analysis: Requirements fulfilled in multivariate analysis, namely all variables related to p value <0.05 entered which are then analyzed include variable consistency the type of complementary food, the frequency of supplementary feeding, using the statistical ratio method to see the riskier and most related variables. It is indicated that the consistency of food types and frequency can improve nutritional status (Table 3).

Table 3. Multiple Logistic Regression

Variable	B	Sig (p-value)	Exp (B)	OR	95% CI
* Consistency type	2.186	0.001	8.903	7.500	2.384 to 33.054
Frequency	1.477	0.027	4.380	3.431	1.183 to 16.219

B: Beta, Sig: Significant, Exp: Expected, OR: Ods Ratio, Cl: Conbidential Interval. * Variables that are most related to the nutritional status of the baby.

Discussion

Giving Age Suitability: Provision of complementary foods for breast milk should be started at the age of 6 months because the digestive system of the body has started to be perfect and ready to receive food other than breast milk. When babies enter the age of 6 months and above, some nutritional elements such as protein, carbohydrates and some vitamins and minerals contained in breast milk are no longer sufficient. Based on the results of this study that the suitability of the age of the first time giving is not related to nutritional status. Important findings in this study, supplementary feeding was first given in the first 6 months, but more were given formula milk at the age of under 6 months. Similarly, Lakshman's research is more focused and specific in the provision of bottled milk and obesogenic foods [10].

The results of this study are in contrast to Alzaheb's research in Saudi Arabia (2015) stating that the practice of giving is very useful as a complement to infant malnutrition obtained from breast milk [11]. The introduction of earlier complementary foods before a six-month-old baby has a negative effect as a substitute for breast milk and can stop breastfeeding practices at an early stage [12,13]. Baby's nutritional needs increase along with increasing age and reduced breast milk production and duration of breastfeeding [11]. In the first year of life, the method of feeding babies on time is one way of intervention carried out in the community to support optimal baby growth and development [14].

Consistency of Food Types: important finding in this research is that the type of complementary food has an influence on the nutritional status of infants and children. Research found and explained more specifically the age conformity with the type of quality food consumed has an influence on the absorption of nutrients that have an impact on nutritional status. Various kinds of complementary foods for breast milk are given to each day according to age development. Complementary foods cannot match breast milk in its nutritional content, enzymes, hormones, and immunological substances and antibodies. Modified food ingredients or mixtures of various types of food ingredients that are specially made as complementary foods for breast milk so that these foods contain complete nutrients needed by babies because this period includes the period of growth.

This study is not in line with stating that the average food supplement studied cannot meet the needs of calcium, iron and zinc every day as a nutritional source of complementary foods for infants in developing countries [15]. This study is in line with that conducted in Tanzania in the 6-23 month age group (2010) which states that the main determinant that can affect a baby's health, development and growth is the proper consumption of complementary foods [16]. Giving baby food is a modification factor that can reduce mortality and disability caused by preterm birth [17]. The growth and development of premature babies is in accordance with types of food such as breast milk or fortified formula [18].

Giving Frequency: Quantity of complementary food is very important for brain growth and intelligence development. The fulfillment of infant and family nutrition is closely related to the frequency of food provided. The frequency of breastfeeding must be adjusted to the age and ability to produce breast milk. Increasing age needs are also increasing and the ability to produce breast milk decreases so that the frequency of supplementary food supply is increasing and added some types of snack foods.

The frequency of eating children is also influenced by several factors such as the family's socio-economic status and the number of family members. According to

the theory, the proportion of adults more than children in the family can result in less food availability for children. Low-income communities increase the attention and focus on breastfeeding and supplementary food for babies [2].The results of this study are similar to research conducted in Krakow and Silesia (2014) stating that regular feeding is very important, adequate daily nutrient intake is useful for physical development and and it is necessary to introduce healthy eating patterns for health during the growth period [19]. Perceptions about breast milk and feeding given complementary breast milk can be improved by health education [14].

Conclusion

Provision of complementary breast milk food is related to the nutritional status of the baby. The consistency of food types has a greater relationship with nutritional status compared to frequency. The age match for starting complementary foods performed by mothers starts at 6 months of age. The practice of giving complementary foods for breast milk is influenced by the mother's knowledge which has an impact on the mother's skills in serving complementary foods.

Significant Statement

Results of this study found that babies need complementary food as they age to cover malnutrition from the intake of breast milk for growth and development. The practice of providing good complementary foods can be seen from the suitability and consistency in providing complementary foods caused by knowledge of maternal nutrition.

Funding Sources: Used during this study were sourced from personal funds.

Acknowledgments: The authors wish to thank all the Public Helath students who helped in the collection of the data. The Makassar City Government, the Health Office, the Head of the community health center which has given research permission. Respondents who have been willing to spend time in the interview process.

Internal Conflict: The author (s) declare that they have no conflict of interest.

Ethical Clearance: Ethical approval has been obtained from Ethical Commission of Health Research, Faculty of Public Health, with protocol number UH910183005.

References

1. Hadi AJ, Hadju V, Indriasari R, Sudargo T, Nyorong M. Model of Peer intervention Assessment of Nutritional Educator in the Efforts to Change Behaviour in Decreasing Overweight in integrated islamic Elementary Schools at Makassar. Indian J Public Heal Res Dev. 2019;10(9):613–8.
2. Bazzano AN, Kaji A, Felker-Kantor E, Bazzano LA, Potts KS. Qualitative studies of infant and young child feeding in lower-income countries: A systematic review and synthesis of dietary patterns. Nutrients. 2017;9(10):1140.
3. Dhingra U, Gittelsohn J, Moh'd Suleiman A, Moh'd Suleiman S, Dutta A, Ali SM, et al. Delivery, immediate newborn and cord care practices in Pemba Tanzania: a qualitative study of community, hospital staff and community level care providers for knowledge, attitudes, belief systems and practices. BMC Pregnancy Childbirth. 2014;14(1):173.
4. (UNICEF.) UNCF. The state of the world's children 2012: children in an urban world. UNICEF New York; 2012.
5. Ahmad A, Boediman D, Prawirohartono EP. Pola makanan pendamping air susu ibu dan status gizi bayi 0-12 bulan di Kecamatan Lhoknga Kabupaten Aceh Besar. J Gizi Klin Indones. 2006;3(1):58–65.
6. Baker P, Smith J, Salmon L, Friel S, Kent G, Iellamo A, et al. Global trends and patterns of commercial milk-based formula sales: is an unprecedented infant and young child feeding transition underway? Public Health Nutr. 2016;19(14):2540–50.
7. Khan AM, Kayina P, Agrawal P, Gupta A, Kannan AT. A study on infant and young child feeding practices among mothers attending an urban health center in East Delhi. Indian J Public Health. 2012;56(4):301.
8. Lutter CK, Morrow AL. Protection, Promotion, and Support and Global Trends in Breastfeeding–. Adv Nutr. 2013;4(2):213–9.
9. Tabata M, Abdelrahman K, Hair AB, Hawthorne KM, Chen Z, Abrams SA. Fortifier and cream improve fat delivery in continuous enteral infant feeding of breast milk. Nutrients. 2015;7(2):1174–83.
10. Sankar MJ, Sinha B, Chowdhury R, Bhandari N, Taneja S, Martines J, et al. Optimal breastfeeding practices and infant and child mortality: a

systematic review and meta-analysis. Acta Paediatr. 2015;104:3–13.

11. Alzaheb RA. Factors Associated with the Early Introduction of Complementary Feeding in Saudi Arabia. Int J Environ Res Public Health. 2016;13(7):702.
12. Kronborg H, Foverskov E, Væth M. Predictors for early introduction of solid food among Danish mothers and infants: an observational study. BMC Pediatr. 2014;14(1):243.
13. Madhu GN, Harish S. Complementary feeding practices among mothers of children aged six months to two years admitted in a tertiary care hospital. Int J Contemp Pediatr. 2017;5(1):97–100.
14. Kamath SP, Garg D, Khan M, Jain A, Baliga BS. Perceptions and Practices regarding Breastfeeding among Postnatal Women at a District Tertiary Referral Government Hospital in Southern India. Scientifica (Cairo). 2016;2016.
15. Nona S, Srijana K. Perceptions and Practices Regarding Breastfeeding among Postnatal Mothers. Int J Nurs Educ. 2018;10(4):128–33.
16. Victor R, Baines SK, Agho KE, Dibley MJ. Factors associated with inappropriate complementary feeding practices among children aged 6–23 months in T anzania. Matern Child Nutr. 2014;10(4):545–61.
17. Colaizy TT, Bartick MC, Jegier BJ, Green BD, Reinhold AG, Schaefer AJ, et al. Impact of optimized breastfeeding on the costs of necrotizing enterocolitis in extremely low birthweight infants. J Pediatr. 2016;175:100–5.
18. Lok KYW, Chau PH, Fan HSL, Chan KM, Chan BH, Fung GPC, et al. Increase in Weight in Low Birth Weight and Very Low Birth Weight Infants Fed Fortified Breast Milk versus Formula Milk: A Retrospective Cohort Study. Nutrients. 2017;9(5):520.
19. Ostachowska-Gasior A, Piwowar M, Kwiatkowski J, Kasperczyk J, Skop-Lewandowska A. Breakfast and other meal consumption in adolescents from southern Poland. Int J Environ Res Public Health. 2016;13(5):453.

Determinant of Premature Rupture of Membrane in Indonesia (Secondary Data Analysis of Idhs 2017)

Chintya Elittasari[1], Sudijanto Kamso[2]

[1]Magister Program of Public Health, Faculty of Public Health, [2]Biostatistics and Population Studies Department, Faculty of Public Health, Universitas Indonesia, Depok, Indonesia

Abstract

Premature rupture of membranes (PRoM) constitutes 5-10% of the causes of complications in full-term pregnancy and 30% of preterm pregnancy. In Indonesia, according to Riskesdas data in 2018, ProM is the biggest delivery complication of 5.6% in women aged 10 - 54 years. Based on IDHS 2017 data, it is the third biggest complication during labor with a percentage of 16.1%, which increased from 14.9% in 2012. Premature rupture of membranes risks troubled mothers and fetuses that potentially cause maternal and perinatal morbidity and mortality. Little is known about the determinants of PRoM in Indonesia. Therefore, this study was conducted to identify the determinants of the ProM in Indonesia. This research method using logistic regression analysis to individual data IDHS 2017 by enclosing 4 independent variables: age, parity, amount of iron tablet consumption, and smoking habit to predict the incidence of PRoM. Sample of this study counted 12,340 people. Based on multivariate analysis found that consumption of Fe tablets is significantly related to PRoM by Odds Ratio (OR) 0.7 (95% CI: 0.631 - 0.777) controled by maternal age. The conclusion of this study is mothers who consume ≥ 90 iron tablets during pregnancy are 0.7 times low risk of experiencing PRoM than mothers who consume iron tablets < 90 tablets during pregnancy.

Keywords : *PRoM ; Amount of Iron Tablet Consumption; Indonesia*

Introduction

Premature rupture of membranes (PRoM) is a condition of membranes rupture before the beginning of labour, where cervical dilatation of less than 3 cm in primipara and less than 5 cm in multiparas. PRoM which occurs before 37 weeks pregnancy is called premature PRoM, whereas occurs after 37 weeks PRoM itself[(1)]. PRoM constitutes 5-10% of the causes of complications in full-term pregnancy and 30% of preterm pregnancy[(2)]. According to Riskesdas 2018, PRoM is the biggest delivery complication of 5,6%[(3)]. Based on IDHS data 2017, ProM is the third biggest complication during labour of 16.1%[(4)]. PRoM is risked causing maternal and perinatal morbidity and mortality. A serious complication of ProM includes retained placenta and haemorrhage requiring dilatation and curettage (12%), maternal sepsis (0,8%), and maternal death (0,14%). So that, ProM is a high risk of caesarean deliveries [(1)]. Based on IDHS data 2017 the number of caesarean deliveries caused by PRoM decreased to 18.8% from 22.8% in 2012. Meanwhile, cases of within a month old infant mortality increased to 19% from the previous 14%[(4,5)].

The risk factors associated with PRoM include maternal age, parity, infection, anemia, multiple pregnancies, increased intrauterine pressure, and genetic factor[(6)]. According to a case-control study conducted at Tugurejo Regional General Hospital mentioning the relationship between fetal malposition, maternal age, parity, history of PRoM, maternal employment status, anemia status, and active-passive smoking with the incidence of PRoM and there was no association between multiple pregnancies, genetic factor, previous recurrent miscarriage with PRoM[(7).] Another case-control study where conducted in Mekele City Tigray about risk factors of PRoM in public hospital mention abortion histories, caesarean delivery histories, previous PRoM, and abnormal vaginal discharge significantly associated with KPD, and previous PRoM to be the strongest risk factor for PRoM[(1)].

Corresponding author:
Chintya Elittasari
E-mail: chintya.elittasari@ui.ac.id

Determinants identification of PRoM is needed to predict and prevent the occurrence of PRoM to prevent complications. Previous PRoM determinant researches have been conducted in various regions and different times of health services, yet secondary data utilization thoroughly in Indonesia still less in amount. Therefore, this study aims to fill those gap by identifying the determinants of PRoM using Indonesian Demographic and Health Survey (IDHS) data.

Method

This study used secondary data from IDHS 2017 and designed in cross-sectional. Populations of this study are all interviewed women who had live births in the 5 years before the survey. The total sample of this study were 12,340 people. Univariate, bivariate (crosstabs), and multivariate analysis (logistic regression) were performed in this study. Statistical analyses were performed using SPSS version 21.0; p <0.05 indicated statistical significance. Inclusion criteria of this study were women who gave birth to the last child within 5 years before the survey and experienced complications at the time of delivery. The dependent variable of this study was PRoM and the independent variables were maternal age, parity, amount of iron tablet consumption and smoking.

Tabel 1. Bivariate Analysis result for significant variables (ρ ≤ 0,25) of determinant PRoM in Indonesia, 2017

Variable	PRoM				OR	P Value
	No		Yes			
	n = 8400	%	n = 3940	%		
Age (years)						
No risk (20 – 35)	6051	49	2956	24	0,857	0,006
High Risk (< 20 & > 35)	2349	19	984	8		
Parity						
< 2	2822	22,9	1341	10,9	0,980	0,686
≥ 2	5578	45,2	2599	20		
Amount of iron tablets consumption						
≥ 90	4253	34,5	2342	18,9	0,700	0,000
< 90	4147	33,6	1598	13		
Smoking						
No	8275	67,1	3885	31,5	0,936	0,729
Yes	125	1	55	0,4		

**Bivariat analysis was using crosstabs*

The bivariate analysis showed that maternal age (*p-value*: 0.006) and total consumption of iron tablets (*p-value*: 0,000) are related to PRoM. Meanwhile, parity (*p-value*: 0.686), and smoking (*p-value*: 0.729) were not related to PRoM. Based on the table above there are 2 variables that have *p-value* <0.25, there are age and amount of consumption of iron tablets. So both of them required to enter multivariate modelling.

Tabel 2. Multivariate analysis Determinant of PRoM in Indonesia, 2017

Variable	Model 1	Model 2
	cOR (95% CI)	aOR (95% CI)
Age	0,851 (0,761, 0,952)**	0,858 (0,769 - 0,958)**
Parity	1,032 (0,933, 1,120)	-
Amount of iron tablets consumption	0,700 (0,631, 0,777)***	0,700 (0,631 - 0,777)***
Smoking	0,940 (0,645, 1,370)	-

OR, odds ratio; CI, confidence interval.
*p<0,05, **p<0,01, ***p<0,001

The multivariate analysis showed that iron tablet consumption was the dominant factor causing PRoM, with OR 0.7 (95% CI: 0.631 - 0.777) after controlled by maternal age variable. This study in line with the case-control study conducted at Wates Regional Hospital in 2015 that stated there is an association of anemia in pregnancy with ProM with *p-value* = 0.036 and OR 2,524 (95% CI: 1.042 - 6.113) pregnant women with anemia have a risk 2, 524 times higher experiencing PRoM[8].

Discussion

Study Limitation

This study used secondary data of IDHS 2017, because of limitation the research data, anemia variable which in theory is related to PRoM incidences in this study was replaced by the amount of iron tablet consumption during pregnancy. Researchers also could not control results from interviews with respondents due to the possibility of recall bias that caused by respondents memories related to research variables.

Relationship Between Maternal Age and ProM

The results of this study showed that there is a relationship between maternal age and PRoM incidences. Similarly with past research conducted by Berkowits (in Hussain, 2012) which found that mothers with 30 years old or older significantly increased occurrence of preterm rupture of membrane (pPROM)[9]. Larger studies by retrospective cohort study conducted by Lucke and Brown (2007) show that increasing maternal age is significantly associated with a high risk of pPROM occurrence after being controlled by variables of race, parity, diabetes, chronic hypertension and maternal smoking status[10]. However, in contradiction with past research conducted at Yogyakarta Hospital by Rahayu (2018) which states that there is no relationship between maternal age, parity, gestational age, uterine over distance with PRoM occurence[11].

Based on literature optimal maternal reproduction age is between 20-35 years old. Under or above those ages will increase pregnancy and deliveries risked. Maternal age will affect the reproductive organs by decreasing their ability and elasticity in pregnancies. The older maternal ages, both of environmental stress and oxidative stress are increased that induce biological damage of cell at molecular level[12], which affects decreasing of vitamin C level on blood circulation[13] so that inhibit collagen formation and stability of collagen cross-link[12]. Structure alteration, amount of cells and collagen catabolism cause rupture of membranes[14].

Relationship Between Parity and ProM

This study showed that there is no significant relationship between parity and occurrence of PRoM. In line with research conducted in Gowa, suggesting that the amount of parity is not a risk factor of premature rupture of membranes even though both of ≤ 1 and> 3 parity are 1.5 times higher risked than maternal parity of 2-3 (OR = 1.5 95%CI: 0, 91 - 2.48)[15]. Contradiction with results research was conducted at Bahteramas Hospital which states that maternal parity is a risk factor of PRoM occurrence (OR = 9.94 95%CI: 4.44 - 22.24) [16]. This may be due to more respondents with ≥ 2 parity who didn't experience PRoM compared to those who experienced it.

In multiparous and grand multiparous women the risk of PRoM occurrence will increase. Multiparous women have intrinsic weakness of the uterus caused by cervical trauma due to previous deliveries that caused increasing of uterine motility, hanging bellies and decreasing of cervical flexibility that causes premature cervical dilatation and ends with PRoM. Furthermore, in multiparous and grand multiparous women occurred cervical damage tissue which consists more of nerve fibres than connective tissue that allows the basic muscles of the uterus to stretch[17].

Relationship Between Amount Of Maternal Iron Tablet and ProM

Overall, 50% of anemia was caused by iron deficiency[18]. 75 - 95% of anemia during pregnancy were caused by iron deficiency[19]. A study conducted in Singapore in 2019 mentioned that almost three-quarters of pregnant women in Singapore experienced an iron deficiency in the early third trimester of pregnancy[20]. During pregnancy, women lose 680 mg iron. Iron necessity enhances 3 times higher during pregnancy (> 4 mg per day). Pregnant women are fragile to iron deficiency due to an increased need for iron during pregnancy for the expansion of erythrocytes, plasma volume, fetal, and placental growth. Based on research at Karang Asem primary health services in Samarinda 2015-2017, it was found that there was a significant relationship between the distribution of Fe tablets and anemia. Pregnant women who are not compliant with consuming Fe tablets are 1.3 times more likely to develop anemia than pregnant women who are compliant in consuming Fe tablets[21].

This study showed that mother who consumes ≥ 90 iron tablets during pregnancy is 0.7 times low risk of experiencing PRoM than mothers who consume iron tablets < 90 tablets during pregnancy. Same with the retrospective cohort study conducted in Purworejo Regency stated that anemia in the second trimester has been shown to increase of PRoM occurrence. Mothers with anemia are at risk of PRoM 2.11 (RR = 2.11; 95% CI: 1.06 - 3.44) times higher than mothers without anemia after controlled by iron tablet consumption[22]. Another case-control study in Singaraja Bali found, mothers with anemia at risk of experiencing PRoM 3.59 (OR = 3.59; 95% CI = 1.82-7.09) times higher than mothers who were not anemic after controlled by parity variable[23].

Anemia during pregnancy causes weakness of amnion membranes due to lack of tissue oxygenation caused by reduction of haemoglobin mass[6]. So that mother with anemia during pregnancy is risky to PRoM occurrences

Relationship Between Smoking and ProM

This study showed that smoking is not associated with PRoM. Same with a case-control study at General Hospital of Mekele Tigray City, December 2015 - June 2016 that Stated there was no significant relationship between smoking and PRoM(1). Contradiction with research was conducted in Southern Ethiopia, that smoking is a positive predictor of premature rupture of membranes, women with a history of smoking during pregnancy are at risk of experiencing PRoM of 17 times higher than non-smoking mothers (AOR; 17,053, 95% CI [2,145, 135,6])[24]. The differences might be due to the low prevalence of smoking respondents.

Based on the literature, smoking lead to decrease of collagen and protein in membranes by increasing cadmium levels and decreasing the ability of CU2 + to synthesize collagen in mesenchymal cells of aminion[25]. Also, nicotine causes arteriolar constriction leading to uterine decidua ischemia[26] so affecting the integrity of the membrane that leads PRoM.

Conclussion

Amount of iron tablets consumption is a dominant factor of PRoM occurrence after controlled by maternal age variables. Based on these results, the researcher recommends consumption of ≥ 90 iron tablets to all pregnant women during pregnancy to prevent the occurrence of PRoM, that can cause maternal and perinatal morbidity and mortality. The results of this study are expected to encourage the effectiveness of distribution and compliance of the iron tablets consumption for pregnant women.

Acknowledgement: Thanks to Prof. Dr. dr. Sudijanto Kamso, SKM as a supervisor in this study as well mothers, and family who have provided support in completing this research.

Conflic of Interest : The authors declare no conflicts of interest in this study

Source of Funding : Independent (self-based)

Ethical Clearance : This study was conducted after

obtaining approval from

BKKBN via online/website of IDHS 2017 for data processing

References

1. Assefa NE, Berhe H, Girma F, Berhe K, Berhe YZ. Risk factors of premature rupture of membranes in public hospitals at Mekele city , Tigray , a case control study. 2018;6(October):1–7.
2. Mahmoodi Z, Hoseini F, Shahr HSA, Ghodshi Z, Amini L. The Association Between Maternal Factors and Preterm Birth and Premature Rapture of Membranes. 2010;4(3):135–40.
3. RI BP dan PKK. Laporan Nasional Riskesdas 2018. Jakarta; 2019.
4. Nasional BK dan KB, Statistika BP, Kesehatan K, USAID. Survey Demografi dan Kesehatan Indonesia 2017. Jakarta; 2017.
5. Statistika BP, Nasional BK dan KB, Kesehatan K. Survei Demografi dan Kesehatan Indonesia 2012 [Internet]. Jakarta; 2013. Available from: http://kesga.kemkes.go.id/images/pedoman/SDKI 2012-Indonesia.pdf
6. Irsam M, Dewi AK, Wulandari E. Jumlah Paritas dan Anemia sebagai Faktor Prediktor Kejadian Ketuban Pecah Dini Parity and Anemia status as the Predictors for Premature Rupture Membrane. 2014;(024):1–8.
7. Rohmawati N, Fibriana AI. Ketuban Pecah Dini di Rumah Sakit Umum Derah Ungaran. 2018;2(1):23–32.
8. Riska Dwi Pramita S, Duhita F, Diah Wulandari. Hubungan Anemia Dalam Kehamilan Terhadap Kejadian Ketuban Pecah Dini (KPD) [Internet]. Vol. 036. Universitas Gadjah Mada; 2017. Available from: http://etd.repository.ugm.ac.id/index.php?act=view&buku_id=109136&mod=penelitian_detail&sub=PenelitianDetail&typ=html
9. Husain tarek khalaf ala, Mohamed sahar nagieb, Dien hamida alam el, Ahmed amal abd elaziz. Cervicovaginal infection during pregnancy and its relation to preterm pre labour rupture of membranes. J Am Sci. 2012;8(12).
10. Luke B, Brown MB. Contemporary risks of maternal morbidity and adverse outcomes with increasing maternal age and plurality. Sci Direct [Internet]. 2007;88(2):283–93. Available from: https://www.sciencedirect.com/science/article/pii/S0015028206044098
11. Rahayu B. Hubungan Faktor - Faktor Usia Ibu, Paritas, Umur Kehamilan, dan Overdistensi dengan Kejadian Ketuban Pecah Dini di Rumah Sakit Yogyakarta. Media Ilmu Kesehat [Internet]. 2018;7(2):137–42. Available from: https://pdfs.semanticscholar.org/f0db/315dcee642b3810938f1fa28e82e5fd63f60.pdf
12. Mourisa C, R Z-H, Betty. Gambaran Histopatologi Selaput Ketuban pada Perempuan Hamil yang Mendapat Acetylsalicylic Acid (ASA) Dosis Rendah Histopathological Appearance on The Fetal Membranes of Pregnant Women who Received Low-Dose ASA. Bul Farmetera. 2018;3(3):120–8.
13. Longini M, Perrone S, Vezzosi P, Marzocchi B, Centini AG, Rosignoli L, et al. Association Between Oxidative Stress in Pregnancy and Preterm Premature Rupture of Membrane. Sci Direct [Internet]. 2007;40:793–7. Available from: https://pdf.sciencedirectassets.com/271896/1-s2.0-S0009912007X01899/1-s2.0-S0009912007001294/main.pdf
14. Prawirohardjo S. Ilmu Kandungan. Jakarta: PT. Bina Pustaka Sarwono Prawirohardjo; 2008. 677–681 p.
15. Tahir S, Seweng A, Abdullah Z. Faktor Determinan Ketuban Pecah Dini di RSUD Syekh Yusuf Kabupaten Gowa. UNHAS [Internet]. 2012; Available from: http://pasca.unhas.ac.id/jurnal/files/abdbde934df5c895d7deebd756ce04e1.pdf
16. Hastuti H, Sudayasa IP, Saimin J. Analisis Faktor Risiko Ketuban Pecah Dini di Rumah Sakit Umum Bahteramas. J Ilm Fak Kedokt Univ Halu Oleo [Internet]. 2016;3(April):268–72. Available from: http://ojs.uho.ac.id/index.php/medula/article/view/2553
17. F.G C. Obstetri Williams. Jakarta: EGC; 2012. 855 p.
18. World Health Organization. The Global Prevalence of Anaemia in 2011 [Internet]. Geneva, Switzerland; 2015. Available from: https://www.who.int/nutrition/publications/micronutrients/global_prevalence_anaemia_2011/en/
19. Lianos G, José M, Zamudio G, Los JLL De, García R-. Significance of anaemia in the different stages

of life. Enfermia Glob. 2016;43(Julio):419–31.

20. Loy SL, Lim LM, Chan S, Tan PT, Chee YL, Quah PL, et al. Iron status and risk factors of iron deficiency among pregnant women in Singapore : a cross-sectional study. BMC Public Health [Internet]. 2019;1–11. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-6736-y
21. Rosita D, Eryando T, Rahmaniati M, Setiarini A, Agustini K, Julina. Pengaruh Pemberian Tablet Zat Besi (Fe) Terhadap Kejadian Anemia Pada Ibu Hamil di Puskemas Karang Asem Kotamadya Samarinda Tahun 2015 - 2017 [Thesis]. Universitas Indonesia; 2018.
22. Ritawati, Hakimi. Hubungan Anemia dan Risiko Kejadian Ketuban Pecah Dini di Kabupaten Purworejo [Internet]. Universitas Gadjah Mada; 2009. Available from: http://etd.repository.ugm.ac.id/index.php?mod=penelitian_detail&sub=PenelitianDetail&act=view&typ=html&buku_id=41019&obyek_id=4.
23. Pratiwi PI, Emilia O, Kartini F. The Effect of Anemia on The Incidence of Premature Rupture of Membrane (PROM) In Kertha Usada Hospital , Singaraja , Bali. Belitung Nurs J [Internet]. 2018;4(3):336–42. Available from: https://www.belitungraya.org/BRP/index.php/bnj/article/view/391
24. Workineh Y, Birhanu S, Kerie S, Ayalew E, Yihune M. Determinants of premature rupture of membrane in Southern Ethiopia , 2017 : case control study design. BMC Res Notes [Internet]. 2018;1–7. Available from: https://doi.org/10.1186/s13104-018-4035-9
25. Sirak B, Mesfin E. Maternal And Perinatal Outcome of Pregnancies With Preterm Premature Rupture of Membranes (pPROM) At Tikur Anbessa Specialized Teaching Hospital, Addis Ababa, Ethiopia Maternal And Perinatal Outcome Of Pregnancies With Preterm Premature Rupture Of Mem. Ethiop Med J [Internet]. 2014;52(September 2015). Available from: https://www.researchgate.net/profile/Eyasu_Kassa/publication/283900095.pdf
26. Liu J, Feng Z, Wu J. The Incidence Rate of Premature Rupture of Membranes and its Influence on Fetal – neonatal Health : A Report From Mainland China. J Trop Pediatr [Internet]. 2010;56(1). Available from: https://watermark.silverchair.com/fmp051.pdf

The Influence Factors of The Performance of Midwives on the Neonatal Health Services in Balangan District

Dahmila Febrianty[1], Husaini[1], Bahrul Ilmi[2], Roselina Panghiyangani[3], Lenie Marlinae[4]

[1]Master of Public Health Science Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia, [2] Polytechnic of Health, Ministry of Health, Banjarmasin, Indonesia, [3] Medical Education Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia, [4] Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract

The performance of midwives in Balangan District in neonatal health services from 2016 to 2018 did not reach the Minimum Service Standard target for newborn services based on Ministry of Health Decree of the Republic of Indonesia No 43 in 2016. The low performance of midwives in neonatal health services in Balangan District has an important position on the performance of the Balangan District Health Office to reduce IMR. This research aim to analyze the factors that influence the performance of midwives in neonatal health services in Balangan District. The research using an observational analytic study with a cross sectional study design. Sample of 70 midwives took using a purposive sampling method. The results of this research showed that there was no influence between education (p=0.230) and compensation (p=0.193) on the performance of midwives in neonatal health services, while the length of service could not be analyzed. The most dominant factor influencing was training (p=0.000) with Exp (B) of 23.33 with a confidence level of 95%.

***Keywords**: education, compensation, training, tenure, performance*

Introduction

Neonatal health service by midwife is one way to reduce infant mortality in the neonatal period. Neonatal visits that do not meet the standards or behavior of non-neonatal visits statistically have a large risk of neonatal death. Neonatal visits are conducted to reduce the risk of neonates who are vulnerable to health problems.

Based on maternal and child health reports of Balangan District Health Office, neonatal health services in 2016 amounted to 78.77% consisting of coverage of the first neonate visit at 6-48 hours after birth according to the standard of only 87.83%, complete neonatal visits according to the standard only amounted to 84.42% and handling neonatal complications was only 64.05%. In 2017 neonatal health services only amounted to 69% consisting of coverage of first neonate visits according to the standard of only 84.45%, complete neonatal visits according to the standard was only 79.66% and handling neonatal complications was only 42.5%, whereas in 2018 neonatal health services by 75.57% consisting of coverage of first neonate visits according to the standard of only 83.2%, complete neonatal visits according to the standard of only 79.3% and handling of neonatal complications only by 64.2% .[1] The performance of midwives in neonatal health services from 2016 to 2018 did not reach the Minimum Service Standard (SPM) target for newborn services based on the Ministry of Health Decree of the Republic of Indonesia Number 43 of 2016. The low performance of midwives in neonatal health services in Balangan District has an important position on the performance of the Balangan District Health Office to reduce IMR. Neonatal health services have a statistically significant relationship with neonatal deaths in Indonesia. The low performance of midwives in neonatal health services is influenced by various

Corresponding Author:
Dahmila Febrianty
Master of Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Jalan A. Yani, Km.36, Banjarbaru, Kalimantan Selatan, Indonesia, email: midwife_febrianty@yahoo.com

factors.[2] Individual factors influence performance consisting of abilities and skills, cultural background and demographics. Demographic factors can influence performance.[3] Factors that affect employee performance are influenced by a number of factors including motivation, ability, knowledge, expertise, education, experience, training, interests, personality attitudes, physical conditions and physiological needs, social needs and egoistic needs.[4] Factors that influence performance are internal factors, namely individual characteristics such as years of service and attitudes towards tasks and external factors.[5]

Materials and Method

This research used observational analytic study, with the time approach of data collection using a cross-sectional design. This study uses secondary data analysis from monthly and annual reports on maternal and child health for neonatal health services and nominative list data of civil servant for the Balangan District Health Office especially for midwives, midwife training data and compensation data. The population in this study were all midwives in the village and public health center who had civil servants (PNS) status and at least one year of service in their working area, totaling 92 people out of 116 midwives. The sample of this study was 70 people in which was obtained purposively based on the proportion of the total population who met the criteria for inclusion and then for each public health center. Analysis of the data used is descriptive and statistical analysis of the test chi-square and test logistic regression doubled the significance level of 95%.

Findings and Discussion

Table 1. Frequency Distribution of Education, Compensation, Training, and Working Period of Midwives in The Neonatal Health Service on Balangan District

Variable	Frequency	Percentage (%)
Education		
Diploma IV/ Bachelor of Midwifery	5	7.1
Diploma III Midwifery	65	92.9
Compensation		
High	9	12.9
Low	61	87.1
Training		
Complete	19	27.1
Incomplete	51	72.9
Working Period		
Long	35	50
Medium	13	18.6
Short	22	31.4
Midwive's Performance		
Good	13	18.6
Not good	57	81.4

Table 2. Bivariate Analysis of The Influence of Education, Compensation, Training, and Working Period to The Midwives Performance in The Neonatal Health Service on Balangan District

Variable	Midwive's Performance				Total		Chi-Square
	Good		Not good				
	n	%	n	%	N	%	p-value
Education							
Diploma IV/ Bachelor of Midwifery	2	40	3	60	5	100	0.230
Diploma III Midwifery	11	16.9	54	83.1	65	100	
Compensation							
High	0	0	9	100	9	100	0.193
Low	13	21.3	48	78.7	61	100	
Training							
Complete	10	52. 6	9	47.4	19	100	0.000
Incomplete	3	5.9	48	94.1	51	100	
Working Period							
Long	7	20	28	80	35	100	-
Medium	4	30.8	9	69.2	13	100	
Short	2	9.1	20	90.9	22	100	

The influence of education on the performance of midwives in neonatal health services

Based on the results of the fisher's exact test obtained p-value of 0.230 (p>0.05) which means midwife education has no influence on the performance of midwives in neonatal health services. The level of education of midwives have an important role on the performance of midwives in neonatal health services. It should have the competence to midwife consisting of a set of knowledge, skills and attitudes acquired through higher education and continuing education. The higher level of midwife education can be interpreted to have more knowledge, skills, and high ability in neonatal health services. At least midwives who have diploma/bachelor education so that midwives who have good knowledge, skills and abilities about neonatal health services according to the standard are also very little that have an impact on the low performance of midwives in neonatal health services. The level of employee performance will greatly depend on the ability of the employee itself such as the level of education, knowledge, experience where the higher the level of ability is likely to have higher performance as well.[6] The results of this study are in line with research Purwaningsih et al. (2015) which states that there is no significant relationship between education and the implementation of neonatal visits by midwives.[7]

The influence of compensation on the performance of midwives in neonatal health services

Based on the results of the fisher's exact test obtained p-value of 0.193 (p>0.05), which means midwife compensation has no influence on the performance of

midwives in neonatal health services. The compensation distribution to midwives in the form of additional allowances for a certain amount of money each month does not affect the performance of midwives in neonatal health services because the compensation provided is not proportional. Compensation provided is not based on the performance of midwives in providing neonatal health services but based on consideration of the workplace and rank of midwife. If compensation were given to midwives in accordance with the performance made by midwives to neonatal health services will improve the performance of midwives.[8] This study is in line with Rachmawati (2014) which states that the performance of village midwives in performing a neonatal visit is increasingly poor due to the poor perception of village midwives towards a compensation system and in line with Merita (2016) that midwives receive financial compensation that is not appropriate, will encourage dissatisfaction in him, so that in doing work will be less good.[9,10]

The influence of training on the performance of midwives in neonatal health services

Based on the results of the fisher's exact test obtained p-value of 0.000 ($p<0.05$), which means that the complete training that midwives have participated in affects the performance of midwives in neonatal health services neonates with PR of 17.778, which means midwives who have completed training have a 18 times greater chance to perform well. Training is a systematic and planned effort so that employees get additional capabilities so that the quality of work gets better.[11] Training is a process that teaches certain knowledge and expertise, and attitudes so that employees become more skilled and able carry out their responsibilities better, in accordance with the standards.[12]

To improve the performance of midwives in neonatal health services, midwives should take a comprehensive series of technical training related to neonatal health services such as midwifery competency training, APN, asphyxia management and LBW management and MTBS. The full technical training followed by a midwife obstetrics can improve the competence to midwife. Factors that influence employee performance is influenced by training.[4] This study is in line with research Suryaningtyas et al (2014) which states there was an influence between training and midwife performance in neonatal visits and supported by Purwaningsih et al (2015) research that training related to handling infants to midwives through asphyxia management training, LBW management, MTBS/MTBM can affect neonatal services in accordance with the service standards that should be provided to neonates.[7,8] There were differences in performance between midwives who have been trained and midwives who have not been trained on MTBM in terms of quality aspects of midwife performance in the management of neonatal visits.[13]

The influence of working period on the performance of midwives in neonatal health services

The chi square statistical test results with a 95% confidence level in the cross table 3 x 2, showed that all expected counts were 2 cells (33.3%) less than 5. So the p-value could not be analyzed so the working period can not be concluded whether or not influence to the performance of midwives in neonatal health services.

Multivariate Analysis

Table 3. Final Models of Multivariate Logistic Regression

Independent Variable	p-value	PR
Training	0.000	23.33
Compensation	0.999	0.000

The results of multivariate analysis showed that the independent variables included in the model were training and compensation and the variable with the strongest influence was the training variable. Variable training is the most dominant variables that affect the performance of midwives in neonatal health services with exponential beta (Exp. B) 23.33. This revealed that training was the most influential variable after gaining control of the education, compensation and training variables. Training is a process that teaches certain knowledge and expertise, and attitudes so that employees are more skilled and able to carry out their responsibilities better, in accordance with standards.[12]

To improve the quality of midwives in accordance with service, non-formal education is developed through training programs, internships, seminars or workshops held in collaboration with professional organizations, the ministry of health, health service facilities, international institutions and others.[14]

The main objectives of the training are to improve performance and upgrade expertise so that it is in line with technological progress. Training is specific, practical and immediate. Specific means that training is related to the field of work being carried out. Practical and immediate means those that have been trained can be put into practice.[15] Training that has been followed by someone who is related to their field of work will be able to affect skills and mentality and will increase their confidence in their abilities, this will positively affect the performance of midwives.[13]

Conclusion

Education has no influence on the performance of midwives in neonatal health services. Compensation has no influence on the performance of midwives in neonatal health services. Training has an influence on the performance of midwives in neonatal health services. The tenure cannot be concluded whether there is no influence or not. The most influential factor on the performance of midwives in neonatal health services in Balangan District is the training.

Ethical Clearance

Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted to protect the human rights and security of research subjects.

Source Funding: This study was done by self-funding from the authors.

Conflict of Interest: The authors declare that they have no conflict interests.

References

[1] Balangan District Health Office. Maternal and Child Health Report of Balangan District Health Office. Balangan. 2018.

[2] Sukamti S, Riono P. Neonatal Health Services Affect Neonatal Death in Indonesia. Journal of Health Science and Technology. 2015; 2: 11-19.

[3] Gibson L, James. Organization and Management Translation Edition. Erlangga Jakarta. 2010.

[4] Sutermeister. People and Productivity. Toronto: Mc. Graw Hill. 1999.

[5] Ilyas Y. Performance, Theory, Assessment and Research. Center for Economic Studies. 2002.

[6] Robbins SP, Judge TA. Organizational Behavior. Salemba Empat Publisher. Jakarta. 2015.

[7] Purwaningsih E, Kartasurya IM, Mawarni A. Relationship between Characteristics of Village Midwives and Behavior in Neonate Services in the Klaten District Health Center Area. Indonesian Health Management Journal. 2015; 3(1).

[8] Suryaningtyas RF, Nugraheni AS, Mawarni A. Analysis of Internal and External Factors Related to Village Midwife Performance in Neonatal Visits in Pati District. Indonesian Management Journal. 2014. 2(2).

[9] Rachmawati I. Factors Influencing the Performance of Midwives in the Village during a Neonatus Visit (Factors that Affect the Performance of Midwifes in Health Centers in the Neonatal Visit). Journals of Ners Community. 2014; 5(1).

[10] Merita. The Effect of Competence, Financial Compensation and Sufficiency on the Performance of Village Midwives in Tebo District. Thesis. Megister Management. Jakarta Open University Postgraduate Program. Jakarta. 2016.

[11] Priansa JD. Performance Management Employees in Processing Resources Human Resources Company. Publisher of CV Pustaka Setia. Bandung. 2017.

[12] Mangkuprawira TB. Strategic Human Resource Management. Ghalia Indonesia. Bogor. 2011.

[13] Muslimah, Suryawati C, Sriatmi A. Analysis of the Differences in the Performance of Village Midwives Who Have and Have Not Been Trained Integrated Management of Young Babies in The Management of Neonalat Visits in Kudus District. Indonesian Health Management Journal. 2013; 1(3).

[14] Yuningsih R. Policy Development Professional Midwives in Efforts to Improve Health Care Mother and Child (Midwifery Profession In Policy Development Efforts To Improve Maternal and Child Health Services). DPR Journal. 1999; 7(1).

[15] Bintoro, Daryanto. Management of Employee Performance Appraisal. Gava Media Publisher. Yogyakarta. 2017.

Identification of Risk Factors in Cervical Cancer

Dewi Rosita Hendriana[1], Dwi Susanti[2], Budi Prasentyo[3], Punky Mulawardhana[3]

[1] Student at Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [2] Lecturer at Department of public health and preventive medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [3] Lecturer at Department of obstetrics and gynaecology, General Hospital of dr. Soetomo, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

Abstract

Background: The prevalence of cervical cancer was about 528.000 cases with mortality rate of 266.000 around the world and was ranked first as the most female genital cancers in developing countries. One of the factors suspected to be the cause of cervical cancer is the long-term use of hormonal contraception. This research aimed to identify risk factors of cervical cancer in General Hospital of Dr. Soetomo Surabaya.

Method: Analytical retrospective study with case control method was used in this study. Information about contraception use and other risk factors was obtained from personal interview. Sampling was done by *accidental sampling technique*. The sample meeting the inclusion and exclusion criteria was divided into two groups, namely 124 case groups and 124 control groups. The data was analysed using *chi-square test* and logistic regression.

Result: Patient using oral contraception for more than 5 years showed the results of OR 5.410; 95% CI = 2.403-12.176 and patient using *Intrauterine Device* (IUD) for more than 5 years had OR 3.016; 95% CI = 1.122-8.113. While prim-gravida age under 20 years was OR 2.621; 95% CI = 1.465-4.688. This data was contrast if compared with female having prim-gravida age above 20 years.

Discussion: Theoretically, the use of the hormonal contraception causes cancer. It is correlated with existence of oestrogen and progestin hormone's role to increase the protein expression of E6 and E7 from HPV. Moreover, young age is indicated to have the condition of intimal genital cells which are immature, so that if pregnancy occurs, it can induce a cell damage and facilitates genital infection.

Conclusion: The use of oral combination contraception and non-hormonal contraception more than 5 years and prim-gravida age is under 20 years are dominant factors influencing cervical cancers in woman

Keywords: *Cervical Cancer, Risk Factors, Oral Contraception, Prim-gravida*

Introduction

Cervical cancer is a global problem experienced by almost all countries in the world, particularly in developing countries. Nowadays, there are more than one million women in this world predicted to suffer cervical cancer.[1] The prevalence of it in 2012 was 528.000 cases and around 266.000 cases ended in death (7.5%) for woman. The mortality caused by cancer almost reached nine-tenth (87%) and occurred in less-developed region.[2]

The main cause of cervical cancer is often associated with infection with human papilloma virus (HPV). Human papillomavirus is a double-stranded group of viral DNA, known to be the most potential HPV types 16 and 18 to cause 70% of cervical cancer cases.[1] Various factors have been reported to be risk factors, including

Corresponding Author:
Dewi Rosita Hendriana
Faculty of Medicine, Universitas Airlangga
Campus A, Jl. Mayjen Prof. Dr. Moestopo 47,
Surabaya, Indonesia (Zip Code: 60131)
Email: dewirosita1305@gmail.com

early sexual intercourse[3], sex multi-partner, smoking[4], and long-term use of hormonal contraception contributes as risk factors of cervical cancer's cause.[5]

The use of hormonal contraception is thought to cause changes in gene expression and increase the incidence of cervical cancer. A study has shown that women using oral hormonal contraception for five years or more have a greater risk of cervical cancer. [6] A systematic review notes that as many as 28 studies, including 12.531 women with cervical cancer showed that the risk of cervical cancer decreased after stopping use of oral hormonal contraception.[7] In 2005, the International Agency for Research on Cancer decided oral hormonal contraception was included in the carcinogenic classification for human uterine cervix based on clinical results, in vitro studies and experimental animals.[2]

Method

This study aimed to identify the risk factors in cervical cancer as an option to prevent this disease. An analytical retrospective study using case control design was used. Period of research was from January to October 2017.

Sample

The accidental sampling technique was used to take the sample. The total sample of the study was 252 respondents divided into two groups consisting of case and control group samples, which each amounted to 126 respondents per group. Case sample was a cervical cancer patient in the One-Stop Oncology Clinic (POSA) Dr. Soetomo. Meanwhile, the control sample was a no-cancer patient in the Gynaecology Clinic Dr. Soetomo with a number of 1:1 from the total of cases' sample.

Research Instrument and Data Analysis

Research instruments included: Data on medical records of female patients with cervical cancer in General Hospital Dr. Soetomo, informed consent and questionnaire. Data analysis used bivariate technical of chi-square test and multivariate technical of logistic regression multivariate. Statistical analysis was found to be significant if the number of p-values reached about <0.05. The data collected was processed by using SPSS program version 17. (SPSS.Inc. Chicago, IL)

Result

Distribution of Respondents Demographic

The average age in the control and case group was 47 and 52 years, with the main occupation as a housewife. Respondents, as farmers, were found more in the case group of 20 respondents (16.3%), whereas the control group were 5 respondents (4.1%). The most common type of contraception used in the case group was the combined oral pill (OCC) as many as 49 (39.5%) respondents and in the control group as many as 40 (33.1%) respondents chosen not to use contraception. (Table 1)

Results of Bivariate Analysis of Factors Affecting the Incident of Cervical Cancer

The most chosen type of contraception in the case group is OCC contraception. All contraception groups were analysed using a bivariate test and showed a p-value of 0.004 (p-value <0.05) which means that there is an influence of the use of contraception on cervical cancer events. (Table 2)

The first age to have sex in the most cases group at age <20 years was 70 respondents (56.5%) while in the control group the most had sex at the age >20 years were 79 respondents (65.3%). Bivariate test results on this variable showed a p-value of 0.001 (p-value <0.05) which meant that there was a correlation between the age of first sex with cervical cancer with an OR value of 2.438 (95% CI = 1.456-4.084).

The number of sex partners showed a difference between the case group and the control group. A total of 30 respondents (24.2%) in the case group had sex partners >1 person, whereas in the control group only 21 respondents (17.4%). Bivariate test in this variable showed a p-value of 0.189 (p-value>0.05) which meant that there was no influence between the number of partners in sex with the incidence of cervical cancer.

Bivariate testing on age of prim-gravida variable shows a p-value of 0.002 (p-value <0.05) which meant that there was an influence between the age of first pregnancy and the incidence of cervical cancer in women. Parity data of respondents in the study showed as many as 107 (86.3%) respondents in the case group had a history of parity > 2 times during life while, in the control group showed as many as 82 respondents (67.7%).

Multivariate Analysis' Result of Factors Affecting the Occurrence of Cervical Cancer

Non-hormonal contraception users >5 years have an odds ratio (OR) of 3.016 (95% CI=1.122-8.113), meaning that women who use non-hormonal contraception >5 years tend to have a risk of contracting cervical cancer 3.016 times greater than women who do not use contraception. (Table 3)

The prim-gravida age has a significant value with OR 2.621 (95% CI=1.465-4.688), meaning that women who are first pregnant less than 20 years tend to have a risk of cervical cancer 2.621 times greater than women who are pregnant when they are above 20 years old.

Based on the final results of the analysis, it can be seen that the value of Negelkerke R square is 0.165, which means that the variability of the dependent variable that can be explained by the independent variable is 16.5%, while the remaining 83.5% is explained by other variables outside the model research.

Table 1. Distribution of Respondents Demographic

Variable	**Case (n=124)**	**Control (n=121)**
	n (%)	n (%)
Age		
20-29 Years	0 (0%)	11 (9%)
30-39 Years	8 (6.4%)	22 (18%)
40-49 Years	42 (33.9%)	37 (30.7%)
50-59 Years	50 (40.3%)	24 (19.9%)
60-69 Years	21 (17%)	27 (22.4%)
70-79 Years	3 (2.4%)	0 (0%)
The number of Contraception		
Do not use	24 (19.5%)	40 (33.1%)
Combined Oral Pill	49 (39.5%)	24 (19.8%)
Injection /3months	22 (17.7%)	29 (24%)
Injection /month	4 (3.2%)	5 (4.1%)
Implant	5 (4%)	7 (5.8%)
IUD	20 (16.1%)	16 (13.2%)

Table 2. The Bivariate Analysis' Results of Factors Influencing the Incidence of Cervical Cancer

Variable	Cervical Cancer Case (n=124) n (%)	Control (n=121) n (%)	p-Value	OR (95% CI)
Contraception			0.004*	
Do not use	24 (19.5%)	40(33.1%)	REF	
Combined Oral Pill <5	7 (5.6%)	10 (8.3%)	0.782	1.167 (0.392-3.471)
Combined Oral Pill >5	42 (33.8%)	14 (11.4%)	0.000	5.000 (2.272-11.002)
Other hormonal <5	10 (8%)	15(12.4%)	0.827	1.111 (0.431-2.864)
Other hormonal >5	21 (17%)	26 (21.5%)	0.447	1.346 (0.626-2.896)
Non-Hormonal <5	6 (4.8%)	6 (5%)	0.419	1.667 (0.483-5.757
Non-Hormonal >5	14(11.3%)	10 (8.3%)	0.082	2.333 (0.897-6.072)
The First Sex Age			0.001*	2.438 (1.456-4.084)
>20 Years	54 (43.5%)	79 (65.3%)	REF	
<20 Years	70 (56.5%)	42 (34.7%)		
The Number of Sex Partners			0.189*	1.520 (0.814-2.838)
1 Person	94 (75.8%)	100 (82.6%)	REF	
>1 People	30	(24.2%)	21(17.4%)	
Prim gravida			0.002*	2.314 (1.348-3.973)
>20Years	69(55.6%)	90(74.4%)	REF	
<20 Years	55 (44.4%)	31(25.6%)		
Parity			0.001*	2.994 (1.581-5.667)
<1 times	17 (13.7%)	39(32.3%)	REF	
>2 times	107 (86.3%)	82(67.7%)		

(*) Significant result by using *p-value*<0.25

Table 3 The Multivariate Analysis' Results of Factors Influencing the Incidence of Cervical Cancer

Variable	B	p-Value	OR (95% CI)	
Contraception		0.002*		
Do Not Use		REF		
Combined Oral Pill <5	0.82	0.886	1.086	(0.354-3.333)
Combined Oral Pill >5	1.688	0.000*	5.410	(2.403-12.176)
Other Hormonal <5	0.265	0.594	1.303	(0.492-3.454)
Other Hormonal >5	0.322	0.423	1.379	(0.628-3.031)
Non-Hormonal <5	0.678	0.297	1.970	(0.552-7.033)
Non-Hormonal >5	1.104	0.029*	3.016	(1.122-8.113)
Prim gravida	0.963	0.001*	2.621	(1.465-4.688)
>20 Years		REF		
<20 Years				
Constant	-0.912			

(*) Significant result by using *p-value*<0.05

Discussion

A study conducted in 2014 showed 75% of cervical cancer sufferers were contraceptive users with the most choices, namely hormonal contraception as much as 69.2%.[8] The choice of contraception found 80 case group respondents chose to use hormonal contraception compared to 40 control group respondents who mostly chose not to use contraception. Cervical cancer patients who use oral contraception as much as 26.67%, injection contraception as much as 25.71%, IUD contraception as much as 20.95% and implant contraception as much as 3.81%.[9]

The use of contraception is often associated with the incidence of cervical cancer, specifically the use of hormonal contraception.[10] The mechanism that occurs theoretically is the role of the hormones oestrogen and / progestin to increase the expression of E6 and E7 proteins from HPV. The functions of E6 and E7 proteins themselves as degradation of tumour suppressor genes p53 and pRb.[11] The duration of contraception is often a factor in increasing the risk of cervical cancer. Risk factors will continue to increase with the length of time of exposure to hormonal contraception.[7] The effect is very weak, however, it can become stronger as the duration of use increases.[4]

There was a correlation between the age of first sexual intercourse and the incidence of cervical cancer with the results of bivariate analysis p-value = 0.001 (p<0.05). Women with the age of first sexual intercourse <20 years had an increased risk of cervical cancer by 1.75 when compared with women who have first sexual intercourse at age >20 years (95% CI=1.01-3.03). [12]

The number of sex partners is also a risk factor for cervical cancer. Cervical cancer is closely related to HPV infection. HPV is a virus that can be transmitted

through sexual intercourse whether vaginal, anal, or oral sex. The bivariate test showed the number of sex partners did not show a significant correlation to the incidence of cervical cancer with p-value = 0.189 (p>0.05).

Prim-gravida occurring in too young age is also a risk for cervical cancer. This is proved by the results of bivariate analysis that have been carried out showing a correlation between the age of first pregnancy <20 years and the incidence of cervical cancer with p-value = 0.002 (p <0.05). Most cervical cancer sufferers experience prim-gravida at the age of ≤ 18 years as many as 51 people (57.3%), whereas cervical cancer patients for those > 18 years were 38 people (42.7%).[13] Other studies conducted at Sanglah Hospital Denpasar, Bali, showed the highest incidence of cervical cancer in the 2-4 parity group of 33 people (68.8%).[14]

The variables having a significant effect on response variables were the use of OCC>5 years which meant that women who use OCC>5 years tended to have a risk of contracting cervical cancer 5.410 times greater compared to women who do not use OCC. Women using oral contraceptives for >5 years were more at risk of suffering from cervical cancer 4.17 times compared to those using oral contraceptives for less than five years or having never used oral contraceptives.[15, 16]

The use of non-hormonal contraception, the IUD, indicates meaningfulness in this study. The use of non-hormonal contraception (IUD)>5 years had an OR value of 3.016 (95% CI = 1,122-8,113) which means that women using an IUD>5 years have a risk of 3.016 times greater occurrence of cervical cancer than women who do not use contraception. Women using an IUD have a 12.7 times greater risk of cervical cancer than women who have never used an IUD before.[17]

The analysis result of the variable age for the first time pregnant showed that prim-gravida women aged under 20 years were likely to have a risk of cervical cancer 2.621 times greater than women aged over 20 years. This can be caused because pregnancy at a young age has the condition of cells in the internal genitalia of women are still too young, so that if pregnancy occurs can cause a cell damage and facilitate the occurrence of genital infections.[18] Women having prim-gravida age <20 years have a risk of 2.1 times affected by cervical cancer compared to women who are pregnant at the age of> 20-25 years (95% CI = 1.20-3.67).[12, 19]

Conclusion

The use of OCC and non-hormonal contraception for more than 5 years and the age of prim-gravida less than 20 years are two dominant factors that influenced the risk factor of cervical cancer in women.

Conflic of Interest: The authors declare that they have no competing interests.

Source of Funding: The authors declare that this study was self-funded.

Ethical Clearance : This study received a certificate of ethical clearance from ethical commission of General Hospital of Dr. Soetomo Surabaya Indonesia in 20th January 2017, No. 24/panke. KKE/I/2017

References

1. WHO. Human papillomavirus (HPV) and Cervical Cancer Genewa: World Health Organization; 2016. Available from: http://www.who.int/mediacentre/factsheets/fs380/en/.
2. Globocan. Cervical Cancer Estimated Incidence, Mortality and Prevalence Worldwide in 2012: International Agency for Research on Cancer (IARC); 2012. Available from: http://globocan.iarc.fr/old/FactSheets/cancers/cervix-new.asp.
3. Reis N, Beji N, Kilic D. Risk Factors for Cervical Cancer: Results from a Hospital-Based Case-Control Study. International Journal of Hematology and Oncology 2011;21.
4. Roura E, Castellsagué X, Pawlita M, Travier N, Waterboer T, Margall N, et al. Smoking as a major risk factor for cervical cancer and pre-cancer: Results from the EPIC cohort. International Journal of Cancer 2014;1352:453-66.
5. Plummer M, Peto J, Franceschi S, Cancer obotICoESoC. Time since first sexual intercourse and the risk of cervical cancer. International Journal of Cancer 2012;13011:2638-44.
6. Moreno V, Bosch FX, Munoz N, Meijer CJ, Shah KV, Walboomers JM, et al. Effect of oral contraceptives on risk of cervical cancer in women with human papillomavirus infection: the IARC multicentric case-control study. Lancet 2002;3599312:1085-92.
7. Smith JS, Green J, de Gonzalez AB, Appleby P, Peto J, Plummer M, et al. Cervical cancer and use of hormonal contraceptives: a systematic review.

The Lancet 2003;3619364:1159-67.

8. Nugrahaningtyas. Hubungan Antara Penggunaan Kontrasepsi Hormonal dan Obesitas dengan Kejadian Kanker Leher Rahim di RSUD Kabupaten Sukoharjo [Skripsi]. Surakarta: Universitas Muhammadiyah Surakarta; 2014.
9. Sulistiya DP, Pramono D, Nurdiati D. Faktor-faktor yang berhubungan dengan kejadian kanker serviks di rumah sakit Sardjito Yogyakarta. Berita Kedokteran Masyarakat; Vol 33, No 3 (2017)DO - 1022146/bkm17160 2017.
10. National Cancer Institute. What is Cancer? 2015.
11. Gewin L, Myers H, Kiyono T, Galloway DA. Identification of a novel telomerase repressor that interacts with the human papillomavirus type-16 E6/E6-AP complex. Genes & development 2004;1818:2269-82.
12. Makuza JD, Nsanzimana S, Muhimpundu MA, Pace LE, Ntaganira J, Riedel DJ. Prevalence and risk factors for cervical cancer and pre-cancerous lesions in Rwanda. The Pan African medical journal 2015;22:26.
13. Munagala R, Rai SN, Ganesharajah S, Bala N, Gupta RC. Clinicopathological, but not socio-demographic factors affect the prognosis in cervical carcinoma. Oncology Reports 2010;24:511-20.
14. Aprilia A, Surya I. Profil Kanker Serviks pada Wanita dengan Usia Di Bawah 40 Tahun di Rsup Sanglah Denpasar Periode Juli 2013-Juni 2014. E-Jurnal Medika Udayana 2016;511:1-5.
15. Swandari P, Soetomo S, Widodo MAA, Sutiman BS. High parity and hormonal contraception use as risk factors for cervical cancer in East Kalimantan. Medical Journal of Indonesia 2010;194.
16. La Vecchia C, Boccia S. Oral contraceptives, human papillomavirus and cervical cancer. European journal of cancer prevention : the official journal of the European Cancer Prevention Organisation 2014;232:110-2.
17. Arta OP, Sunaryo R, Murti B. Hubungan antara Pemakaian Alat Kontrasepsi Dalam Rahim (AKDR) dan Kejadian Kanker Serviks di RSUD Dr. Moewardi. Nexus Kedokteran Klinik 2012Vol 1, No 2 (2012): Nexus Kedokteran Klinik.
18. Cibula D, Gompel A, Mueck AO, La Vecchia C, Hannaford PC, Skouby SO, et al. Hormonal contraception and risk of cancer. Human reproduction update 2010;166:631-50.
19. Zhang B, Zhou AF, Zhu CC, Zhang L, Xiang B, Chen Z, et al. Risk factors for cervical cancer in rural areas of Wuhan China: a matched case-control study. Asian Pacific journal of cancer prevention : APJCP 2013;1412:7595-600.

Risk Factors of Hypoxemia in Children With Pneumonia

Eko Wahyudi[1], Tutwuri Handayani[1], Retno Asih Setyoningrum[2]

[1]Resident, [2]Lecturer, Department of Child Health, Faculty of Medicine, Universitas Airlangga

Abstract

Objective To evaluate the risk factors of hypoxemia in children with pneumonia.

Methods A retrospective study was conducted for children aged 2 months until 5 years old with pneumonia who were hospitalized from 2015 to 2016 at Dr. Soetomo Hospital. We evaluated comorbidities as risk factors of hypoxemia in children with pneumonia. Hypoxemia was defined as the arterial partial pressure of oxygen below 80 mmHg recorded from arterial blood gas analysis. We used the chi-square test and logistic regression presented as adjusted odds ratio (OR) and 95% confidence interval (95% CI), two tail test with $p<0.05$.

Result One hundred and ninety-six children with pneumonia enrolled in this study, with 62.2 % were male and 75.5% aged 2-12 months old. Hypoxemia was mostly found in children between 2 until 12 months old (OR 2.012, 95% CI 1.000 to 4.046, $p=0.048$). Univariate analysis revealed sex and almost all comorbidities (malnutrition, down syndrome, neurological disorder, encephalitis, HIV infection, and congenital heart disease) were not risking factors of hypoxemia in children with pneumonia. Logistic regression revealed anemia and severity of pneumonia based on WHO criteria as a risk factor of hypoxemia. Anemia occurred in 89.3% with hypoxemia (adjusted OR 4.984, 95% CI 2.239 to 11.097, $p<0.001$). Hypoxemia occurred in 93.9% of children with severe pneumonia (the OR 6.313, 95% CI 1.418 to 28.106, $p=0.016$).

Conclusion Anemia and severity of pneumonia were risk factors of hypoxemia in children with pneumonia, aged 2 months until 5 years old.

Keywords**:** *children with pneumonia, hypoxemia, risk factor, arterial blood gas analysis, severe pneumonia*

Introduction

Pneumonia is a leading killer of children. More than 2 million children under 5 years old die from pneumonia each year, almost 20% of under 5 deaths worldwide.[1] In 2010, there were almost 4 million new cases of pneumonia in children 0-4 years old in Indonesia. 11.5% of cases were severe and 4.2% severe cases led to death.[2] The etiology of pneumonia can be viral or bacterial. A cohort study in two hospitals in Semarang, Indonesia was found the most common causative agents were Influenza virus (18%), *Klebsiella pneumoniae* (14%), and *Streptococcus pneumoniae* (13%).[3] A study found that age under 4 months or hypoxia (oxygen saturation < 85 percent) were risk factors for mortality in children with pneumonia. The children who had either of the risk factors were 5.6 times more likely to die than children without the factors.[4] To reduce mortality, predictive factors need to be addressed with more attention. Since the decrease in oxygen saturation is an important factor, this research is aimed to find risk factors of hypoxemia in children with pneumonia.

Corresponding Author:
Retno Asih Setyoningrum,
is Doctoral in Department of Child Health, Faculty of Medicine, Universitas Airlangga/ Dr. Soetomo General Hospital. Jl. Mayjen Prof. Dr. Moestopo No. 47, Airlangga, Surabaya, East Java, Indonesia, (+62 31) 5501681,
E-mail: mail: retnosoedijo@yahoo.co.id

Materials and Method

A retrospective study was performed at the pediatric ward at Dr. Soetomo Hospital. The subjects were children aged 2 months until 5 years old hospitalized

with pneumonia from January 2015 until December 2016. Pneumonia was defined by WHO criteria fast breathing of at least 50 breaths per minute in a child aged 2-11 months and at least 40 breaths per minute in a child aged 1-5 years and also chest indrawing.

Age, gender, and clinical presentations were recorded. The severity of pneumonia was based on WHO criteria which are a cough or difficulty breathing with at least oxygen saturation below 90% or severe respiratory distress or one of the danger sign (inability to drink, reduced level of consciousness, convulsions). Comorbidities as risk factors of hypoxemia were evaluated from clinical, laboratory and radiology data. Complete blood count and blood-gas analysis were performed on admission. Hypoxemia was defined as the arterial partial pressure of oxygen below 80 mmHg recorded from arterial blood gas analysis.

Chi-square test and logistic regression were performed using SPSS. Adjusted odds ratio (OR) were presented using 95% confidence interval and two-tail test. *P*-value of <0.05 was considered significant. This study was approved by The Ethical Committee of Faculty of Medicine Universitas Airlangga – Dr. Soetomo Hospital.

Results

196 patients were enrolled in this study. Patients' age ranged from 2-56 months, with 75.5% being 2-12 months old. 62.2 % of patients were male (Table 1). Apparently, hypoxemia was very common from our patients. From all the pneumonia patients, 144 children (73.5%) had hypoxemia from the blood gas analysis. We found that mostly hypoxemic patients were in the age group 2-12 months old.

We analyzed several comorbidities in the subjects (Table 2). Comorbidities were common among the patients. Most patients with comorbidities were more likely to have hypoxemia, except malnutrition and congenital heart disease. From univariate analysis using chi-square, anemia (OR 5.193; 95% CI 2.358-11.43) and severe pneumonia (OR 6.858; 95% CI 1.580-29.77) were significant risk factors for hypoxemia.

The risk factors significant during univariate analysis were entered into a multivariate model using logistic regression. We found that anemia (adjusted OR 4.984; 95% CI 2.239-11.097) and severe pneumonia (adjusted OR 6.313; 95% CI 1.418-28.106) continued to be associated with hypoxemia (Table 3).

Anemia occurred in 84 patients (42,9%). 89.3% children with anemia had hypoxemia. Most children (41.8%) had moderate anemia (Hb=7-10). 20.4% patients had mild anemia, while only 1.5% patients had severe anemia (Hb<7). Severe pneumonia occurred in 33 patients (16.8%), yet 93.9% of them had hypoxemia.

Discussion

Most of the patients were in the age range of 2-12 months old. This result was similar to a 2009 study in Taiwan where children aged younger than 1-year-old had the highest incidence of pneumonia.[5] The hypothesis was that in this age group, viral etiology is greater. However, pneumococcal/lobar pneumonia was greater in children aged 2-5 years old, due to higher pneumococcus colonization rate in kindergarteners. Another study also found that community-acquired pneumonia was higher in children aged under 2 years than in those aged 2-6 years.[6] Almost two-thirds of our patients were male. Some studies also had more male child with pneumonia than female, usually around 60% male and the rest female.[7,8]

Malnourished children in our study were less likely to have hypoxemia than children without malnutrition. This finding was different from what a study in Bangladesh which found more children with hypoxemia had malnutrition, although it was not significantly related.[9] The case fatality rate, however, was still higher in malnourished children due to late recognition of pneumonia, immunodeficiency, comorbidities such as diarrhea, and delayed health-seeking behavior.

From our finding, children with Down syndrome, neurological disorder, and encephalitis was more vulnerable to hypoxemia, even though they were not significantly related. Children with neurologic disorder such as cerebral palsy, developmental delay, Down syndrome, epilepsy, and other diseases were more commonly hypoxic than children with other non-neurological underlying conditions or without underlying conditions. Children with neurological disorders also were more likely to be admitted to ICU.[10]

Hypoxemia occurred in all of the patients with HIV infection, but HIV status was not significantly related to hypoxemia. HIV exposed children had higher rates of treatment failure and in-hospital mortality than HIV-unexposed children. But, the same study found no

significant differences in hypoxia and WHO disease severity by HIV exposure status.[11]

34.2% of the children in this study had congenital heart disease (CHD). However, the proportions of hypoxemia were higher in children without CHD. The prevalence of CHD was higher than a study in Nigeria with the prevalence of 11.6%.[12]

We found that anemia was a significant risk factor for hypoxemia. A study found that anemic children were four times more susceptible to develop pneumonia compared with non-anemic children.[13] Anemia caused erythrocytes' inability to provide adequate oxygen to the body's tissues.[14]

Furthermore, iron deficiency made it easier to contract acute lower respiratory tract infection. Alveolar macrophages may be difficult to obtain iron from red blood cell metabolism in iron deficiency states.[15]

One study found that cyanosis was higher in children with iron deficiency anemia.[16] Anemia also was associated with severe acute lower respiratory infection in another study.[17] It is reasonable that early and accurate diagnosis of iron deficiency anemia in children and supplementation iron can reduce the incidence and severity of pneumonia in children.

Severe pneumonia also was significantly related to hypoxemia. This consolidated that blood oxygenation remained an essential factor for evaluating pneumonia severity and need for hospitalization. Risk of death in children with hypoxemia was 1.4 to 4.6 times higher than in those without hypoxemia.[18] Oxygen administration is essential in treating severe pneumonia, with the recommendation of giving by nasal cannulae.

Conclusion

From the multivariate analysis, we found anemia (adjusted OR 4.984; 95% CI 2.239-11.097) and severity of pneumonia (adjusted OR 6.313; 95% CI 1.418-28.106) were risk factors of hypoxemia in children with pneumonia, aged 2 months until 5 years old. Early diagnosis and management of risk factors associated with hypoxemia can help reduce mortality in cases of pneumonia in children.

Table 1. Characteristic of Pneumonia Patients at Pediatric Ward of Dr. Soetomo Hospital from January 2015-December 2016

Comorbidities	Patients n (%)	Hypoxemia proportions in children with comorbidity	Hypoxemia proportions in children without comorbidity	OR (95% CI)	p
Malnutrition	83 (42.3)	71.1	75.2	0.810 (0.428-1.533)	0.517
Down syndrome	13 (6.63)	84.6	72.7	2.068 (0.443-9.658)	0.346
Neurological disorder	26 (13.3)	76.9	72.9	1.237 (0.467-3.272)	0.668
Encephalitis	7 (3.6)	85.7	73	2.217 (0.261-18.87)	0.455
HIV infection	5 (2.6)	100	72.8	1.374 (1.260-1.499)	0.173
Congenital heart disease	67 (34.2)	70.2	75.2	0.775 (0.401-1.498)	0.448
Anemia	84 (42.9)	89.3	61.6	5.193 (2.358-11.43)	0.000
Severe pneumonia	33 (16.9)	93.9	69.3	6.858 (1.580-29.77)	0.003

Table 2. Univariate Analysis of Comorbidities in Pneumonia Patients at Pediatric Ward of Dr. Soetomo Hospital from January 2015-December 2016

Table 3. Multivariate Analysis of Risk Factors for Hypoxemia

Risk factors	Adjusted OR (95% CI)	p
Anemia	4.984 (2.239-11.097)	<0.001
Severe pneumonia	6.313 (1.418-28.106)	0.016

Source of funding : self

Conflict of Interest : -

References

1. Wardlaw T, Salama P, Johansson EW, Mason E. Pneumonia: the leading killer of children. The Lancet. 2006;368(9541):1048-50.
2. Rudan I, O'Brien KL, Nair H, Liu L, Theodoratou E, Qazi S, et al. Epidemiology and etiology of childhood pneumonia in 2010: estimates of incidence, severe morbidity, mortality, underlying risk factors and causative pathogens for 192 countries. Journal of global health. 2013;3(1):010401.
3. Farida H, Gasem MH, Suryanto A, Keuter M, Zulkarnain N, Satoto B, et al. Viruses and Gram-negative bacilli dominate the etiology of community-acquired pneumonia in Indonesia, a cohort study. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases. 2015;38:101-7.
4. Djelantik IG, Gessner BD, Sutanto A, Steinhoff M, Linehan M, Moulton LH, et al. Case fatality proportions and predictive factors for mortality among children hospitalized with severe pneumonia in a rural developing country setting. Journal of tropical pediatrics. 2003;49(6):327-32.
5. Wu PS, Huang LM, Chang IS, Lu CY, Shao PL, Tsai FY, et al. The epidemiology of hospitalized children with pneumococcal/lobar pneumonia and empyema from 1997 to 2004 in Taiwan. European journal of pediatrics. 2010;169(7):861-6.
6. Gentile A, Bardach A, Ciapponi A, Garcia-Marti S, Aruj P, Glujovsky D, et al. Epidemiology of community-acquired pneumonia in children of Latin America and the Caribbean: a systematic review and meta-analysis. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases. 2012;16(1):e5-15.
7. Haider N, Nagi AG, Khan KM. Frequency of nutritional rickets in children admitted with severe pneumonia. JPMA The Journal of the Pakistan Medical Association. 2010;60(9):729-32.
8. Banstola A, Banstola A. The epidemiology of hospitalization for pneumonia in children under five in the rural western region of Nepal: a descriptive study. PloS one. 2013;8(8):e71311.
9. Chisti MJ, Ahmed T, Faruque AS, Abdus Salam M. Clinical and laboratory features of radiologic pneumonia in severely malnourished infants attending an urban diarrhea treatment center in Bangladesh. The Pediatric infectious disease journal. 2010;29(2):174-7.
10. Millman AJ, Finelli L, Bramley AM, Peacock G, Williams DJ, Arnold SR, et al. Community-Acquired Pneumonia Hospitalization among Children with Neurologic Disorders. The Journal of pediatrics. 2016;173:188-95.e4.
11. Kelly MS, Wirth KE, Steenhoff AP, Cunningham CK, Arscott-Mills T, Boiditswe SC, et al. Treatment Failures and Excess Mortality Among HIV-Exposed, Uninfected Children With Pneumonia. Journal of the Pediatric Infectious Diseases Society. 2015;4(4):e117-26.
12. Sadoh WE, Osarogiagbon WO. Underlying congenital heart disease in Nigerian children with pneumonia. African health sciences. 2013;13(3):607-12.
13. Rashad M, Fayed S, El-Hag AM. Iron-deficiency anemia as a risk factor for pneumonia in children. Benha Medical Journal. 2015;32(2):96-100.
14. Scott SP, Chen-Edinboro LP, Caulfield LE, Murray-Kolb LE. The impact of anemia on child mortality: an updated review. Nutrients. 2014;6(12):5915-32.
15. Hussain SQ, Ashraf M, Wani JG, Ahmed J. Low Hemoglobin Level a Risk Factor for Acute Lower Respiratory Tract Infections (ALRTI) in Children. J Clin Diagn Res. 2014;8(4):PC01-PC3.
16. Ahmad S, Banu F, Kanodia P, Bora R, Ranhotra A. Assessment of Iron Deficiency Anemia as a Risk Factor for Acute Lower Respiratory Tract

Infections in Nepalese Children- A Cross-Sectional Study. Annals of International medical and Dental Research. 2016;2.

17. Jackson S, Mathews KH, Pulanic D, Falconer R, Rudan I, Campbell H, et al. Risk factors for severe acute lower respiratory infections in children: a systematic review and meta-analysis. Croatian medical journal. 2013;54(2):110-21.
18. Principi N, Esposito S. Management of severe community-acquired pneumonia of children in developing and developed countries. Thorax. 2011;66(9):815-22.

Frequently Seen Advertising to Negative Body Images Arising in Adolescents in East Java

Faizatur Rohmi[1], Hardiyanto[1], Sekarini[1], Ronal Surya Aditya[1]

[1]Lecturer, Sekolah Tinggi Ilmu Kesehatan Kepanjen

Abstract

Background: Mass media has a very important role in the life of millennial society today, this is because the mass media is one of the communication media as well as educational media which are the main choice for information sources for the community. Poor perceptions of body image have proven that it can have consequences that can damage health. Even body image is an important aspect of mental health, self-esteem and well-being.

Methode : This study was used a cross-sectional method. The sampling technique in this study was used Random Sampling with a total of 90 students. This research was conducted in Malang. Data collection procedures in this study used the Multidimensional Body-Self Relations Questionnaire-Appearance Scale (MBRSQ-AS) body image questionnaire and the modification of the Stress Level Questionnaire.

Result : This study shows that 70 respondents (77,8%) of the total 90 respondents still had a Advertising beauty products. Spearman correlation value of - 0.430 shows a correlation with moderate strength and a negative correlation direction which means there is an inverse relationship between body image with Ads that are often seen

Conclussion : Advertising of beauty products affects the body image of teenagers. This is likely caused by the mass media ads which is often seen by adolescents. So teenagers are want to look like in the ads that are displayed

Keywords: *Advertising, Body Images, Adolescents*

Background

Mass media has a very important role in the life of millennial society today, this is because the mass media is one of the communication media as well as educational media which are the main choice for getting information sources for the community[1]. Advertising is one type of mass media that is much favored by the public[2]. On a daily basis, the average public is exposed to various types of advertisements and even these advertisements are able to become one of the lifestyle inspirations for the community at large. On the other hand this ad is considered something important to display because it is related to economic and social growth issues. So it is not uncommon for advertisers to make some manipulations to convince the public to imitate, idolize or even use as advertised[3].

Adolescence is a transition from children to adulthood. At this time they tend to be emotionally unstable and often feel insecure, making it easier to convince what has been advertised. Moreover, during adolescence, physical appearance is often a symbol of beauty and feminism as well as the confidence to be able to appeal to the opposite sex. Adolescents who are generally young women are often targeted targets for advertising. The existence of characteristics like the one above that has been inherent in most young women in particular, serve as a reason for advertisers to always display proportional beauty and body features as one of the attractions in these advertisements[3].

Corresponding author:
Ronal Surya aditya
Kepanjen STIKes
Email: Suryaronal@gmail.com

Based on the results of research that has been done mentioned that more than 50% of young women assume that their peers have problems that are not good with their body image[4]. Nearly one-third and half of young women are afraid and worried about their appearance and weight gain or getting fat so often they go on an excessive diet5.

Poor perceptions of body image have proven that it can have consequences that can damage health. Even body image is an important aspect of mental health, self-esteem and well-being. In several studies that have been carried out mention that the media always depicts an ideal body image and this is often a factor that causes someone to be like what is advertised so that not infrequently many young women who do ways that tend to be extreme even some teenage girls especially until they arise against eating disorders5.

Methode

This study was used a cross-sectional method. The sampling technique in this study was used a Random Sampling System with a total sample of 90 students. This research was conducted in Malang.

Ads that are often seen Advertising beauty products Idol figure advertisement Total	 70 20 90	 77,8 % 22,2 % 100 %

Data collection in this study used the Multidimensional Body-Self Relations Questionnaire-Appearance Scale (MBRSQ-AS) body image questionnaire and the modification of the Stress Level Questionnaire which refers to the theory of Distress and Eustress Hans Selye which refers to body image. The questionnaire was then given and filled out by students who were willing to become respondents and had fulfilled the inclusion and exclusion criteria. After all data has been collected and checked for completeness then a data analysis is performed.

Result

Table 1 Characteristics of respondents by age, advertisements viewed, and indicators on body image in Malang Regency.

Characteristics of Respondents	**Freq**	**(%)**
Age 15 years 16 years 17 years 18 years Total	 11 33 23 23 90	 12,1 % 36,7 % 25,6 % 25,6 % 100 %
Body image Indicator Appearance Evaluation Appearance Orientation Satisfaction with Body Parts Anxiety becomes Fat Categorization of body size Total question	 Number of question 7 12 9 4 2 34	 % 20,4 % 38,2 % 25,7 % 10,2 % 5,5 % 100 %

Table 2 Distribution of body image type in Malang Regency.

No	**Body image**	**Frek**	**(%)**
1	Positive body image	47	52,2%
2	Negative body image	43	47,8%
	Total	90	100%

Table 2 shows that 47 respondents (52.2%) of the total 90 respondents still had a negative body image.

Table 3 Distribution of add frequently seen.

Ads that are often seen		
Advertising beauty products	70	77,8 %
Idol figure advertisement	20	22,2 %
Total	**90**	**100 %**

Table 3 shows that 70 respondents (77,8%) of the total 90 respondents still had a Advertising beauty products.

Table 4 Spearman's Rho Test Results Relationship of Body Image with Ads that are often seen

		Ads that are often seen
Body image	R	- 0,430
	P	0,000
	N	90

Table 4 shows that the Spearman's Rho test obtained a p-value of 0,000 <a (0.05) and a Spearman correlation value of - 0.430 shows a correlation with sufficient strength and a negative correlation direction which means there is an inverse relationship between body image with Ads that are often seen.

Discussion

The results of this study highlight the effects of advertising on the body image of teenage girls, aged between 17 and 19 years at vocational high school studying in Sumberpucung District, Malang Regency. This study focuses on body image owned by teenage girls due to the influence of beauty advertisements. The source of these advertisements comes from the mass media that are seen everyday by them. These sources include Instagram, television, youtube which are very popular among teenagers at the vocational high school. The specific hypothesis of this study is that there will be a negative correlation between exposure to beauty advertisements and body image in adolescent girls, which means that more media exposure is used as an ideal beauty concept, so their body image is more likely to be negative[5].

This research is supported by other studies which which states that the negative feelings they have about their bodies are due to the large contribution of beauty advertisements that they often see[6]. The exposure of advertisements that are often see by them is able to become socio-cultural values or to be a certain understanding of the ideal body concept[5]. Similar research states that the body image they possess is one of the reflection aspects of a person's mental health, self-esteem, and well-being[7].

Research on 135 children found that the desire to have a thin body shape is often found around the age of 13 years old. This relates to the mindset or perception of their parents, especially their mothers, because at the age of adolescence they tend to fulfill their own need, especially in terms of appearance [8]. Another study also revealed that 59% of young women want a thinner body than young men. As many as 42% of girls have wanted their bodies to be thinner. Data colected on 785 women from various ethnic backgrounds was found that only one of these tests showed that black and Hispanic women did not have ideal skinny internalization compared to white women. Indeed, they concluded that socio-cultural factors might now have the same effect in all ethnic groups [9]the number of maternal mortality in Balangan in 2014 there were 294.3/100,000 live births. One of the efforts to decrease MMR through antenatal class pregnancy, right election for the delivery assistance and optimize the program through the role of midwife. This study used qualitative method. Population is the midwife in the working area of Health Office Balangan District and informant is 13 midwife coordinator. The research instrument is indepth interviews guide. Data were analyzed qualitative (interview transcript. The similarity of ethnic groups was also found when they concluded that while white women were slightly more dissatisfied with body image than other ethnic groups, the difference was very small and might indicate that body image problems were not the only the problem[10].

Based on previous research, it was stated that ethnic or racial differences also triggered the emergence of perceptions about the ideal body concept of a relatively thin body. In a study using in-depth interviews with 49 white women and 11 black women it was found that women from the black race tended to have a different perspective on the effects of beauty advertisements compared to women who had white skin[11]. White respondents indicated that the desire to appear as shown in advertisements to have a thin body was relatively high, and black respondents were more likely to criticize the appearance of a model with a thin body shape and they said that black men wanted women who had bodies that were not too thin [12].

Actually it has also been recognized that the concept of body image always changes from generation to generation. Around the 1950s the ideal body indicator is if you have a curved body with a small waist. But in this era changed that the ideal body is considered a thin body condition. One study found that 94% of women's magazine covers were depicted with images of ideal thin bodies. Adolescent perceptions, especially young women about advertising, locus of control and self-efficacy are related to eating habits and body image [13]. Based on the results of research that has been done it is mentioned that young women who have a realistic perception of body image and eating habits tend to have a higher internal locus of control and a higher level of self-efficacy [14]such as the provision and delivery of Methadone (as legal drugs. Vice versa, women who are satisfied with their weight tend to have a positive appearance evaluation as part of their body image[15]

Another Research states that young girls with white skin who are often exposed to beauty advertisements

such as fashion magazines report having a higher level of body dissatisfaction[16]. And they also found that young girls with blacks showed that they did not compare themselves to the images in advertisements or even just wanted to look like them because they assumed that beauty was not a white and thin problem[17].

Conclusion

Advertising of beauty products affects the body image of teenagers. this is supported by the mass media which is often seen by adolescents. so teenagers are affected to be like the ads that are displayed

Conflict of Interest Statement : None

Source of Funding: This research was fully funded by Sekolah Tinggi Ilmu Kesehatan Kepanjen

Ethical Clearance: Not required

References

1. Wardani CK, Widyawati MN, Suryono S. The effectiveness of acupressure at LI 4 and SP 6 point on uterine contraction in the first stage of labor on primiparous women. Indian J Public Heal Res Dev. 2018;9(11):565–70.
2. Sasi R V, Professor S, Maran K. Advertisement Pressure and Its Impact on Body Dissatisfaction and Body Image Perception of Women in India. 2012;3(1):1–9.
3. Sasirekha V. Advertisements Impact on Body Image Investment Practices of Women in India. Mass Commun Int J Commun Stud. 2017;11(1):33.
4. YMCA. Reflections on Body Image. Reflections body image. 2012;10.
5. McCabe MP, Mavoa H, Ricciardelli LA, Waqa G, Fotu K, Goundar R. Sociocultural influences on body image among adolescent boys from Fiji, Tonga, and Australia. J Appl Soc Psychol. 2011;41(11):2708–22.
6. Rohmi F. Korelasi Antara Beban Keluarga Dengan Kemampuan Komunikasi Keluarga Pada Penderita Skizofrenia. J Kesehat Mesencephalon. 2017;3(1):1–5.
7. Cory AL, Burns SR. What Did She Say? An Examination of the Influence of Conversation and Media Exposure on Participants' Body Objectification and Anxiety. Psi Chi J Psychol Res. 2007;12(3):97–103.
8. Isa Ma'rufi , Eri Witcahyo HSWN. Analysis of Environmental Health Risks Resulting from Exposure to Pollution Materials. Indian J Public Heal Res Dev. 2018;9(8):27.
9. Rahman F, Marlinae L, Setyaningrum R, Putri AO, Hilmiyati. The role of midwife through antenatal class pregnancy for improvement delivery assistance with professional health workers. Indian J Public Heal Res Dev. 2018;9(1):170–4.
10. Grabe S, Hyde JS. Ethnicity and body dissatisfaction among women in the United States: A meta-analysis. Psychol Bull. 2006;132(4):622–40.
11. Publications S. Social Comparisons , Reflected Appraisals , and Mass Media : The Impact of Pervasive Beauty Images on Black and White Girls ' Self-Concepts Author (s): Melissa A . Milkie Source : Social Psychology Quarterly , Vol . 62 , No . 2 , Special Issue : Qualita. 2016;62(2):190–210.
12. Aditya RS, Qur'aniati N, Krisnana I. Influence of Health Education Short Film Media Lecture Methods on Knowledge, Attitudes, and Practices of Mother About Early Detection of Children Diphtheria Cases. Pediomaternal Nurs J. 2014;
13. Harper B, Tiggemann M. The effect of thin ideal media images on women's self-objectification, mood, and body image. Sex Roles. 2008;58(9–10):649–57.
14. Aditya RS, S FK, Yusuf A, Suwito J. Experience of the Healthworkers in Conductin Methadone Rehabilitation Therapy at the Public Health Center. Dama Int J Res. 2017;2(2):107–13.
15. Haytko DL. A Study Of Middle School Adolescents. 2017;(January 2013).
16. Aditya RS, Solikhah FK, Kurniawan SB. Teenager Response to the Conditions of Basic Level Emergency: A Phenomenology Study. Indian J Public Health. 2019;10(1):170.
17. Levine MP, Harrison K. Media's role in the perpetuation and prevention of negative body image and disordered eating. Handb Eat Disord Obes [Internet]. 2004;0266(April):695–717. Available from: psycnet.apa.org/psycinfo/2004-00177-033

Teachers Perspectives and Practices of Assessment in Health Education in Primary School

Faiznur Maisya Annur Sani[1], Azali Rahmat[2], Gunathevan a/l Elumalai3 & Ali Md Nadzalan4

[1]PhD Candidate, [2]Associate Professor, [3]Associate Professor, [4] Senior Lecturer, Faculty of Sports Science and Coaching, Universiti Pendidikan Sultan Idris, Malaysia

Abstract

Health Education is one of the core subjects studied in primary and secondary schools in Malaysia. However, assessment through Health Education is not widely used among teachers as there is no standardized assessment to test the level of students understanding. This study was conducted to determine the perspectives and practices of assessment among Health Education teachers. 40 Health Education teachers from 5 schools in Bukit Mertajam, Pulau Pinang were involved in this study. A set of questionnaires were used as a research instrument containing 37 items using Likert scale. The reliability value of the instrument is $\alpha = 0.80$. Data were analysed using Statistical Package for the Social Science (SPSS) software version 23.0. Results showed all the teachers are only at 'Agree' and 'Undecided levels for all the perspectives items about assessment that have been given. The component item for types and forms of assessment component showed the highest percentage of 37.5% and 20% teachers are at 'agree' level with mean value of 3.30. Meanwhile, as for the frequency of assessment practices results showed all the items were rated only at 'Sometimes' and 'Frequently'. No significant difference was found in the mean item level between male and female teacher for both agreement and frequency item. The overall mean of assessment items is at a 'agree' and 'sometimes' level of 3.45 and 3.74 respectively. Results demonstrate the effectiveness of assessment activities involvement teachers in developing their knowledge in classroom assessment.

Keywords: *perspectives, practices, assessment, health, education.*

Introduction

Assessment is defined as 'the process of gathering, recording, interpreting, using and reporting information about students' progress and achievements in developing knowledge, skills and attitudes[1]. Assessment has become the medium to acknowledge children's achievement and understanding in schools[2]. There two types of assessment which involves a variety of practices including Assessment for Learning and Assessment of Learning which is formative and summative techniques[3,4]. Formative assessment is frequent interactive assessment of student progress to identify learning needs and feedback teaching skills appropriately. While summative assessment is an appraisal learning at the end of every sub unit to compares student knowledge or skills against standards[5].

Assessment is well known as main part of the teaching and learning cycle in and health education context[6]. Traditionally, health education assessment has focused on testing student knowledge through examination task to help assess what a student gain form their learning process of understanding of health related concepts, their ability to demonstrate health skills, and ability to apply conceptual learning and skills in ways to improve their personal health.

Health education context can, however, provide assessment challenge for educators in order to set academic standard or learning targets, indicating what students understand an applied as a result of instruction. These includes the difficulties of assessing learning in the affective and psychomotor component which their very nature and fleeting[7,8]. According to schools

Corresponding author:
Azali Rahmat
Associate Professor, Faculty of Sports Science and Coaching, Universiti Pendidikan Sultan Idris, Malaysia, Email: azali@fsskj.upsi.edu.my

today relay 100 percent on the cognitive component in making assessment through the mid-year and final year examination[9]. However, the teachers should not sort their students in rank but to access student work over time and provide descriptive feedback for them to improve and succeed.

Therefore, an effective classroom assessment should occur including variety of methods, providing student achievement records and descriptive feedback to the student. It is necessary that the student noted the objectivity of learning and the assessment criteria to work toward proficiency with their teachers. Both teachers and students will take their responsibility for learning and teaching skills to improve their instruction.

This study aimed to examine the perspective and practices implemented by the Health Education teachers in primary schools. The classroom assessment practices questionnaire will detect all the agreement perspectives and practices the teachers applied during their teaching process. The results of this study are great importance to all the educators in improving their knowledge in applying their teaching skills for accessing student.

Methodology

Participants

In this study, researchers have selected Health Education teachers who have option in Physical Education and Health Education for their qualification. There were 40 Health Education teachers selected as samples in this study. They have been teaching for three (3) years and above in primary school.

Instrument

Classroom assessment questionnaires[10] was used to access perspective and practices of the implementation in assessment. The item of the questionnaire consists of; Item 1 – Alignment, Item 2 – Belief in Assessment, Item 3 - Types and Forms of Assessment, Item 4 - Assessment Management and Item 5 - Creativity and Innovation.

The criteria used in the Classroom Assessment Practices for assessing teacher's perspectives and practices in assessment are the percentage agreement and frequency level. The perspectives level of agreement and frequency used in the Classroom Assessment Practices Questionnaires are; 1 – Strongly disagree, 2 – Disagree, 3 – Undecided, 4 – Agree and 5 – Strongly disagree. The level of frequency is determined by the following; 1 – Never, 2 – Seldom, 3 – Sometimes, 4 – Frequently and 5 – Always.

Data collection

A total of five (5) teachers from among the teachers of the school selected have been appointed to assess and implement the instruments. All the sample were assessed in their perception and practices during the teaching process.

Statistical Analysis

Descriptive statistics were used to obtain participants background and mean score. Independent t-test was used to compare the mean score between male and female among the teachers selected. All statistical analysis was done by using Statistical Package for the Social Science (SPSS) software, version 23 (IBM, USA).

Result and Discussion

This study was conducted on the Health Education teachers in primary schools which represents the whole district of Bukit Mertajam, Pulau Pinang. Here's a detail of the demographic background for this study. Table 1 showed the percentage distribution of students by gender. A total of 20 (50%) male teachers and 20 (50%) female teachers were involved in this study.

Table 1. Percentage distribution of teachers by gender and program followed

Gender	N	(%)
Male	20	50
Female	20	50

For the level of agreement classroom assessment practices among the teachers during the assessment, it was found that the teacher perspective the most are only at a "undecided" and "agree" level. For types and forms of assessment component at least 20% of the teachers are at "agree" level and 37.5% of the teachers are at "undecided" level with a mean value of 3.30 in item 22. While the alignment component in item 1 showed the highest percentage of "agree" level that are 52.5% of all the teachers while 12.5% teachers are at "undecided level with mean value of 4.23. The overall mean of classroom assessment agreement is at "agree" level of 3.45.

For the level of frequency classroom assessment practices among the teachers during the assessment, it was found that the teacher frequency in practicing assessment the most are only at a "sometimes" and "frequently" level. For types and forms of assessment component at least 40% of the teachers are at "sometimes" level and 5% of the teachers are at "frequently" level with a mean value of 3.30 in item 22. While the alignment component in item 1 showed the highest percentage of "frequently" level that are 52.5% of all the teachers while 25% teachers are at "sometimes" level with mean value of 4.23. The overall mean of classroom assessment agreement is at "sometimes" level of 3.74.

Table 1 showed the difference in the level of agreement of classroom assessment practices component between male and female teachers. Analysis showed that the value of t (38) = 0.209, p= .087 is insignificant. There was no significant differences in mean agreement level between male and female teachers (M = 101.45, SD = 15.26), with male students (M = 102.60, SD =19.30).

Table 1. Mean Differences in Teachers Agreement Level using Classroom Assessment Practices between Sex.

Gender	**N**	**Mean**	**SD**	**F**	**Sig**	**t**	**df**
Male	20	102.60	19.30	3.08	.087	0.209	38
Female	20	101.45	15.26			0.209	36.07

Table 2 showed the difference in the level of frequency of classroom assessment practices component between male and female teachers. Analysis showed that the value of t (38) = 0.555, p= .159 is insignificant. There was no significant differences in mean frequency level between male and female teachers (M = 113.00, SD = 26.53), with male students (M = 118.15, SD =31.89).

Table 2. Mean Differences in Teachers Frequency Level using Classroom Assessment Practices between Sex.

Gender	N	Mean	SD	F	Sig	t	df
Male	20	118.15	31.89	2.06	.159	0.555	38
Female	20	113.00	26.53			0.555	36.78

Conclusion

The classroom assessment practice component relates to the quality of teaching and learning process in physical and health education and impacted positively on teachers' and learners' perceptions of this subject[1]. Findings of this study demonstrated the benefits for teachers to improve the implementation of assessment in classroom such as Health Education Teachers in enhancing their knowledge in classroom assessment and teaching skills in line with the aspiration of the National Education Philosophy.

Acknowledgement: The researcher's team would like to thank Institute of Graduate Studies and Faculty of Sports Science and Coaching, Sultan Idris Education University for assistance and support to financially aid this study.

Ethical Clearance: This study was approved by the Ministry of Education Malaysia (Code: KPM.600-3/2/3-eras6017).

Conflict of Interest: Nil.

References

1. Ní Chróinín D, Cosgrave C. Implementing formative assessment in primary physical education: teacher perspectives and experiences. Physical Education and Sport Pedagogy. 2013;18(2):219-33.
2. Assessment NCfCa. Assessment in the primary school curriculum: Guidelines for schools. Dublin: National Council for Curriculum and Assessment. 2007.
3. Black P. Testing: friend or foe?: theory and practice of assessment and testing: Routledge; 2002.
4. Black P, Harrison C, Lee C. Assessment for learning: Putting it into practice: McGraw-Hill Education (UK); 2003.
5. Black PJ. Formative and summative assessment by teachers. 1993.
6. Marx E, Hudson N, Deal TB, Pateman B, Middleton K. Promoting health literacy through the health education assessment project. Journal of School Health. 2007;77(4):157-63.
7. Piotrowski S. Assessment, recording and reporting. Teaching physical education 5. 2000;11:49-61.
8. Bailey R. Teaching physical education: A handbook for primary and secondary school teachers: Routledge; 2013.
9. Rahmat A, Jani J, Salimin N, Khalid NHM, Salleh O. Comprehensive assessment module for first aid in physical and health education. Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health. 2012;12(1).
10. Lebar O, et al. Developing an assessment and accountability framework for preparing quality teachers for the future. Niche Research Grant Scheme (NRGS) Final Report, Ministry of Education, Malaysia. 2019.

Correlations among Age, Parity, and Contraception Using with Pap smear Results in Medan Sumtera Sumatera

Fatwa Imelda[1], Diah Lestari Nasution[1]

[1]Universitas Sumatera Utara, Faculty of Nursing, Medan, Sumatera Utara, Indonesia

Abstract

Objects: to determine correlations among age, parity, and contraception using pap smear results.

Methods: the study was a correlative descriptive. The independent variables are age, parity, and contraception using, while the dependent variable the result of pap smear examination. The samples were 60 respondents. Data were collected using a questionnaire and analysis using the Chi-Square test at an error rate of 0.05.

Results: there was no significant correlation between age and the result of a pap smear examination ($p>0.734$). There was no significant correlation between parity and the result of a pap smear examination ($p>0.204$). There was a correlation between contraception using and the results of pap smear examination $p<0.004$.

Conclusion: it is expected that health workers can improve education and health promotion about cervical cancer prevention by holding seminars or examinations of cervical cancer detection by doing pap smears, and women who have done pap smears with normal results can have repeat pap smears a year later, and abnormal pap smears can repeat. Pap smear again performed 6 months after the previous pap smear.

Keywords: *Age; Parity; Using contraception; Pap smear; Cervical cancer*

Introduction

Cervical cancer becomes a problem for women in Indonesia. Cervical cancer causes the second death in developing countries with reproductive age. In Indonesia, there are 15,000 new cases with 8,000 deaths annually. This cancer is the most common in Indonesian women. It is estimated that one woman dies every hour [(1)].

To reduce the morbidity and mortality of cervical cancer prevention efforts need to be made, which consists of several stages, namely: 1. Primary prevention carried out at this stage is the promotion, education, and vaccination of HPV (Human Papilloma Virus). 2. Secondary prevention is early detection. 3. Tertiary Prevention is a treatment for cases that are found in early detection and prevent complications and early death [(2)].

Early detection in Indonesia is done by pap smear examination, colposcopy, kinescope, cervicography, spectroscopy, automated screening cytology, liquid-based cytology/thin prep, HPV tests, and visual acetate acid inspection (IVA) inspection methods. Pap smear test coverage is estimated to be less than 5%. To fulfill this, an alternative Pap smear test with IVA is sought, which is expected to get wider coverage [(3)].

Pap smear is a simple and quick examination to determine the presence of abnormal cells in the cervix by taking a smear of cells in the cervix and then examined under a microscope to see whether or not the cells are abnormal. This examination can be done at any time, except during menstruation. All women who have had sexual intercourse are encouraged to have regular Pap smears, once a year/at least 3 years. For women who have gone through menopause, a Pap smear can be done until the age of 65 years [(4)].

Corresponding Author:
Fatwa Imelda
e-mail: fatwaimelda05@gmail.com
Jalan Prof. Maas No.03, Kampus USU, Medan 20155, Sumatera Utara, Indonesia

The risk factors of cervical cancer are women who have been active in sex from a very early age, contraception using, and having children more than five.

Method

This study used a cross-sectional study design with a study design by measuring or observing research subjects at the same time or once, measurement of independent variables (age, parity, and contraception using) and the dependent variable (results of pap smear) without a repeat visit. This type of research was descriptive correlative, which was research that aims to explain the relationship, estimate, test based on existing theories. In this study, researchers used a consecutive sampling technique with a total of 60 respondents. The research site in Medan, North Sumatra. By using a simple logistic regression test that was by connecting between several independent and dependent variables.

Results

Table 1.frequency distribution base on variables

Variables	**Frequency normal pap smear**	**%**	**Frequency abnormal pap smear**	**%**	**Frequency sample**	**%**
Age						
≤ 35 years	9	15	9	15	18	30
36-45 years	15	25	16	26.7	31	51.6
>45 years	4	6.7	7	11.7	11	18.4
Total	28	46.7	32	63.3	60	100
Parity						
≤ 2	13	21.7	21	35	34	56.7
>2	9	15	11	28.3	26	43.3
Total	22	36.7	38	63.3	60	100
Contraceptive using						
Hormonal	0	0	8	13.4	8	13.4
IUD	1	1.7	5	8.3	6	10
Non-contraceptive	26	43.3	20	33.3	46	76.6

Table 1 shows that the majority of samples aged 36-45 years were 31 people (51.7%) with normal pap smears as many as 15 people (25%) and abnormal pap smear of 16 people (26.7%). In parity ≤ 2 in the majority of samples were 34 people (56.7%) with normal pap smear results of 13 people (21.7%) and abnormal pap smear results of 21 people (35%). The majority of samples with contraception using were no using 46 samples (76.6%) with normal pap smear results of 26 people (43.3%) and abnormal pap smear results of 20 people (33.3%).

Table 2.correlations among age, parity, and contraception using with pap smear results.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std.Error	Beta		
(Constant)	3.326	1.347		2.469	.017
Age	.037	.108	.051	.341	.734
Parity	-.149	.116	-.301	-1.288	.204
Contraception using	-.278	.091	-.395	-3.041	.004

Table 2.shows that the correlation between age and pap smear results with a t value of .341 and Beta 0.51 and a significant level of 0.734 means greater than 0.05 ($p>0.05$) meaning that there was no significant correlation between age and pap smear results. The correlation between parity and pap smear results with a value of t=1.288 Beta -.301 and a significant level of 0.204 means greater than 0.05 ($p>0.05$) means that there was no significant correlation between parity and pap smear results. The correlation between contraceptive using and pap smear results with a value of t=-3.041 Beta value -.395 and a significant level of 0.004 means greater than 0.05 ($p>0.05$) meaning that there was a meaningful correlation between contraception using with pap smear results.

Discussions

The results of this study it was found that the majority of samples aged 36-45 years were 51.6% and more than the results of abnormal pap smears were 26.7 than the results of normal pap smears. The older a person is, the greater the risk of uterine cancer. The increased risk of cervical cancer in the elderly is a combination of the increasing length of time of exposure to carcinogens and the weakening of the immune system due to age. In adult women over 35 years old, the condition of the reproductive organs begins to undergo an aging process, and in theory it is explained that risk factors that can increase the incidence of women suffering from cervical cancer one of which is the age of pre-menarche and post-menopause Generally new mucosal cells mature after women aged 20 years and over. The peak development of cervical cancer is at the age of 47 years. About 47% of women with invasive cervical cancer are under 35 years of age when diagnosed. About 10%, cervical cancer occurs in older women (> 65 years) and tends to die of disease due to their advanced stage when diagnosed. So if a woman is having sex at teenage age, it is most vulnerable if it is done under the age of 16 years [(5)].

This study there was no significant correlation between age and the results of pap smear examination with a significance p=0.734; meaning that the study showed no significant correlation between age and pap smear examination results. The results of the study that showed no correlation between age and pap smear results were possible because the number of respondents who had normal pap smear results was greater at 36-45 years old, this result was also possible because cervical cancer is not only influenced by a single factor but multiple factors not examined in this study. Other risk factors were not examined because this study used a documentation study, where there was some information from the medical record data that was not filled out by health workers. Women who are prone to cervical cancer are those who are at risk (35-50 years). Although the facts show that there is a reduction in the risk of HPV infection with age, on the contrary, the risk of persistent/ persistent infection increases. This is thought to be because as we age, changes in anatomy and histology.

The results of this study found that the majority of parity history ≤2 is (56.7%) with abnormal normal pap smear results more than 35% than normal pap smear results. The higher the risk of suffering from cancer of the cervix in women with many children, especially with labor distances that are too short. A

woman who often gives birth (many children) belongs to a high-risk group for cervical cancer, the higher the parity of the mother, the less good the endometrium. This is caused by reduced vascularization or atrophic changes in the decidua due to past labor, which can lead to complications in the reproductive organs. With the frequent birth of a mother, it will have an impact on the frequent occurrence of injury to her reproductive organs which ultimately the impact of the injury will facilitate the emergence of Human Papilloma Virus (HPV) as a cause of cervical cancer. In line with the results of Hidayat said that parity of more than> 3 is 16.03 times at risk of developing cervical cancer than people who have some parities <3 [6]. Women with high parity are associated with cervical columnar epithelial eversion during pregnancy which causes new dynamics of immature metaplastic epithelium that can increase the risk of cell transformation and trauma to the cervix making it easier for HPV infection [7].

Hormonal changes during pregnancy may make women more vulnerable to HPV infection or cancerous growth. The risk of cervical cancer will increase in young marriages or first-time coitus, ie at the age of 15-20 years or in a dozen years and the latent period between the first time of coitus until cervical cancer is detected for 30 years. This is related to the maturity of mucosal cells in the cervix. At a young age, mucosal cells in the cervix are immature. That is, still vulnerable to stimuli so they are not ready to accept stimuli from outside. Including chemicals carried by sperm. Because it is still susceptible, mucosal cells can change properties to become cancerous. The nature of cancer cells is always changing at any time ie die and grow again.

The study showed no significant correlation between parity and pap smear examination results with significance p=0.204. The study measured the number of majority parity> 2. So that there are probably still many who fall into the category of having children 2 or more than 2, because the dangerous parity is to have children more than 3 or the distance of pregnancy is too close, because it can cause the emergence of changes in abnormal cells in the cervix which can develop into malignancy [8].

According to the American Cancer Society (ACS) that women who have experienced 3 or more pregnancies in the full term have an increased risk for cervical cancer. Research has shown that hormonal changes during pregnancy may make women more vulnerable to HPV infection or cancerous growth [9].

The results of this study the majority of respondents did not use contraception by 76.7% and the majority with normal pap smear results of 43.3% and the remaining 33.3% with abnormal pap smear results. The use of hormonal contraception for more than 4 or 5 years can increase the risk of cervical cancer 1.5-2.5 times [10]. Taking a family planning pill for more than 5 years containing progesterone and estrogen harms the uterus, which is an infection in the uterus and allows a woman to suffer from uterine cancer [11]. It can be concluded that the use of contraception affects the incidence of cervical cancer. Oral contraceptives with high estrogen levels cause adhesions of Candida albicans which is a bacterium that causes flour albous. Candida albicans can cause adhesions in the vaginal epithelium and is a medium for fungal growth. Candida albicans develop well in a pH 5-6.5 environment, this change can be asymptomatic or cause infection.

The results of this study found there is a correlation between the use of contraceptives with the results of pap smear examination with a significance p=0.004. According to ACS states that the risk of cervical cancer is doubled in women who take birth control pills for more than 5 years, but the risk returns to normal 10 years after they stop. Combined oral contraceptives are a mixture of synthetic estrogens such as ethinylestradiol and one of several C19 steroids with progesterone activity such as norethindrone. This contraception contains a fixed dose of estrogen and progesterone. The use of estrogen can be risky because it stimulates the thickening of the endometrial walls and stimulates endometrial cells so that it changes properties [9].

Conclusion

The result showed that there was a significant correlation between contraception using and the results of pap smear examination with a significance p<0.004.

Suggestions

Health care provider, providing information to women of reproductive age, is recommended to use contraception so that the number of children can be limited and the birth spacing can be regulated properly. Health care provider gives information about contraceptive using so that women who use hormonal contraception can use non-hormonal contraception.

Conflict of Interest: Nil

Source of Funding: Universitas Sumatera Utara Research Center who had given financial support to conduct this research.

Ethical Consideration: The Research Ethics Committee from the Commission of Health Research Ethics Faculty of Nursing Universitas Sumatera Utara No. 1171/V/SP/2017.

References

1. WHO. WHO/ICO Information Centre on HPV and Cervical Cancer (Information Centre). Human Papillomavirus and related cancer. 2015. Summary Report Update 3 rd edition 2010. Available from : www.who.int//hpvcentre.
2. Adam MMRT, Dharminto, Cahyaningrum F. Age relationship, parity and personal hygiene diagnosis with IVA in Puskesmas Brangsong District 2 Brangsong Kendal. Jurnal Kebidanan. 2017; 6(2): 103-107. Available from: doi : 10.26714/jk.6.2.2017.103-107.
3. Nuranna dkk. 2011a. Program Pencegahan Kanker Serviks "*See and Treat*". FK. UI: Jakarta.
4. Rasjidi I. Manual Prakanker Serviks, edisi 1. 2014. Sagung Seto: Jakarta.
5. Kartikawati E. *Bahaya Kanker Payudara dan Kanker Serviks*. 2013. Bandung: Buku Baru
6. Hidayat E, Hasibuan DHS. Fitriyati Y. Hubungan Kejadian Kanker Serviks dengan Jumlah Paritas di RSUD Dr. Moewardi Tahun 2013. 2014.
7. Calvagna M. Diagnosis of Cervical Cancer. American Cancer Society. 2007. website.http://www.cancer.org.
8. Jensen KE, Schmiedel S, Norrild B, Frederiksen K, Iftner T, Kjaer SK. Parity as a cofactor for high-grade cervical disease among women with persistent human papillomavirus infection: a 13-year follow-up. British Journal of Cancer 2013, 108, 234–239.
9. American Cancer Society. *Cervical Cancer Prevention and Early Detection*. 2014. Accessed October 31, 2015 *from* http://www.cancer.org/acs/groups/cid/documents/webcont ent/003167-pdf.pdf
10. Emilia O. Bebas Ancaman Kanker Serviks. 2010. Yogyakarta: MedPress.
11. Wahyuni LK, Tulaar ABM. Pedoman Standar Pengelolaan Disabilitas Berdasarkan Kewenangan Pemberi Pelayanan Kesehatan. Jakarta: Perdosri; 2014. p.5-54,148-50

Family Function and Quality of Life in Elderly in Palu City, Indonesia

Fauzan[1,2], Muhammad Sabir[2],Try Setyawati[2], Ni Wayan Sridani[1,2], Ratna Devi[1,2], Rosmala Nur[3]

[1]Student of Postgraduate student Faculty of Public Health, University of Hasanuddin, City of Makassar, Indonesia, [2]Lecturer in Faculty of Medicine, University of Tadulako, City of Palu, Indonesia, [3] Lecturer in Faculty of Public Health, University of Tadulako, City of Palu, Indonesia

Abstract

To analyze the function of the family towards the quality of life in elderly in Palu City, which is expected to be a basis for the target of a health promotion program on the quality of life in elderly. The research method used an analytic survey of the elderly in the city of Palu. The sample size was 390 respondents. The sample was the 189 elderly victims of natural disaster who lived in the Temporary Shelter (Huntara) and the 201 elderly people who did not live in the Non-Temporary Shelter (Non-Huntara) which conducted in May - June 2019. The research variable was measured by using questionnaires. The characteristics of elderly namely: Age, gender, education, working status, ethnicity, marital status, history of illness, and history of falls. Family function (A = Adaption, P = Partnership, G = Growth, A = Affection, R = Resolve). The quality of life in eldery was measured by using the questionnaires of WHOQOL-BREF. The data analysis used univariate and bivariate analysis with the SPSS application. The results of the study showed that respondents were 53.33% women and 46.67% men, with 47.95% were junior high school graduated and 73.85% were not working. 67.18% elderly were married. Elderly who has a history of illness of 57.69% and history of fall of 36.92%. Mean score of adaption = 1.49, partnership = 1.44, growth = 1.47, affection = 1.29, and resolve = 1.37. Total mean score of APGAR was 7.07. The mean score of physical dimension = 21.7, psychological dimension= 19.9, social relationship dimension = 9, dan environmental dimension = 23.4. The total mean score of quality of life was 74.0. It can be concluded that the family had a good function (score 7.07) for the elderly and the quality of life in elderly was good (score 74.0).

***Keyword**: family function, quality of life, elderly.*

Introduction

One of the impacts of the science and technology advancement, especially in the health sector, is the decrease in infant and child mortality and the increase in life expectancy so that it has an impact on increasing the number of elderly people [1]. In general, in Indonesia, the quality of life in elderly is greatly influenced by family functions for a variety of reasons. The family as the smallest unit of society is greatly influenced by the social environment such as the family's interaction with neighbors, the activeness of the family to participate in community activities [2].

Correspondent Author:
Fauzan
Fauzan, email: fauzan.untad@yahoo.com,
Phone: 081387626768

In determining a person's level of welfare that reflects the quality of life, many factors are the focus of attention, because in determining the quality of life, it cannot be based on a single causative factor. Factors that need to be considered are age, gender, education level, marital status, employment status, income, and the presence of chronic illness in the elderly. This factor is a risk factor in determining the future quality of life in elderly, because changes or disruption in any of these points can reduce the quality of life in elderly. So that in assessing the quality of life a person needs an instrument that includes how a person's basic needs can be met. The instrument is a tool that can measure based on observations from outside a person such as living standards, income, education, individual age, health and most importantly, how to direct or control the way of life and the future life [3].

Elderly population is increasing in number in many countries including in Indonesia. The number of elderly population above 60 years is predicted to increase to 20% in 2015-2050. Indonesia is in the fourth position after China, India, and Japan. The 2014 National Socio-Economic Survey results informed that the number of elderly people in Indonesia was 20.24 million or 8.03%. When compared to the results of the 2010 National Socio-Economic Survey, there was an increase in the number of elderly people, namely 18.1 million people or 7.6% [4]. In Palu City, in 2000 the number of elderly population was 8,968 people or 3.39% of the total population. This number increased to 16,958 people (5.02%) in 2010, then increased again to 18,469 people (5.02%) in 2015 and is projected to reach 21,225 people (6.01%) in 2020 [5].

The optimal quality of life in elderly can be interpreted as the functional condition of the elderly at the maximum or optimum conditions, so that they can enjoy their old age with meaningful, happy, useful and good life. If the family function decreases it can cause the quality of life in elderly to decrease and eventually it will cause the morbidity rate in the elderly to increase and the mortality rate also increases. So this study aimed to determine the family function to the quality of life in elderly in Palu City which is expected to be a foundation as a target of a health promotion program about the quality of life in elderly.

Method

The research method used was an analytical survey of the elderly in the city of Palu. The sample size was 390 elderly. The research variables were the characteristics of the elderly, APGAR, and the quality of life in elderly. Measurement of the characteristics of the elderly used a questionnaire namely gender, education, working status, ethnicity, marital status, history of illness, history of falls. Measurement of family function of the elderly used the APGAR questionnaire or Adaption, Partnership, Growth, Affection, and Resolve questionnaire. APGAR value categories are divided into 3 namely: 0-3 (very high family dysfunction); 4-6 (moderate family dysfunction), 7-10 (low family dysfunction). The quality of life in elderly was measured by using the WHOQOL-BREF (The World Health Organization Quality of Life) questionnaire which consists of 26 questions and is divided into 4 dimensions, namely the dimensions of physical health, psychosocial, social relations, and the environment. Data analysis used descriptive analysis for all variables with the SPSS program.

Results

Table 1 Characteristics of Elderly

Characteristics		**n**	**%**
Gender	Male	182	46.67
	Female	208	53.33
Education	Elementary School	7	1.79
	Junior High School	187	47.95
	Senior High School	80	20.51
	Higher Education	116	29.74
Working Status	Working	102	26.15
	Not Working	288	73.85
Ethnicity	Kaili	302	77.44
	Bugis-Makassar	46	11.79

Cont... **Table 1 Characteristics of Elderly**

	Javanese	29	7.44
	Others	13	3.33
Marital Status	Married	262	67.18
	Widowed	112	28.72
	Divorced	16	4.10
History of Illness	Yes	225	57.69
	No	165	42.31
History of Falls	Yes	144	36.92
	No	246	63.08
Total		390	100.00

Table 1 shows that the majority of elderly respondents were women (53.33%) with education level of junior high school (47.95%) and higher education/diploma (29.74%). Most respondents did not work (73.85%) and came from the Kaili ethnic (77.44%). Then in marital status, most respondents were married (67.18%). There are 42.31% of respondents who have a history of illness while 36.92% of respondents who have a history of falls.

Table 2 APGAR value distribution of Elderly

Value	**FAMILY FUNCTION**					**Total Score**
	A (Adaption)	**P (Partnership)**	**G (Growth)**	**A (Affection)**	**R (Resolve)**	
Mean	1.49	1.44	1.47	1.29	1.37	7.07
SD	0.63	0.65	0.66	0.71	0.66	2.76
Minimum	0.00	0.00	0.00	0.00	0.00	0.00
Maximum	3.00	2.00	4.00	3.00	2.00	13.00

Table 2 shows that the family function of the elderly was good with a mean score of 7.07 which is an accumulation of the functions of adaption, partnership, growth, affection, and resolve. APGAR is the physiological functions of the family.

Table 3 Quality of life in elderly people

Value	Dimension				QOL
	Physical	Psychological	Social Relationship	Environment	
Mean	21.7	19.9	9.0	23.4	74.0
SD	2.6	2.6	1.7	3.7	8.2
Minimum	14.5	24.0	8.0	27.0	99.0
Maximum	27.5	25.0	13.5	32.5	94.5

Table 3 shows the mean score of quality of life in elderly people was good (74.0) with a score on the physical dimension of 21.7, psychological dimension of 19.9, relationship dimension of 9.0, and environment dimension of 23.4.

Discussion

The results showed that the APGAR of elderly family was good. Family function is an important factor in supporting the improvement of the quality of life of patients with chronic diseases. Good quality of life will reduce the risk of complications that can worsen the situation [6]. Family support is one of the factors that influence the quality of life in elderly. Family support is a form of family behavior in the form of information, assessment/appreciation, instrumental and emotional in providing services to the elderly [7]. Family is the main support system for the elderly in maintaining their health [8]. Family support is included in supporting factors that can influence a person's behavior and lifestyle so that it has an influence on their health status and quality of life [9].

The results showed that the quality of life in elderly was good. Life expectancy, life satisfaction, psychological health, cognitive function, health and physical function, income, living conditions, social support and social networks are complex components of quality of life. The family has an important role in the concept of health and illness in elderly family members and provides direct care for sick family members so that the physical, psychological, social, and environmental impact will affect the quality of life in elderly [10,11].

Other studies showed that medically healthy elderly people have good family support, because healthy elderly people carry out their daily activities assisted by families and also independently [12]. Basic care for the elderly is related to basic daily activities for the elderly which include daily personal care from personal hygiene, nutrition, to other activities such as physical training in order to maintain the quality of life [13]. Family function had a positive correlation with the quality of life in elderly [14]. If the family function is "healthy" (a state of well-being physically, mentally, and socially) then it is possible for a whole family to live normally socially and economically, so it can reduce morbidity and mortality which in turn will improve the quality of life in elderly.

Conclusion

The family function in caring for the elderly can be the main key in dealing with elderly problems such as physical, psychological, and social decline so that the quality of life of the elderly does not decline. For the elderly, the family is a source of satisfaction and assistance that can provide an energy to fight the pressure and stress. The existence of adequate family support can reduce mortality, easily recover from illness and can improve cognitive, physical and emotional function.

Ethical Clearance: Taken from Faculty of Public Health, University of Hasanuddin committee.

Source of Funding: Faculty of Medicine, University of Tadulako.

Conflict of Interest: None

References

1. Yuliati A., Baroya N., Ririanty M. The Different of Quality of Life Among the Elderly who Living at Community and Social Services. Pustaka Kesehatan. 2014;2(1):87-94.
2. Sutikno. Hubungan fungsi keluarga dengan kualitas

hidup lansia. Universitas Sebelas Maret, Surakarta, 2011.

3. Gureje O., Kola L., Afolabi E., Olley BO. Determinants of quality of life of elderly Nigerians: results from the Ibadan Study of Ageing. Afr J Med Med Sci. 2008;37(3):239-47.
4. Kementerian Kesehatan. Kecakapan dan Pengasuhan Lansia. 2013.
5. Badan Pusat Statistik. Statistik Penduduk Lansia 2014, Hasil Survei Sosial Ekonomi Nasional. Jakarta: Badan Pusat Statistik RI; 2016.
6. Oktowaty S., Setiawati EP., Arisanti N. The Relationship Between Family Function and Quality of Life of Chronic Degeneratif Patients in Primary Health Care Service. JSK. 2018;4(1):1-6.
7. Fadilah N. Relationship Of Family Support With Elderly Visits To Posyandu Elderly In Posyandu Bugenvil 50 Village Gugut District Jember. Jurnal Kesehatan Dr Soebandi. 2015;3(2):167-80.
8. Reinhard SC., Given B., Petlick NH., Bemis A. Supporting Family Caregivers in Providing Care. En: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008.
9. Hernandez LM., Blazer DG., Institute of Medicine (US) Committee on Assessing Interactions Among Social B. The Impact of Social and Cultural Environment on Health. National Academies Press (US); 2006.
10. Schulz R., Sherwood PR. Physical and Mental Health Effects of Family Caregiving. Am J Nurs. 2008;108(9 Suppl):23-7, doi: 10.1097/01.NAJ.0000336406.45248.4c.
11. Ziemba RA. Family Health & Caring for Elderly Parents. Michigan Family Review. 2002;07(1):35-52, doi: http://dx.doi.org/10.3998/mfr.4919087.0007.104.
12. Kaur H., Kaur H., Venkateashan M. Factors determining family support and quality of life of elderly population. International Journal of Medical Science and Public Health. 2015;4(8):1049.
13. Prabasari NA., Juwita L., Maryuti IA. Family Experience in Caring For Eldery At Home (Phenomenological Study). Jurnal Ners LENTERA. 2017;5(1):56-68.
14. Artini NM., Prihandhani IS., Martini NMDA. The Relation Of Family Function With Quality Of Elderly's Life In Jimbaran Village South Kuta Sub District. Caring. 2017;1(2):84-90.

Self Regulation Effect on Glycemic Control of Type 2 Diabetes Melitus Patients

Hariyono Hariyono[1], Leo Yosdimyati Romli[1]

[1]Lecture Medical Surgical Nursing Department School of Health Science Insan Cendekia Medika Jombang

Abstract

Background: Self regulation is an effective way for people with Diabetes Mellitus in order to get good glycemic control for the diabetes mellitus patient recovery. The purpose of this study was to analyze the effect of self regulation on the patient glycemic control. **Method:** This research used pre experimental pre post test design. The population of this research is all DM patients in Bulurejo Village, Diwek District, Jombang Regency with a sample of 30 respondents. In this research we used purposive type sample. The variable of this research are: self regulation and glycemic control. The way of collecting data is by laboratory test. **Result and analysis**: The results showed that self regulation affect on glycemic control in DM patient according to the wilcoxon test, the glycemic control score p=0.046 (p<0,05). The glycemic control before the intervention almost all respondents had uncontrolled HbA1C levels of 28 respondents or 93.3% and after intervention almost all respondents had uncontrolled HbA1C levels of 24 respondents or 80%. **Discuss and conclusion**: Self regulation can improve glycemic control quite well, but still needs integration with other components related to treatment and care in diabetes mellitus patient, with self regulation it is expected that they will be able to increase their motivation to support increased self care abilities, change behavior and carry out activities to maintain glycemic control.

Keyword*: Self Regulation, Glycemic Control, Diabetes Mellitus*

Introduction

Diabetes mellitus in some developing countries has increased significantly due to the increasing population of aging, changes in diet, severe physical activity, and unhealthy behavior patterns. The level of blood glucose in diabetes mellitus is also influenced by low self regulation in which sufferers cannot control themselves against factors that can trigger disorders of blood glucose level regulation in patients with type 2 diabetes mellitus [3]. Diabetes mellitus has a severe impact on the psychological, social, physical, economic and cultural aspects of individuals, a person with diabetes mellitus tends to try to adapt as best they can, but not infrequently they do not have the knowledge and skills to make decisions and act accordingly so that a sustainable process is appropriate with the patient's condition, hospital care is more meaningful if it is continued with home care, but until now the planning for patients treated has not been optimal [6].

International Diabetes Federation (IDF) calculates the incidence of Diabetes Mellitus in the world in 2012 was 371 million, in 2013 it increased to 382 million and it is estimated that in 2035 people with Diabetes Mellitus will increase to 592 million [2]. Based on the 2013 Annual Report of Hospitals in East Java, Diabetes Mellitus sufferers (102,399 Cases) [8]. Based on data from the Jombang district health office, the number of people with Diabetes Mellitus in 2014 was 21,992 [3].

Various problems that arise due to diabetes mellitus can not be separated from the occurrence of various kinds of complications, especially long-term complications, so that maximum effort is needed to prevent the occurrence of complications, the main key to delaying even preventing complications of diabetes mellitus is by controlling blood sugar [12]. Besides that we also need to improve the quality of life of patients. So the goal of managing patients includes two important things, namely metabolic control and quality of life of patients[9]. Recurrence of diabetes mellitus can be done in many ways to reduce recurrence. One of them is self regulation, where the method of self regulation is

a person's self control process in controlling behavior and monitoring behavior to achieve certain goals by using strategies and involving physical, cognitive, motivational, and social elements. Components which also constitute self regulation include: self monitoring/ self observation and self evaluation/judgmental process [8].

Self monitoring/self observation is a process where individuals observe and feel sensitivity to everything about themselves and their environment [4]. Self evaluation / judgmental process is how a person evaluates himself against his behavior in the surrounding environment. Self response is someone who can evaluate themselves positively or negatively, cognitive function makes a balance that can evaluate positive or negative becomes less meaningful individually [9].

Materials and Method

This study uses a pre-experimental pre-post test design. The study population was all DM patients in Bulurejo Village, Diwek District, Jombang Regency with a sample of 30 respondents. The sampling technique is purposive sampling. The variables of this study include: self regulation and glycemic control. Glycemic control data collection using laboratory tests HbA1c levels.

The process of data collection begins first by selecting prospective respondents and given the opportunity to understand about research. Filling out the questionnaire sheet for the pre test is done after the prospective respondent gives approval, then the HbA1c value is measured by the family.

Respondents were then given self regulation interventions, after the intervention period was completed, the researcher conducted a post test on the respondents of the study by measuring HbA1c levels. The collected data is then processed by the researcher and analyzed for the results and conclusions of the study using the Wilcoxon test.

Research Result

The results of the study of the effects of self regulation on glycemic control of patients with type 2 diabetes mellitus in the village of Bulurejo, District of Diwek, Jombang Regency, collected data including general data such as age, gender, education and employment.

Table 1 Characteristics of Age

No.	Age	f	%
1.	<20 year	0	0
2.	20-35 year	6	20,0
3.	>35 year	24	80,0
Total		30	100

Table 2. Characteristics of Education

No.	Education	f	%
1.	Elementary School	8	26,7
2.	Junior High School	8	26,7
3.	Senior High School	9	30,0
4.	Diploma/Bachelor	5	16,7
Total		30	100

Characteristics of respondents based on education according to the results of research as shown in table 3, it is known that almost half of them have high school education, namely as many as 9 respondents or 30%.

Table 3. Characteristics of Job

No.	Job	f	%
1.	Does not work	6	20,0
2.	Farmer	6	20,0
3.	Entrepreneur	14	46,7
4.	Civil Cervant	4	13,3
Total		30	100%

Characteristics of respondents based on work according to the results of the study as shown in table 4, it is known that half of them have self-employment, namely as many as 14 respondents or 46.7%.

Table 4. Characteristics of HbA1C

No.	HbA1C	Pre	
		f	%
1.	Controlled	2	6,7
2.	Not controlled	28	93,3
Total		30	100

Characteristics of respondents based on HbA1C levels according to the results of the study as shown in table 4, it is known that before the intervention almost all respondents had uncontrolled HbA1C levels of 28 respondents or 93.3%.

Table 5. Characteristics of HbA1C

No.	**HbA1C**	**Post**	
		f	**%**
1.	Controlled	6	20,0
2.	Not controlled	24	80,0
Total		30	100

Characteristics of respondents based on HbA1C levels according to the results of the study as shown in table 5, it is known that after intervention almost all respondents had uncontrolled HbA1C levels of 24 respondents or 80%.

Table 6. Crosstab of HbA1C

No.	Pre	Post				Total	
		Controlled		Not Controlled			
		f	%	f	%	N	%
1.	Controlled	2	6,7	0	0	2	6,7
2.	Not controlled	4	13,3	24	80,0	28	93,3
Total		6	20,0	23	80,0	30	100
		p=0,046 (p<0,05)					

Characteristics of respondents based on HbA1C levels in accordance with table 7 shows that almost all respondents before the intervention and after intervening remained had uncontrolled HbA1C levels of 24 respondents or 80% and a small proportion of respondents before intervention and after intervention had controlled HbA1C levels namely as many as 4 respondents or by 13.3%.

Discussion

Glycemic control of diabetes mellitus patients before self regulation

Glycemic control in people with diabetes mellitus based on the results of research before giving self regulation shows that almost all of the study respondents had uncontrolled glycemic control and only a small proportion of the study respondents had controlled glycemic control.

Self-care for people with diabetes mellitus is a process of developing knowledge or awareness to learn to survive the complex nature of diabetes mellitus and self-care in people with diabetes mellitus should be directed related to healthy food behavior, physically active, monitoring blood glucose levels, appropriate treatment, problem solving with healthy coping, as well as behaviors that reduce risk (Shrivastava, 2013).

Poor control of glucose metabolism is characterized by increasing blood sugar levels or hyperglycemia [6].

The results of the study also showed that almost all respondents were over 35 years old and a small percentage were under 35 years old.

States that there are several factors that can affect the glycemic control of people with diabetes mellitus such as type of diabetes, type of treatment, degree of control to be achieved, age of the patient, available facilities, knowledge and motivation of the patient [3].

The age factor according to the researcher influences the condition of the respondents' glycemic control. Although no age-related analysis was carried out, the age of respondents according to the researchers significantly contributed to uncontrolled glycemic control conditions because knowledge and attitudes with increasing age play a role in shaping a person's health behavior, although there are also other factors that influence health behaviors such as personality systems, experiences, customs held by individuals and the existence of supporting factors or conditions that allow such adequate facilities[7].

Glycemic control of diabetes mellitus patients after self regulation

Glycemic control in people with diabetes mellitus based on the results of the study after being given self regulation showed that almost all of the study respondents had uncontrolled glycemic control and only a small proportion of the study respondents had controlled glycemic control.

States that one of the factors that influence self regulation is an environment that depends on the form of support from the environment, the existence of family support coupled with health workers causes the client's controlled self regulation to be high because of two sources of support that trigger pressure greater for self-regulation, support from health workers in the form of monitoring the course of therapy triggers patients to try to meet external demands, namely managing diabetes mellitus well. People with diabetes mellitus should get education about self-care because it is important to support self care, their glycemic control and education is an important element because it helps optimize blood glucose control to prevent complications [2]. This is also supported by the opinion of Shrivastava, who states that self-care of people with diabetes mellitus is a process of developing knowledge or awareness to learn to survive the complex nature of diabetes mellitus and self care in people with diabetes mellitus. physical, monitoring blood glucose levels, appropriate treatment, solving problems with healthy coping, and reducing risk behavior [12].

The results of the study also showed that almost half of the study respondents had education at the high school, junior high and elementary levels and only a small proportion possessed education at the level of D3 or Bachelor. Knowledge or cognitive is a very important domain for the formation of a person's actions or behavior. The patient's knowledge of diabetes mellitus is a tool that can help patients to manage diabetes during their lives so that more and more people understand the disease better understand how to change their behavior [14]. Education and training for people with diabetes mellitus is an education about knowledge and skills for people with Diabetes Mellitus to support behavior change, improve understanding of the disease so that optimal health is achieved, adjusting psychological conditions and improving quality of life [13].

Age factors according to researchers although in this study no statistical analysis was conducted, educational factors also contributed to changes in glycemic control conditions in people with diabetes mellitus. Patients who have higher education will be able to receive the knowledge provided through education, so that it will change the mindset of patients and can increase knowledge about diabetes mellitus and management. In addition, with a good education base, people with diabetes mellitus will be easier and able to respond well to any intervention given so that changes in the condition of the glycemic control are able to change to be controlled. However, the absence of significant changes related to the condition of glycemic control in respondents indicates that management in Diabetes Mellitus patients does not only focus on one model or intervention method, but also requires treatment, care or education and requires a comprehensive approach in an effort to meet complex needs. for Diabetes Mellitus patients both physiological related needs, education and psychological support [14].

Effect of Self Regulation on Glycemic Control in People with Diabetes Mellitus

Glycemic control based on the results of the study showed that almost all respondents after self regulation still had uncontrolled glycemic control as many as 24 respondents but the results of the analysis statistically

showed that there was an effect of self regulation on glycemic control in people with diabetes mellitus.

Management of Diabetes Mellitus to prevent complications includes 5 pillars, namely eating planning, physical exercise, medication, counseling, and monitoring glucose levels themselves, management of this Diabetes Mellitus must be done for life so often patients are not obedient and tend to become discouraged [10]. The characteristics of people who are able to perform self-regulation properly depend on one of them is the regulation of emotions, a process that always checks or intentionally changes feelings that might lead to counterproductive behavior [11].

Sudden changes in life related to the management of disease treatment and care for people with diabetes mellitus who have to undergo routine life make people with diabetes mellitus lead to the emergence of several negative psychological responses such as anger, feeling useless, increasing anxiety, and stress. Such conditions according to researchers indeed play an important role in the ability of patients to carry out self-care management and if they are able to do so the results they get can be seen one of which is a controlled blood glucose condition[7].

Glycemic control based on the results of the study showed that a small proportion of respondents who had glycemic control from uncontrolled became controlled after being given self regulation and respondents who before being given self regulation had controlled glycemic control and after that remained constant controlled [11].

Controlled self regulation is caused by interpersonal or intrapsychic pressure [5]. One form of self regulation is external, one example of this external form of self-regulation is that people are involved in an activity or pursue goals to meet external demands, avoid punishment, or get prizes [4].

Controlled self regulation according to researchers is influenced by external factors that cause a person to experience pressure so that they conduct self regulation. This is what distinguishes patients who get support only from families. Patients who get support from the family feel that they do not get support from health workers in undergoing therapy so that the external demands they feel are fewer, this causes respondents to have low self-regulation so that the ability to change glycemic control conditions is affected[3].

Conclusions

Glycemic control of diabetes mellitus sufferers is almost entirely before uncontrolled self regulation. Glycemic control of people with diabetes mellitus are almost entirely partially before uncontrolled self regulation is given but there are changes. Self regulation affects the glycemic control in people with diabetes mellitus

Conflict of Interest : None

Ethical Clearence: The Study passed ethical Clearence From Ethical Committee Of The School Of Health Science Insan Cendekia Medika Jombang Indonesia No. 007/KEPK/ICME/IV/2018

Source of Funding : This Study is self funded by the reseachers

References

1. Aini, N., Fatmaningrum, W., Yusuf, A.. Upaya meningkatkan perilaku pasien dalam tatalaksana diabetes mellitus dengan pendekatan teori model behavioral system Dorothy E. Johnson. Jurnal Ners, 2016. 6 (1) 1-11
2. American Diabetes Association. Standart of medical care in diabetes, *Diabetes Care,* 2015.
3. Hariyono, Pengaruh Lama Menderita dengan Kualitas Hidup Penderita Diabetes Melitus Tipe 2. Uiversitas Airlangga . Tesis. 2010.
4. Kusumadewi, Melina Dian. Peran stresor harian, optimisme dan regulasidiri terhadap kualitas hidup individudengan diabetes melitus tipe 2. PsikoIslamika, Jurnal Psikologi Islam (JPI), 2016. 8 (1), 43-62
5. Mashudi. Pengaruh progressive muscle relaxation terhadap kadar glukosa darah pasien diabetes tipe 2. Fakultas Ilmu Keperawatan Universitas Indonesia. Tesis, 2016.
6. Notoatmodjo, S. *Promosi Kesehatan dan Ilmu Perilaku*, Rineka Cipta, Jakarta, 2017.
7. Nursalam. *Manajemen Keperawatan: Aplikasi Dalam Praktik Keperawatan Profesional,* Salemba Medika, Jakarta, 2017.
8. Ormrod, J.E. Psikologi Pendidikan.Jakarta: Erlangga, 2009.
9. Perkeni. *Konsensus pengelolaan dan pencegahan diabetes mellitus tipe 2 di Indonesia*, PB PERKENI,

Jakarta, 2015.

10. Shrivastava, S.R., Shrivastava, P. S., & Ramasany, J. Role of self care in management of diabetes mellitus. Journal of Diabetes & Metabolic Disorder, 2013.
11. Soegondo, Soewondo & Subekti. *Penatalaksanaan Diabetes Mellitus Terpadu*, Balai Penerbit UI, Jakarta, 2009.
12. Suyono, Slamet. Penatalaksanaan Diabetes Melitus Terpadu: Sebagai Panduan Penatalaksanaan Diabetes Melitus Bagi Dokter dan Educator, 2017. Balai Penerbit FKUI.
13. Vansteenkiste, M., Smeets. S.,Soenens, S., Lens, W., Matos,L., Deci, E.L. Autonomous and controlled regulation of performanceapproach goals: Their Relations to Perfectionism and Educational Outcomes. Motiv Emot, 34, 2010. 333–353.
14. Waspadji, S. *Diabetes Mellitus: Mekanisme Dasar dan Pengelolaan yang Rasional*, Balai Penerbit FKUI, Jakarta, 2019.
15. Zimmerman dan Pons. Construct Validation of a Strategy Model of Student Self Regulated Learning. Journal of Educational Psychology, Vol 80(3), 2010. 284-290.

Dynamic Transmission of Dengue Hemorraghic Fever and Climate Variability Patterns in Depok and Bogor

Haryoto Kusnoputranto[1], Margareta Maria Sintorini[2],Suyud Warno Utomo[1], Epi Ria Kristina Sinaga[1] Nurusysyarifah Aliyyah[3], Okky Assetya Pratiwi[4]

[1]Department of Environmental Health, Faculty of Public Health and Graduate School of Environment, University of Indonesia, 16424 Depok, Indonesia, [2]Environmental Engineering, Faculty of Landscape Architecture and Environmental Technology, Trisakti University, [3]Public Health Study Program, Institute of Health Indonesia, [4]Environmental Health Study Program, Institute of Health Indonesia

Abstract

Dengue hemorrhagic fever (DHF) has become an endemic in major cities in Indonesia. Climate change, and poor level of awareness and knowledge of the community in Indonesia causes the case of DHF to continue to exist and it tends to increase. In the extraordinary events in 2015 the morbidity rate reached 50.75. The Intergovernmental Panel on Climate Change (IPCC) prediction in 1996 stated that the incidence of dengue hemorrhagic fever in Indonesia will increase threefold from 2070, if the environment and community conditions do not change. This study aims to produce a system dynamics model with ecological analysis to determine the dynamics of the DHF incidence with climate variability patterns in Depok and Bogor. The design of this study is ecologic study with hypothesis test, modeling, simulation, and intervention. Interviews with respondents include the level of knowledge, attitudes, and behavior (PSP) of the community. Measurement of climate factor includes rainfall, temperature, humidity, and CO2 level in the ambient environment. The results of DHF system dynamics model simulation show the program intervention scenario that has the most significant effect on the decline of Breeding Places and the decrease of DHF cases by increasing the participation of the community to actively control water places that are potential for mosquito breeding places.

Key words: *system dynamics model, intervention, simulation, dengue hemorrhagic fever, climate change*

Introduction

The increasing population has caused cases of communal disease to increase. DHF cases in Indonesia have relationship between environmental changes and an increase in cases of disease. The number of environmental factors that are identified as having an effect on the incidence of DHF which tend to recurred encourage researchers to figure out what environmental factors can be used as indicators in predicting the occurrence of DHF cases and DHF transmission system in Depok and Bogor, as well as predicting the incidence of DHF through intervention models on system dynamics.

This study produces a dynamics model of DHF transmission in relation to climate variability patterns that will contribute to improvements in development on a local and even national scale. The dynamics model of DHF transmission is expected to be an innovation to reduce the incidence of DHF, especially in Depok and Bogor.

Correspondence Author:
Haryoto Kusnoputranto.
Department of Environmental Health, Faculty of Public Health and Graduate School of Environment, University of Indonesia, 16424 Depok, Indonesia
E-mail: haryoto_k@yahoo.com

Method

This study includes ecological studies by using hypothesis test. Modeling and simulation is carried out to identify factors that are relevant to future DHF cases. The eminence of this study links environmental factors in ecology such as rainfall, temperature and humidity as well as basic indicators of air quality, namely CO_2, with

larva free index.

Study related to the determination of dynamics model to recognize early warning of the emergence of DHF cases has been started since 2006. It is expected that the patterns that have been found are continued in the concept of this study for a broader area, namely in Jakarta, Bogor, Depok, Tangerang and Bekasi (Jabodetabek).

The samples in this study are air quality sample, larva free index, case sample, house sample, and respondent sample. Air quality sample is taken from the research location. Larva free index obtained from the Depok and Bogor Health Services. Case samples are DHF experienced by respondents in the last two years. House sample is determined based on WHO standards for larvae and mosquito surveys according to the area and population: "Cluster Design Sampling".[1]

The minimum number of samples calculated based on the prevalence of DHF in the preliminary study was 14%, while the expected prevalence of control variables that had been found was 4%. In the hypothesis test using a 5% confidence level and 90% test strength. The distribution of household sample was carried out by dividing the sample proportionally according to the number of cities in the Special Capital Region of Depok (Depok Village and Pancoran Mas Village, Pancoran Mas District and Beji Village and Tanah Baru Village, Beji District) and Bogor (Kedung Badak Village, Kayu Manis Village, Kencana Village, and Mekar Wangi Village, Tanah sereal District). In each region, a total of 220 houses were taken with individual analysis units.

The study is conducted within three years starting in 2018. Data is collected from the Special Capital Region of Jakarta, include: Environmental data (rainfall, temperature, humidity, and CO_2 level in the ambient air through direct measurements at the sampling point) and Community data to find out the knowledge, attitudes and behavior of the community about DHF.

Rainfall measurements are carried out every rainy day using rain gauge. Temperature and humidity are measured using thermo hygrometer, and CO_2 level is measured using RAC sampling. Community data collection is carried out through interviews using a questionnaire to determine social, economic and education status of the community, as well as knowledge, attitudes and behavior of the community about DHF, prevention and eradication of *Aedes* vectors.

To obtain the concept of DHF control in the future, a system dynamics model is used. The stages of the study to obtain the research outcome are: (1) validation of environmental components (2) demonstration of the model in the relevant environment, (3) report on comprehensive activities. In this study, the case of DHF is considered as one of the components of the causal system in a scenario simulated through intervention.

Simulation is carried out through modeling, model production, simulation and validation of the simulation results stages to determine the compatibility between the simulation results and the imitated mechanism. Simulation results are used to understand process behavior and predict future trends.[2]

Results and Discussion

Dengue Hemorraghic Fever Case Prediction based on Model Simulation Based on Figure 1, it is known that climate variability patterns affect the incidence of DHF because the life of the disease vectors and dengue virus as an agent is very dependent on environmental conditions. Temperature, humidity, air chemical composition, water chemical composition as the breeding place for mosquitoes, rainfall, wind speed and other environmental factors are the limiting factors of its life. Therefore, the environmental system associated with the incidence of DHF has 4 subsystems, namely: climate subsystem, *Aedes* mosquito, human and DHF. These four subsystems are interconnected and they influence each other.

Climate subsystem is a series of climate factors related to global climate change that triggers an increase in global earth temperature. As a result, this global warming phenomenon can affect living things. The most dominant insect causing DHF is *Aedes aegypti*. CH_4, N_2O, CO_2 and CFC-11 are gases that cause the global climate change or the so-called greenhouse effect if it is at a concentration exceeding normal concentration. The increase in global temperatures will increase sea surface temperatures so that the next impact is to encourage the El Nino phenomenon. According to the World Meteorological Organization (WMO), there is a relationship between the occurrence of El Nino and the incidence of DHF in Indonesia.[3] This cycle forms the climate subsystem in the model.

The second subsystem is the *Aedes* mosquitoes, from eggs to adult mosquitoes, which is indicated by a positive arrow. The connecting factor of the climate

subsystem and mosquito subsystem is the breeding places for mosquitoes. Breeding places are highly affected by rainfall. When rainfall is high, containers are easily filled with water and this relationship is indicated by a positive arrow. Another connecting factor of the climate subsystem is the ambient temperature which then affects the Extrinsic Incubation Period (EIP). Extrinsic Incubation Period is influenced by environmental temperature, humidity, level of viremia in humans, and viral strains.[4] Temperature increase will shorten EIP and increase transmission. Temperatures that increase to 34ºC will affect the temperature of the water in breeding places which also accelerates the hatching of eggs into larvae.

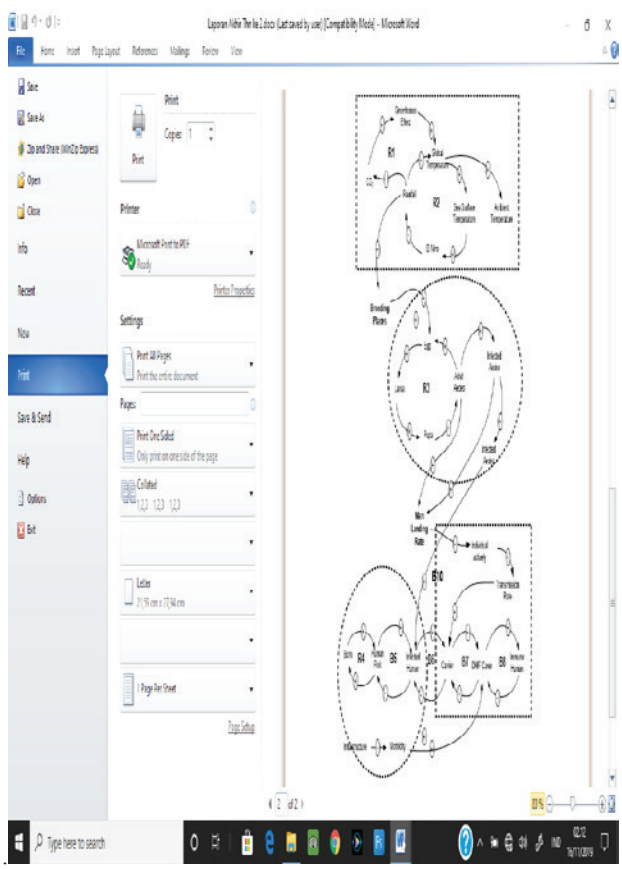


Figure 1. Dynamics System Model of DHF Cases with Community Role Improvement (PSP) intervention

Vector subsystem and disease subsystem are connected by Landing Rate and the role of dengue virus factors. The presence of DHF is determined by the contact between mosquitoes and humans. It is assumed that the larger the mosquito population the higher the Landing Rate, so the connecting arrow becomes positive. The larger the *Aedes* mosquito population the larger the infective *Aedes* population that carries the Dengue virus. This relationship is indicated by a positive arrow

After the *Aedes* mosquito bites a human, the virus replicates in the human body. The more viruses incubated into humans the more humans become infectious so that the number of DHF cases in the community increases. This link is indicated by a positive arrow.

Human activity is indicated by the intensity of petroleum fuels usage. The impact of fuel utilization is the increase of CO_2 emissions; the relationship is indicated by a positive arrow. The Landing Rate factor is also related to the human subsystem through the individual activeness factor. The more inactive a person is, the easier for mosquitoes to approach, especially during peak hours.

In this case, intervention in increasing the knowledge, attitudes and behavior (PSP) of the community is required. From the analysis, it is known that the factors that are significantly related to the occurrence of DHF in the community are knowledge, attitudes and behavior factors. This program provides community awareness education. This relationship is indicated by a positive arrow for PSP. Figure 3 shows the diagram stock flow scheme which is the model production stage, where all variables are included as factors that influence the incidence of DHF.

Conclusions

System dynamics model simulation of DHF shows the program intervention scenario that has the most significant effect on the decline of Breeding Places and the decrease in DHF cases is by increasing the participation of the community to actively control water places that are potential to be mosquito breeding places. Environmental factors influence DHF cases and the vectors *Aedes aegypti* and dengue viruses related to climate change. The Indonesia geography, knowledge, attitude and practice have caused DHF cases were increase.

Simulation in this study has produced a model that can be used for other infectious diseases. Through system dynamics modeling, the transmission model of the disease can be known in details, so that the most effective interventions can be determined in handling infectious disease cases.

Conflict of Interest Statement: The authors of this research declare that there is no conflict of interest related to this study

Source of Funding: All funds used to support this research come from the Ministry of Research, Technology and Higher Education of the Republic of Indonesia, Grant of PTUPT Program.

Ethical Clearance: The ethical clearance of this research taken from Ethics Committee of Faculty of Public Health, Universitas Indonesia.

References

1. Health Department. Prevention and Control of Dengue Fever and Dengue Hemorrhagic Fever, Complete Guide to Translation from WHO Regional Publication No. 29, "Prevention and Control of Dengue and Hemorrhagic Fever", WHO and Health Department Cooperation, Jakarta. 2003.
2. Muhammad E, Soesilo B. Analysis of dynamic system, living environment, social, economy, management, UMJ Press, Jakarta. 2001.
3. Gagnon AS, Bush AB, Smoyer-Tomic KE. Dengue epidemics and the El Niño southern oscillation. Climate Research. 2001 Nov 22;19(1):35-43.
4. Gubler, J, Kuno, G 2001 Dengue and dengue hemorrhagic fever, CABI Publishing, 10 E 40th Street Suite 3203 NY 10016, USA.

Waste Management Program to Create Zero Waste in School Level: Communication, Information, and Education (CIE) and Participation Methods

Haryoto Kusnoputranto[1], Nurina Vidya Ayuningtyas[2], Olivia Purnamasari[3], Muhamad Riski[3], Dhiya Farah Athaya Wijaya[3] , Zakianis[4]

[1]Professor, [2]Magister Student,[3]Undergraduate Student, Department of Esnvironmental Health, Faculty of Public Health, Universitas Indonesia, [4]Lecturer of Environmental Health Department, Faculty of Public Health, Universitas Indonesia

Abstract

In low-income countries, 90% waste accumulates in landfills without sorting processes and some are even eliminated by burning it. In 2019, the amount of waste in Depok reaches 1,300 tons every day, there is an increase from the previous year. Data shows that public sectors, such as schools, contributes 5% of the total waste. Based on this condition, the researchers held community service activities in schools to give motivation in managing the waste to reduce the volume of waste in landfills. The methods used were quantitative and qualitative. The activities held were in the form of training, improvement of soft skills in processing waste and preserving the environment, as well as monitoring and evaluation activities. From the results of the post-test scores after the training, it was found that the teachers' insight increased by 28.3%, while in the students by 25%. Adiwiyata school criteria achievement score also increased by more than 60% in each school. However, we need to know that changes in behavior cannot occur in a short time. Continuous change requires time and a strong commitment to ensure that the program continues to run routinely in the coming years.

***Keywords**: Adiwiyata, Biopore, Vertical Garden, Waste Management, Elementary School*

Introduction

The amount of waste in the world always increases annually. The World Bank reports that every person produces 0.74 kg of waste every day. In low-income countries, 90% waste accumulates in landfills or eliminated by burning it [(1)]. Solid waste that is not managed properly can cause flood, air pollution, and health problems such as diarrhea and dengue fever [(2)].

Indonesia is a developing country that has problems in managing waste. The Ministry of Environment and Forestry reports that around 72% of the population does not care about waste and 69% of waste ends up in landfills without sorting processes [(3)]. The types of waste produced by the population include organic waste (60%), plastic waste (14%), paper waste (9%), metals and other materials (17%) [(4)].

Depok is one of the cities in West Java Province with a high population growth. High populations result in increased waste production [(1)]. In 2019, the amount of waste in Depok reaches 1,300 tons every day, an increase of 61.5% from the previous year [(5)]. The types of waste are dominated by organic waste. Sources of waste can come from household activities (63%), traditional markets (9%), shopping centers (7%), public sectors such as schools, hospitals, and others (5%) [(6)].

Inadequate waste management systems and bad behavior of people who do not care about waste management at the household level are the causes of the increase in waste volume [(3)]. The government continues

Corresponding Author:
Haryoto Kusnoputranto
Professor of Department Environmental Health
Faculty of Public Health, Universitas Indonesia
email: haryotok@ui.ac.id / haryoto_k@yahoo.com
phone: +62 813 805 47 570

to improve the waste management system by developing TPS3R (Waste Disposal Sites of Reuse, Reduce, Recycle) to reduce the volume of waste in landfills. The purpose of the TPS3R development is to reduce the quantity and sorting of waste based on its type before being transported to landfills [7].

Another reason for the increase in waste volume is bad behavior of the people. Behavior is related to awareness level [8]. Behavior that is based on awareness will have a lasting impact compared to behavior without good awareness [9]. From this theory, we can determine that increasing people awareness is one way to change behavior because we can always rely on government programs in managing the waste we produce.

Awareness on waste management must be delivered earlier. We must educate children about waste at home and school. School is a place for students to learn new things and a place for the formation of behavior and character. Therefore, curriculum based on environmental conservation needs to be established in schools. Curriculum based on environmental preservation is held with the aim of increasing student knowledge[8]. The aim is to make students closer to the environment so that they can develop awareness to exploit wisely [10].

The Indonesian government has grown the participation of every school in managing the environment through the Adiwiyata Program. It is a program for schools in environmental culture. Every level of education can participate in this program and this program is voluntary, currently. The principles of this program are based on education, participation, and sustainability[11]. Until 2018, not many schools participated in this program. It was only about 30 schools out of 877 schools in Depok receiving Adiwiyata award. This means, there are several schools implementing environment-based curriculum and many schools have few activities concerning on the environment. One of the programs assessed by the Adiwiyata Program is waste management at the school level.

Based on this reason, we organized a counseling program for teachers and students to increase awareness on waste management programs at the school level. In addition, we also attempted to increase the participation of this program to all school communities. We also conducted monitoring and evaluation to see the development of program implementation at the school level.

Materials and Method

Research Design

This Community Service Activities was located in Elementary Schools in Depok City on July-November 2019. We collaborated with two schools, namely Sukatani 6 Primary School and Cilangkap 6 Primary School. We selected these two schools based on inclusion criteria in which both schools have sufficient land to make biopore hole, have never participated or participated in the Adiwiyata Program, and have a commitment to join and run the program.

Biopore is one of replication methods of natural processes for water absorption. The technique of making biopore hole can be seen in Figure 1. The advantage of biopore hole is to increase surface water absorption, reduce standing water, and increase water supply in the soil. However, currently, the biopore hole can be used as a decay hole for organic waste which can later be utilized as compost [11]. We used the Communication, Information and Education methods, and Participation to run this program.

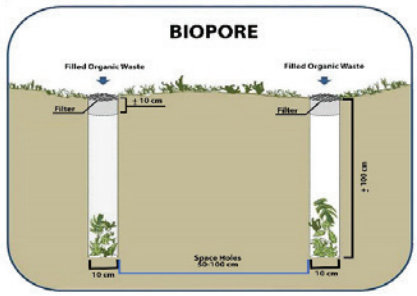


Figure 1. Technique of making biopore

Source: www.pu.go.id

Procedure

The team coordinated with the Principal and Teachers regarding the program focusing on waste management at the school level in the preliminary survey. We provided information about the implementation time, objectives, and series of activities to be performed. After obtaining permission from the Principal, the team continued with the training program.

A total of 6 teachers and 10 students from each school were involved in the training. We provided information on the types of waste, how to sort the waste, how to make biopore hole for the use of organic waste, how to

make a vertical garden using old bottles, how to reduce plastic waste, and others. To evaluate the absorption of information from training activities, the team conducted pre-test before training and post-test after training.

The team realized that training for Teachers and Students was not possible using the same method. Therefore, the team divided two methods, namely question and answer lectures for the teacher and learning while playing using the Snakes and Ladders tool that the team had prepared for the students. The team also provided facilities and supporting infrastructure to the schools in the form of posters, augers to make biopore hole, and plant seeds to make vertical gardens.

After three months, the team visited the schools for monitoring and evaluation activities regarding the implementation of the program in each school. We used evaluation instruments to measure the progress of program implementation. The evaluation instrument contained the types of waste produced by schools, the conditions of waste processing (separated or still mixed between organic and inorganic waste), and obstacles found during the program implementation. We also discussed with the Principal and Teachers as well as Students who have been trained on the obstacles found and the progress of the program implementation to provide appropriate solutions to solve existing problems.

Figure 2. Making biopore

Findings

From the comparison results of pre-test and post-test scores, it is known that there is an increase in the level of awareness before and after training. The increase in grades in the Teachers group is by 28.3%, while the increase in grades in the Students group is by 25%. Data on the number of respondents, gender, and pre-test and post-test mean values can be seen in Table 1.

Table 1. Respondents and Score of pre-test and post-test from training

Variable	N	%	Mean	Max-Min	Information
Teacher					
Male	6	50			
Female	6	50			
Student					
Male	10	50			
Female	10	50			
Score of pre-test*					
Teacher			51.7	26.7 – 93.4	
Student			54	30 – 90	
Score of post-test*					
Teacher			80	60 – 93.4	
Student			79	50 – 100	

* Note: Post-test and pre-test scores increased by 28.3% for teachers, while for students increased by 25%

From the evaluation results of the monitoring activities, it is known that the types of waste produced by schools are in the form of food scraps, dried leaves and twigs, paper, plastic cups, straws, plastic bottles, cardboard, rice paper, and styrofoam. In addition, the researchers conducted a scoring to assess school achievements in the Adiwiyata program assessment. After receiving intervention, each school had a score increase of around 60%. However, it is still below 56 (70%), which means these schools require improvement efforts in every aspect of assessment. Schools with grades less than 56 (70%) have not been able to participate in the Adiwiyata School Competition.

Discussion

Awareness is one of the factors that can affect behavior change in a person [12]. Behavior that is based on sufficient awareness will last longer, compared to behavior that is not based on sufficient awareness [9]. Referring to the theory, in order to realize zero waste at the school level, the researchers focus on increasing awareness before continuing on to the participation program.

Efforts to increase knowledge were performed by providing training to school community, including teachers and students appointed. The trainees are expected to become agents of change in their respective schools and be able to motivate their colleagues and friends to participate in the waste segregation and environmental preservation program as an effort to realize the Adiwiyata school.

From the results of the pre-test and post-test assessment of the trainees, both teachers and students, it showed an increase in knowledge before and after the training activities (Table 1). After the participants were determined to have increased knowledge, the intervention activities continued with growing participant participation by providing soft skills to the participants. The type of soft skills provided is how to make biopore hole as an effort to reduce the volume of organic waste such as leaf litter and food scraps (Figure 3) and create a vertical garden by utilizing used items found at school.

The series of activities consisting of training and soft skills improvement increases the score on the fulfillment of Adiwiyata aspects in schools in the third aspect, that is participatory-based environmental activities. Participatory-based environmental activities increasing scores include training attended by school community in environmental conservation, increasing awareness of waste in schools by collaborating with the Waste Management Unit by sending excess leaf litter to compost and scavengers for removing plastic bottles, plastic cups, and used cardboard, as well as showing environmental preservation efforts undertaken by all school community, that is making biopore holes by utilizing organic waste as compost and making vertical gardens by utilizing used bottles.

The training activities provided also have an impact on increasing the awareness and motivation of school community in maintaining and providing supporting appropriate facilities and infrastructure for their purpose. The form of this activity is the procurement of bins by its type to sort organic and inorganic waste (Figure 3) by the schools, sorting plastic bottles and cups, making biopore holes, making vertical gardens from used bottles (Figure 4), and campaigning carrying packaged meal from house to reduce plastic and styrofoam waste from canteens or food vendors. The form of providing supporting facilities and infrastructures adds a score to the fourth aspect, that is the management of environmentally friendly supporting facilities.

Figure 3. Trash bin before (left) and after training (right)

(1) (2) (3)

Figure 4. Composting organic waste (1,2) and vertical garden (3)

In addition to training aimed at increasing the awareness and concern of the school community in implementing environmental conservation activities and creating zero waste schools, there are other factors in supporting the success of the program. This factor is commitment from the top management [13], in this case is the Principal. The principal as a leader in the school is an important factor in keeping the program running and able to run sustainably [14,15].

Commitments from the School Principal can be realized by making a policy or regulation and socializing the policy or regulation to all school community [12,14].

The Principal has shown his commitment to the waste management program by conveying it regularly during Monday's ceremony to teachers and students in their respective schools.

Changes as a whole and continuously require sufficient time because they cannot change in a short time [16]. Third party can help motivate the change process because the third party can become role models and trigger perceptions [17] of school community in implementing waste management behavior at the school level.

In implementing waste management interventions in the schools, the researchers had several difficulties in keeping the program running continuously. We can only describe the conditions of waste management before and after the intervention without knowing for sure how much the volume of waste is reduced after the intervention. In open discussions with the teachers and students, the researchers also had several matters that hindered the program's sustainability, including the busy schedule of schools to fulfill educational activities such as exam preparation so that there was a lot of time allocated in learning activities. Regarding the results of discussions with the Principal and Teachers, this issue can be overcome by adding waste management activities and environmental preservation efforts into the education curriculum activities so that the activities can be controlled and run without disrupting other activities. Adding a series of waste management and environmental preservation activities to the structure of the formal education curriculum in schools can also improve scores on aspects of implementing an environment-based curriculum in Adiwiyata assessment.

Conclusion

Various efforts can be made in realizing zero waste schools such as training to increase awareness and motivation for behavior change and to increase soft skills to trigger citizen participation in efforts to change behavior and provide supporting facilities and infrastructure in optimizing waste management programs in schools. From the programs provided such as training to make biopore holes as a means to reduce organic waste and training to make vertical gardens using used goods, it is expected to help the schools increase participation in achieving Adiwiyata scores better. However, this is not enough without the support of the superior (Principal) in the form of a superior commitment.

Financial Support

This activity is funded from the Community Service Grant, Universitas Indonesia.

Conflic of Interest: No conflict of interest in this activity.

Ethical Clearence: The Ethical Review was issued by the Ethics Commission of the Faculty of Public Health, Universitas Indonesia.

Acknowledgement: The researchers would like to express their gratitude and highest appreciation to the Directorate of Research and Community Service at the Universitas Indonesia as a funder in supporting the implementation of this program. In addition, the researchers also expressed their gratitude to all community, both the School Principal, Teachers, and Students from Sukatani 6 Primary School Depok and Cilangkap 6 Primary School Depok for allowing and participating in this community service program.

References

1. World Bank. Solid Waste Management [Internet]. 2019. Available from: www.worldbank.org
2. Hoornweg, Bhada-Tata. What a Waste: Global Review of Solid Waste Management. Washington DC: Urban Development and Local Government Unit World Bank; 2012.
3. CNN Indonesia. KLHK: 72 Persen Masyarakat Tak Peduli dengan Sampah Plastik. 2019; Available from: www.cnnindonesia.com
4. CNN Indonesia. Riset: 24 Persen Sampah di Indonesia Masih Tak Terkelola. 2018; Available from: www.cnnindonesia.com
5. Suwarso IE. Sampah Depok Naik 500 Ton per Hari. 2019; Available from: www.mediaindonesia.com
6. Dinas Lingkungan Hidup. Dokumen Informasi Kinerja Pengelolaan Lingkungan Hidup Daerah Kabupaten Kulon Progo Tahun 2017. 2017.
7. Dinas Lingkungan Hidup dan Kebersihan Depok. Pengelolaan Lingkungan Hidup Kota Depok. 2017.
8. Gusti A, Isyandi B, Bahri S, Afandi D. Faktor Determinan Intensi Perilaku Pengelolaan Sampah Berkelanjutan pada Siswa Sekolah Dasar. 2015;65–72.
9. Notoadmodjo S. Kesehatan Masyarakat: Ilmu dan

Seni Edisi Pertama. Jakarta: Rineka Cipta; 2007. 144 p.

10. Tim Mata Kuliah Umum Pendidikan Lingkungan Hidup. Pendidikan Lingkungan Hidup. Semarang: Universitas Negeri Semarang; 2014.
11. Institute of Environmental Science for Social Change. Integrating Biopore in Drainage Management in Campus [Internet]. 2010. Available from: www.essc.org
12. Notoadmodjo S. Kesehatan Masyarakat: Ilmu dan Seni Edisi Kedua. Jakarta: Rineka Cipta; 2010.
13. Lokhorst AM, Werner C, Staats H, Dijk E Van, Gale JL. Commitment and Behavior Change : A Meta-Analysis and Critical Review of Commitment-Making Strategies in Environmental Research. 2013;
14. Hermanto SP. Peran Kepemimpinana Kepala Sekolah dalam Menumbuhkan Kesadaran Perbedaan Individu Berkebutuhan Khusus di Seklah Inklusi. 2012;
15. Morris J. Theories and Models of Behaviour and Behaviour Change. For Res. 2012;1–27.
16. Kementerian Lingkungan Hidup. Peraturan Menteri Lingkungan Hidup Republik Indonesia Nomor 05 Tahun 2013 Tentang Pedoman Pelaksanaan Program Adiwiyata. 2013.
17. World Bank. Theories of Behavior Change. Washington DC: Communication for Governance & Accountability Program (CommGAP); 2010. 1-6 p.

Effects of Health Perception, Generativity, and Wisdom on Job Competency of Korean Care Workers

Hee Kyung Kim[1], Cheol Hee Park[2], Nan Young Lee[3]

[1]Professor, Department of Nursing, Kongju National University, Gongju, South Korea, [2]Master degree student, Department of Nursing, Kongju National University, Gongju, South Korea, [3]Lecturer, Department of Nursing, Kongju National University, Gongju, South Korea

Abstract

Purpose: The purpose of this study is to produce fundamental materials for nursing intervention development for care workers' job competency enhancement by analyzing impact of care workers' health perception, generativity and wisdom on job competency.

Methods: Data was collected by means of self-report questionnaire with ethical considerations from 116 care workers at two nursing homes and one care worker center in D Borough in D City, two nursing homes in J Borough, and one nursing home in S Borough. The collected data was then analyzed by frequency scale, mean, standard deviation, t-test, ANOVA, Pearson correlational coefficients, and stepwise multiple regression.

Results: The care workers' health perception scored 3.86 points out of 5 points, generativity scored 2.75 points out of 4 points, and wisdom scored 3.49 points out of 5 points, and job competency scored 3.79 points out of 5 points. The job competency of care workers was a moderate positive correlation with health perception ($r=.49$, $p<.001$), generativity ($r=.34$, $p<.001$), wisdom ($r=.47$, $p<.001$). The health perception ($\beta=.346$, $p<.001$) of care workers had a significant influence on job competency. Health perception, wisdom and work experience of care workers explained 39.6% of job competency.

Conclusion: Care workers should be provided with environmental and institutional strategies for constant service provision without career disruption. Job competency affected by care workers' health, wisdom and work experience, therefore, regular check-up and spur for maintenance of good health are required, in addition to constant refresher and capability enhancement education for extended wisdom on caring and life in daily lives. On top of that, a capability management program should be developed in consideration of the said factors. Job competency increased in proportion to work years in elder caring, therefore, institutional management of manpower is needed in policy-level.

Keywords: *Health perception, Generativity, Wisdom, Job competency, Care workers*

Introduction

The country's current population is 51,635,000 as of 2018 and expected to increase until otherwise in 2031, while the current population over age 65, which is 7,381,000, is expected to increase until 2050 (18,813,000). Given the rapid population ageing, the elderly over age 65 is forecasted to reach 41.0% in 2060[1] from 14.3% in 2018. Accordingly, there has been a need of health and welfare policies for the elderly called out to date, especially of high-quality services of health and medical employees for elderly's better health and life quality.

In this regard, the country implemented the National Long-Term Care Insurance in 2008 whereby complimentary caring is provided to the elderly of great age or with a senile disease struggling in daily lives to assist in housework and physical activities in order to help improve their health and life in later years, and also ease burden on their families to ultimately enhance the national quality of life, and has been reinforcing medical

and nursing service, day and night caring service, senior welfare centers and elderly care facilities for those over age 65 annually.[1] Professional nursing centers, elder care hospitals and educational institutions have devoted to cultivating care workers as the professionals to provide quality in-home services

Care workers' job competency can be seen as a worker's capability to provide efficient in-home care services using its acquired skills and knowledge as internalized with its own values and job attitude. Internalization processes differently by individual, and thus the quality of service appears differently depending on how the worker internalizes its acquired skills and knowledge upon its own values and attitudes when rendering care services[2]. Simply put, care workers' job competency is an integral of worker's set of values, attitude, knowledge and skills.

Impact factors on enhancement of care workers' job competency will vary, although the primary should be worker's subjective perception of its own health. The subjective health perception is an overall wellness of physical, psychological and social functional ability[3], being neutral between human and environment, with an ability to adapt to environment, perform social tasks and roles[4]. Hence, positive self-perception of health is seen to reduce work stress and enhance job competency.

According to Erikson's human development and life cycle theory, generativity is an adult's ability to self-survive and create fruits and thoughts that will outlast for next generations as it looks after families, society and system, maintains and succeeds cultural tradition, and also an affection to nurture and lead next generations.[5] Generativity ideally arouses one's passion and resolution to provide a guidance outside the range of caring, nurturing and family, and takes a form of advice, teaching, guidance and volunteer activity in work place and local community. Accordingly, an individual with high generativity is influential on others with desirable results.[6] Most care workers are falling in the middle-aged bracket, whose development task is achievement of generativity. Generativity is also considered an essential element and value for care workers' job competency enhancement given its attributes.

A research on job competency of 120 care workers at elders nursing home[7] revealed wisdom as the most influential factor on job competency. A wise man has problem-solving capability and insights to embrace life and build a stronger relationship with others. As wisdom refers to, in cognitive terms, keen eyes, insights and exceptional judgement, while in private terms, balanced integration and consonance of ego[8], a wise care worker assumes positive attitude and performs impartial, empathic communication in elder caring.

Therefore, this study attempts to identify impact factors on enhancement of care workers' job competency after defining the degree of health perception, generativity and wisdom in respect of the level of job competency.

Method

Subjects: The subjects of this study are 116 care workers with more than 6 months of work experience selected from two nursing homes and one care worker education center in D Borough in D City, two nursing homes in J Borough and one nursing home in S Borough. All participation was made voluntarily by grownup male and female workers upon their understanding of purpose of this study as submitted with written consent. As the least number of samples for 5 predictors, effect size 0.15, significance level 0.05 and power 0.90 was calculated to be 116 by G-power 3.1.9.4 program, but given elimination rate 10%, a total of 128 workers were surveyed initially, with those with less than 6 months of work experience excluded later on, leaving the final number to be 116. Ahead of the survey, the participants were informed of this study's purpose and survey method, that the survey results would be anonymized as confidential and be only used for study purpose. They submitted a study participation acceptance form, knowing participation could be revoked anytime if desired.

Instruments

Health perception: The Korean version of THI (Todai Health Index) [9], developed by Health Department of Tokyo University Medical School, was used as amended and supplemented for this study. The tool consisted of 30 questions across 4 sections-physical, psychological, spiritual and social. Using a 5 point Likert scale, a higher score indicated a better condition of health perceived. For this study's reliability, Cronbach's α was shown .94.

Generativity: LGS (Loyola Generativity Scale), developed by McAdams and Aubin[10], used by Hong[11], was employed as amended for this study. It consisted of 19 questions on such concepts as teaching, knowledge

transfer, positive contribution to society, caring and responsibility for others, creativity and productivity, sustainable legacy. Using a 4 point Likert scale, a higher score indicated a higher level of generativity. For research reliability, Cronbach's α of this study was shown .79.

Wisdom: Korean Men's Wisdom Scale (KMWS), developed by Kim[12] was used. It consisted of 43 questions across 4 sectors of cognitive ability, refinement and balance, positive attitude toward life, empathic interpersonal relationship. Using a 5 point Likert scale, a higher score indicated a higher level of wisdom. For research reliability, Cronbach's α of this study was shown .97.

Job competency: National Capability Standard (NCS), restructured for care workers by Lee[13] was used. It consists of 24 questions on communication capability, problem-solving capability, self-development capability, interpersonal relationship capability, technique capability and professional ethic capability. Using a 5 point Likert scale, a higher score indicated a higher degree of job competency. For research reliability, Cronbach's α of this study was shown .94.

Data collection: The researchers of this study visited 5 nursing homes and 1 care worker education center in D City to provide explanation on the purpose of this study to care workers directly after getting approval of the center head and manager upon explanation of the purpose and method of this study. Written consent was submitted by participants ahead of survey for data collection.

Ethical consideration: Approval was acquired by the ethics committee of K University on the objective, methodology and protection of rights of study participants (KNU_IRB_2019-90). During the study period the guidelines on ethical studies were observed.

Data analysis: Using the SPSS/WIN 23.0 program, the general characteristics and variables were analyzed for frequency, percentage, mean and standard deviation. The difference in job competency across different general characteristics was analyzed using a t-test, ANOVA and Scheffe test. The correlation between care workers' variables was analyzed using Pearson's correlation coefficients. Multiple regression analysis was conducted to analyze the factors affecting the subjects' job competency.

Results

General Characteristics of Korean Care Workers

The average age of 116 care workers was 57.43±0.51, with the majority in the age bracket of 50-59 (44.0%). Female care workers accounted for most (112 people, 96.6%). For educational background, 93 had a minimum high school education (80.2%). The average years of work experience was 42.5±33.20 months, with 47 workers less than 24 months (40.5%). The majority of respondents had received 1 or more refresher education or professional education for the past one year (85 people, 73.3%). More than a half earned less than KRW1 million (73 people, 62.9%). For the form of job, in-home care service job took up the majority (112 people, 96.6%). Those who care one person a day were 62 (53.4%).

Degree of Health Perception, Generativity, Wisdom and Job Competency in Korean Care Workers:

Korean care workers' health perception scored 3.86 points out of 5 points, generativity scored 2.75 points out of 4 points, and wisdom scored 3.49 points out of 5 points, and job competency scored 3.79 points out of 5 points (Table 1).

Table 1. Degree of Health Perception, Generativity, Wisdom and Job Competency in Korean Care Workers

Variables	M±SD	Range
Health perception	3.86±0.51	1~5
Generativity	2.75±0.32	1~4
Wisdom	3.49±0.50	1~5
Job competency	3.79±0.48	1~5

Difference in Job Competency across General Characteristics

Comparative analysis of job competency According to general characteristics found that work years (F=5.19, p=.007) and form of job (t=4.38, p=.016) make differences in job competency: A group of people with more than 5 years of work experience showed a higher level of job competency than a group with years between 2 and 5; a group of people who provide in-home care

service showed a higher level of job competency than a group on shifts at institutions.

Correlation between Perceived Health Perception, Generativity, Wisdom and Job Competency in Care Workers

The job competency of Korean care workers was a moderate positive correlation with health perception (r=.49, p<.001), generativity (r=.34, p<.001), wisdom (r=.47, p<.001) (Table 2).

Table 2. **Correlation between Health Perception, Generativity, and Wisdom on Job Competency in Korean Care Workers**

Variables	**Health perception r(p)**	**Generativity r(p)**	**Wisdom r(p)**	**Job competency r(p)**
Health perception	1			
Generativity	.43(<.001)	1		
Wisdom	..43(<.001)	.45(<.001)	1	
Job competency	.49(<.001)	.34(<.001)	.47(<.001)	1

Factors affecting Job Competency in Korean Care Workers

To find out the factors affecting the job competency of Korean care workers was conducted multiple regression analysis by the stepwise method with health perception, generativity, and wisdom as independent variables, and work experience and type of working agency among general characteristics. The problem of multicollinearity expected in the multiple regression analysis was 0.1 or higher with the tolerance limit of 0.533~0.785, and the variance inflation factors (VIF) was 1.274~1.877 that did not exceed the standard of 10 or higher, so there was no problem of multicollinearity. Also, the Durbin-Watson value was 1.795, with no problem of autocorrelation. The analysis showed that health perception (β=.346, p<.001) had a high influence on the job competency of Korean care workers and As it shows explanation power of 39.6%, showed that the higher the degree of health perception and wisdom, and the longer of work experience, the higher the job competency is. Health perception, wisdom and work experience were the variables affecting the job competency of Korean care workers (Table 3).

Table 3. Factors affecting Job Competency in Korean Care Workers

Variables	B	SE	β	t	p
Constant	1.552	.341		4.554	<.001
Health perception	.330	.080	.346	4.138	<.001
Wisdom	.347	.082	.353	4.246	<.001
Work experience (25~60 months)	-.368	.099	-.375	-3.735	<.001
Work experience (over 61 months)	-.261	.100	-.264	-2.615	.010
R^2=.396 Adj. R^2=.375 F=18.218 *p*<.001					

Reference: work experience (less than 24 months)

Discussion

This study's job competency was shown 3.79 out of 5 possible, similarly to that of Kim's[2] research (3.68±0.51) on 217 in-home service care workers. These levels are merely modest, requiring improvement. Generativity was shown 2.75 out of 4 possible, also moderate and similar to that of Hong[11]'s research (2.70±0.42) on adults in senescence. The average age of this study's subjects was 57.4, with the majority over age 50, whose development task should be considered generativity achievement. According to McAdams & Aubin[10], an adult fosters, educates, leads and promotes a progressive spirit of next generation and attains generation of products and fruition of life beneficial to social systems, i.e., generativity. Generativity is a drive for one's better perception of itself and its own life to help assess oneself more positively and meaningfully. People with more generativity associated resources and abilities tend to be more supportive for others and feel more responsibility for society.[11] Generativity is deemed the main concept to motivate in care workers' job performance who are mostly middle-aged, therefore, they should be aided with a chance of improvement.

This study found that job competency had pure correlations with health perception, generativity, and wisdom, while impact factors on job competency as health perception, wisdom and work experience. Subjective perception of good health is a comprehensive self-evaluation in physical, physiological, psychological and social terms where health is the key element of every life. Generativity is also a main element of caring for others.[11] Wisdom is another essential element of care workers' performance as a wise man displays comprehension, communication skill, competence, interpersonal relationship and social humbleness.[14] Therefore, it is always needed to consider and devise measures to improve the said concepts for enhancement of care workers' job competency. On top of that, care workers should make daily efforts to stay fit through regular check-up and to make early detection of possible disease for timely treatment, and further to nurture wisdom while constantly pursuing relevant job experiences for extended knowledge and skills. There should also be institutional aids; local governments, educational institutions and practical affair institutions should exert best possible endeavors to achieve job competency improvement and quality environment formation.

Conclusions

For enhancement of care workers' job competency, daily care for health management is needed, for early detection of possible disease for timely treatment as well. They should endeavor to increase generativity, the development task of the middle-aged, and to live a wise life individually. As this study finds health perception, wisdom and work experience as the main impact factors of job competency, care workers should be provided with a chance to improve their knowledge and skill for continued caring service without career disruption, assisted by job capability enhancement programs and quality environment devised by their employer institutions in consideration of the said elements, health, wisdom and generativity.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: Nil

References

1. Statistics Korea. 2018 Elderly Statistics, http://kostat.go.kr/portal/korea/kor_nw/3/index.board? bmode=read&aSeq=370781& pageNo=&amSeq=&s Target=&sTxt=
2. Kim, AR. Impacts of Care Worker's Self-efficacy and Stress-coping Ability on Job Competency: Focused on Female Care Workers providing Home Care Services in the C. Region. Master thesis, Korea Nazarene University, 2019.
3. Kim, MA. Influence of Job Stress and Perceived Health on Health Promotion Behaviors of Geriatric Hospital Nurses , Master thesis, Dongshin University, 2019.
4. Cho, WJ. An Empirical Study on Adult Perception of Health Behavior. Doctoral dissertation, Yonsei University, 1983.
5. Erikson, E. H. Identity, Youth, and Crisis. New York: Norton. 1968.
6. Taylor, A. Generativity and adult development: Implications for mobilizing volunteers in support of youth. In Clary, E. G. & Rhodes, J. E.(eds.), Mobilizing Adults for Positive Youth Development, Springer. 2006, 83-100.
7. Kim, HK, Lee, NY., & Park, CH. Effects of Self-efficacy and Wisdom on Job Competency of Care Workers in Korea, Indian Journal of Public Health

Research & Development, submitting, 2020.

8. Lee, SL, Cho, SH. The Development and Validity of the Korean Wisdom Scale. THE Korean Journal of Culture and Social Issues, 2012; 18(1), pp.1-26.
9. Lim, KH. A Study on Shifting Nurses' Health Conditions and Job Satisfaction, Master thesis, Hanyang University.
10. Hong, EJ. A Study on Helping Activities of Mature and Senior Age Group and Their Generativity. Doctoral dissertation, Yonsei University, 2008.
11. Kim, MH. Development and Validation of a Wisdom Scale for Korean Senior Citizens. Doctoral dissertation, Kyungsung University, Pusan, 2014.
12. Lee, J. Learning Transfer and Job Competency of Care Workers': Focusing on Dementia job trainingprogram participants, Doctoral dissertation, Gachon University, Seongnam, 2017.
13. McAdams, DP., de St. Aubin, E. A theory of generativity and its assessment through self-report, behavioral act, and narrative themes in autobiography. Journal of Personality and Social Psychology, 1992, 62, 1003-1015.
14. Lee, SL, Cho, SH. Counselor's Wisdom, Counseling Processes, and Outcomes, The Korean Journal of Counseling and Psychotherapy, 2010, Vol. 22, No. 1, 71-94

Effects of Self-efficacy and Wisdom on Job Competence of Care Workers in Korea

C, Nan Young Lee[2], Cheol Hee Park[3]

[1]Professor, Department of Nursing, Kongju National University, Gongju, South Korea, [2]Lecturer, Kongju National University, Gongju, South Korea, [3]Master degree student, Kongju National University, Gongju, South Korea

Abstract

Purpose: The purpose of this study was to analyze the effect that self-efficacy and wisdom on job competence in care worker in Korea.

Method: The subjects of this study were 123 care workers. The data were analyzed using descriptive statistics, t-test, ANOVA, Pearson's correlation coefficient and stepwise multiple regression using the SPSS Window 23.0 program.

Results: The care workers' self-efficacy scored 3.80 points out of 5 points, and wisdom scored 3.63 points out of 5 points, and job competence scored 3.66 points out of 5 points. The job competence of care workers was a high positive correlation with self-efficacy ($r=.53$, $p<.001$), wisdom ($r=.72$, $p<.001$). The wisdom ($\beta=.715$, $p<.001$) of care workers had a significant influence on job competence, showing a 51.1 percent explanation power.

Conclusion: The self-efficacy and wisdom of care workers showed a positive correlation with job competence, the higher the degree of self-efficacy and wisdom was found to be, the higher the job competence. Wisdom is the most influential variable on the job competence of care workers. Therefore, in order to improve the health and quality of life of the elderly who living at home by increasing the job competence of the care workers, it is necessary to provide the intervention program so that self-efficacy and wisdom can be developed. Especially, wisdom has the attribute that can be acquired through experience while living, so it is also necessary to train them to make a successful resolution in response to various problems. This study is aimed at the care workers who provide home care, so it is suggested that the study is repeated targeting the care workers who work in the hospital by expanding the institution.

Keywords: *Care workers, Self-efficacy, Wisdom, Job competence*

Introduction

The medical expenses of the elderly aged 65 or older are 34.5% of the total medical expenses according to the statistics of 2013, and the medical expenses of the elderly will account for 45.6% of the total medical expenses in 2020, which is caregiving and health management for the elderly is emerged as an important national issue. [1]According to the statistical data of the elderly in 2018, The elderly aged 65 tend to increase their medical and caregiving services to 38.6% among the social concerns for their aging, and In 2017, the number of welfare facilities for the elderly is 76,371, which is increasing every year, and the number of elderly care facilities and day and night protection services is continuously increasing. [2]Among the health workforce who care for the elderly, the care workers are the primary workforce who care for the health of the elderly such as nursing and bathing in the geriatric hospitals, the care facilities, and the home, their professional ability play significant role in managing the health of the elderly. Also, only those who have completed a specific education at an

Corresponding Author:
Nan Young Lee
Lecturer, Dept. of Nursing, Kongju National University, Gongju, South Korea
E-mail: 317nan@naver.com

educational institution recognized by the Ministry of Health and Welfare and obtained a certificate through a qualification test may work as a care worker.

On the other hand, competence is an internal characteristic of an individual who causes effective and excellent performance by the criteria in a specific situation or job, it is defined as the total aggregate of the features, actions, and [3]characteristics necessary to achieve successful job performance. [4]Competence means the individual's performance as a result of applying what the learner has learned to work, and measuring competency means measuring an individual's performance. Jang[5] stated that the competence of the care worker who directly provides the service is a critical factor that governs the quality of service and that the environment should be developed so that he or she can acquire nursing skills with a sense of occupation. Shin[6] defined Job competence as a whole of a given role within the organization, such as the mission and strategy that an individual seeks to perform a successful job in the enterprise or organization, and such as skills, attitudes, and knowledge necessary to perform. Therefore, this job competence of care workers plays an essential role in the service targeting the elderly, and it is considered to be an essential factor in improving the quality of life and health preservation of the elderly. In particular, since the care workers who belong to the visiting care center visits the elderly's home and takes care of the elderly almost alone, it is thought that the level of individual competence plays a significant role in the health and quality of life of the elderly.

Once we analyze the factors that are relevant to Job competence so far, we can take into account the variable of self-efficacy and wisdom. When care workers perform caring, they need assurance and judgment of their actions in dealing with complex situations. Self-efficacy is the primary source of action and is caused by subjective judgments in repeated tasks that are truly self-assured of their ability, and this can be enhanced by the development of active ability to react and expertise, and if this process is repeated, subjective judgment is likely to lead to objective judgments7, so the self-efficiency is judged to have a positive effect on the job competence of care workers who take care of the elderly in vulnerable situations and also contributes to the improvement of job competence volume.

Also, Wisdom is the core of human development8 because it is the work of the mind to discern the reason or good or evil of things, and positive qualities such as self-integration and maturity, judgment and interpersonal skills, and understanding of life. Wisdom can be said as a mature mental activity that solves various problems in life through a balanced integration of cognitive, emotional, mental, moral, and relational factors. In the case of a wise care workers, it is thought that they will be able to perform the job well if they take care of the elderly with such as a positive attitude, a sympathetic interpersonal and a perspective.

Therefore, in this study, we intend to use that targeted on care workers to identify the extent of their job competence and analyze the extent to which their effectiveness and wisdom affect the job competence of the care workers as a baseline data for developing an arbitration program to increase the amount of job competence of care workers.

Methord

Subjects: The subjects of this study were 123 care workers in charge of visiting care centers located in Dong-gu, Jung-gu, and Seo-gu, D city. They are adult men and women who understood the purpose of the study and voluntarily expressed their willingness to participate and provided written consent. The study subjects were those with at least six months of experience as care workers. The number of samples was calculated using the G-power 3.1.9.4 program. The number of samples required to maintain the effect size .15, significance level .05, power .90, and four predictors was 108 people, and the subjects were 130, considering a 20% dropout rate.

Instruments

Self-efficacy: The tool that the general Self-efficacy scale developed by Chen, Gully, & Eden[9] then adapted by Noh[10] was used. It is a 5-point Likert scale with 8 questions in total and is from 'Strongly disagree' of 1point to 'Strongly agree' of 5points, which means that the higher the score is, the higher the degree of self-efficacy. The reliability in the study of Noh[10] was Cronbach's α=.83 and this study was .85

Wisdom: KMWS developed by Kim11 was used. In total, 43 questions consist of 4 sub-regions as 16 questions for cognitive competence, 11 questions for purify and balance, 10 questions for positive attitudes of life, and 6 questions for empathetic interpersonal relations. By the scale of from 'Strongly disagree' of 1point to 'Strongly agree' of 5points, we could see that

the higher the score, the higher the degree of wisdom is. The reliability at the time of development was Chronbach's α=.93 and this study was .95.

Job competence: We use the tools from National Occupational Capacity Standards with (NCS) adapted by Lee to suit for care workers. In total, 24 questions consisted of sub-regions as 4 questions for communication competence, 3 questions for problem-solving competence, 4 questions for self-development competence, 4 questions for interpersonal competence, three questions for technical competence, and 6 questions for vocational ethics competence. By the scale of from 'Strongly disagree' of 1point to 'Strongly agree' of 5points, we could see that the higher the score, the higher the degree of job competence is. The reliability at the time of development was Chronbach's α=.85, and this study was .93.

Data collection: Researchers were visited four visiting care centers located in Dong-gu, Jung-gu, and Seo-gu in D city in person to explain the purpose and method of research to the Director of the Center and got permission, then explain the purpose of the study to the care workers, and complete the questionnaire after obtaining written consent. Use time to complete the questionnaire was about 15 to 20 minutes.

Ethical consideration: Approval was acquired by the ethics committee of K University on the objective, methodology and protection of rights of study participants (KNU_IRB_2019_66). During the study period the guidelines on ethical studies were observed.

Data analysis: Using the SPSS/WIN 23.0 program, the general characteristics and variables were analyzed for frequency, percentage, mean and standard deviation. The difference in job competence across different general characteristics was analyzed using a t-test, ANOVA and Scheffe test. The correlation between the subjects' variables was analyzed using Pearson's correlation coefficients. Multiple regression analysis was conducted to analyze the factors affecting the subjects' job competence.

Results

General Characteristics of Care Workers: The average age of 123 nursing care providers was 56.13, and 39.8 % (49 people) of them was over 60 years old as the most significant number, and most of them 83.7% (103 people) was female, and for the graduation level was mostly high school graduates as 64.2 %(79 people) . The average working experience of care workers was 41 months, with 70.6% (72 people) groups of less than three years as the most significant number. The group that said they had no experience in receiving remuneration or professional education within the past year as the most significant number 44.7 percent (55 people), and in total income accounted, 510,000 won ~ 1 million won was more than the majority as 61.8 % (76 persons). Service institutions were mostly cases of visiting care performing as 87.8 % (108 people).

Degree of Self-efficacy, Wisdom and Job Competence in Care Workers: The care workers' self-efficacy scored 3.80 points out of 5 points, and wisdom scored 3.63 points out of 5 points, and job competence scored 3.66 points out of 5 points (Table 1)

Table 1. Degree of Self-efficacy, Wisdom and Job Competence in Care Workers

Item	M±SD	Range
Self-efficacy	3.80±0.52	1~5
Wisdom	3.63±0.44	1~5
Job competence	3.66±0.47	1~5

Difference in Job Competence across General Characteristics: Looking at the difference in job competence according to general characteristics of care workers was, it has shown that there was no difference in the degree of the job competence in all characteristics of age, gender, education, work experience, In-service education or professional education, total income, and the type of service institution.

Correlation between Self-efficacy, Wisdom and Job Competence in Care Workers: The self-efficacy and wisdom (r=.70, p<.001) of the care workers showed a high positive correlation, and the self-efficacy and job competence (r=.53, p<.001) and the wisdom and job competence (r=.72, p<.001) also showed a high positive correlation. In other words, the higher the degree of self-efficacy of care workers, the higher the degree of wisdom and the higher the degree of self-efficacy or the higher the degree of wisdom was found to be, the higher the degree of job competence (Table 2).

Table 2. Correlation between Self-efficacy, Wisdom and Job Competence in Care Workers

Variables	Self-efficacy r(p)	Wisdom r(p)	Job competence r(p)
Self-efficacy	1		
Wisdom	.70(<.001)	1	
Job competence	.53(<.001)	.72(<.001)	1

Factors affecting Job Competence in Care Workers: To find out the factors affecting the job competence of care workers was conducted multiple regression analysis by the stepwise method with self-efficacy and wisdom as independent variables. The problem of multicollinearity expected in the multiple regression analysis was 0.1 or higher with the tolerance limit of 1.000, and the variance inflation factors (VIF) was 1.000 that did not exceed the standard of 10 or higher, so there was no problem of multicollinearity. Also, the Durbin-Watson value was 1.341, with no problem of autocorrelation. The analysis showed that wisdom(β=.715, p<.001) had a high influence on the job competence of the care workers and As it shows explanation power of 51.1%, showed that the higher the degree of wisdom, the higher the job competence is, and wisdom was the only variable affecting the job competence of the care workers.

Table 3. Factors affecting Job Competence in Care Workers

Variables	B	SE	β	t	p
Constant	.878	.249		3.526	.001
Wisdom	.765	.068	.715	11.243	<.001
R^2=.511 Adj. R^2=.507 F=126.408 p<.001					

Discussion

This study analyzes the relationship between self-efficacy and wisdom and to identify the influential factors of job competency in order to provide high-quality care services on visiting the elderly's home by using their job competency targeted to care workers belonging to the visiting care center.

According to the study, Most of the care workers were middle-aged women. That is similar to Lee13's study result. Middle-Aged women cover most of the care worker jobs. As their level of job competency is moderate, they need continued and planned training for enhanced job competency. The care workers who are visiting the home must use their competence to provide care services without the supervision of the medical practitioner, so they should seek to improve job competence through training. Since the job training with inappropriate timing and duration act as an obstructive factor to care workers, it should be considered and provided the job training.

As self-efficacy can increase performance by making efforts, challenges, and actions as the primary source of behavior, so it is necessary to consider for job competence. Also, care workers should be able to demonstrate their job competence through efforts to increase wisdom, as wisdom, which is the result of the study targeting the counselors, was an important factor affecting the counseling process and performance. Wisdom people are enhanced in their ability to accept life and build relationships with others from a high problem-solving ability and insight, so it becomes a positively necessary factor for care workers.

Therefore, it is necessary to provide job education programs considering the variables of self-efficacy and

wisdom of care workers.

Conclusions

Self-efficacy and wisdom of care workers had a positive correlation with job competence, the factor affecting the job competence of care workers was wisdom, which had a significant effect. Therefore, should be developed and applied to the caring arbitration programs that encourage caregivers to increase their self-efficacy, which is the confidence that they can do, and to exercise their wisdom to pay more attention to their duties and solve various problems.

Thereby it can bring about the effect of the quality of life and health recovery of the elderly who are provided with care at home by improving the competencies of care workers. In the future, it proposes that the study is repeated targeting the care workers working in hospitals.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: Nil

References

1. Health Insurance Review & Assessment Service. 2013 Health Insurance Fees Statistics. Seoul: Health Insurance Review & Assessment Service, 2013.
2. Korean National Statistics office. The Elderly Person Statistics. 2018. http://kostat.go.kr
3. Spencer, L., & Spencer, S. Competence at Work: Models for Superior Performance. NY: John Wiley & Sons, 1993.
4. Abraham, SE., Karns, LA., Shaw, K., & Mena, MA. Managerial Competencies and the Managerial Performance Appraisal Process. Journal of Management Development, 2001; 20(9-10): 842-852.
5. Jang, YJ., A Study on the Determinants of Training Transfer on the Education and Training in Firms. Master thesis, Ewha Womans University, Seoul, 2002.
6. Shin, SH. A Study on the Influence of Servant Leadership on the Job Attitude of Employees: Focusing on the Moderating Effect of the Emotional Intelligence and the Managerial Competency of the Leader. Doctoral dissertation, Kyung Hee University, Seoul, 2011.
7. Kim, HH. The Effect of Geriatric Care helper's Knowledge of Dementia on Job stress, Self-efficiency and Care Fulfillment. Doctoral dissertation, Daegu Haany University, Daegu, 2014.
8. Ardelt, M. Antecedents and Effects of Wisdom in old age: A Longitudinal Perspective on Aging Well. Research on Aging, 2000; 22, pp. 360-394.
9. Chen G. Gully MS. Eden D. Validation of a New general Self-efficacy Scale. Organizational Research Methods. 2001; 4(1): 62-83.
10. Noh, JH. Why should I be thankful? The Effects of Gratitude on Well-being under the Stress. Unpublished master's thesis. Ajou University. Suwon, 2005
11. Kim, MH. Development and Validation of a Wisdom Scale for Korean Senior Citizens. Doctoral dissertation, Kyungsung University, Pusan, 2014.
12. Lee, J. Learning Transfer and Job Competence of Care Workers': Focusing on Dementia job training program participants, Doctoral dissertation, Gachon University, Seongnam, 2017.
13. Lee, YJ. Study on Job Training Empowerment Measures for Care Givers. Journal of Welfare for Aged, 2013; 61, pp.339-358.
14. Kim, AR. Impacts of Care Worker's Self-efficacy and Stress-coping Ability on Job Competency: Focused on Female Care Workers providing Home Care Services in the C. Region. . Master thesis, Korea Nazarene University, Cheonan, 2019.
15. Lee, SL, Cho, SH. Counselor's Wisdom, Counseling Processes, and Outcomes. The Korean Journal of Counseling and Psychotherapy, 2010; 22,1, pp. 71-94.

Risk Factors of Chronic Energy Deficiency in Pregnant Women in The Working Area of Sungai Jingah Public Health Center Banjarmasin 2019

Helwatin Najwa[1], Triawanti[2], Lenie Marlinae [3], Roselina Panghiyangani [2], Meitria Syahadatina Noor[2]

[1] Master of Public Health Science Study Program, [2] Medical Education Study Program, [3]Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract

Chronic Energy Deficiency (CED) is a problem of malnutrition, especially in pregnant women. The prevalence of CED in South Kalimantan Province is 18% and Banjarmasin City has 1296 cases. The highest CED was in the Sungai Jingah Public Health Center of 141 cases. This study was to analyze the relationship of age, knowledge, occupation, income, parity, distance of pregnancy, and the number of family members with CED in pregnant women in the working area of Sungai Jingah Public Health Center, Banjarmasin. The research using a cross sectional with a questionnaire. Statistical analysis using chi square test and multiple logistic regression. The study population were pregnant women at Sungai Jingah Public Health Center month period from January to March the year 2019 a number of 289 mothers and sampling of 103 people. The result showed p-value age (p=1.000), knowledge (p=0.001), occupation (p=0.996), income (p=0.006), parity (p=1.000), space of pregnancy (p=0.371), the number of family members (p = 0.017) to CED in pregnant women. Multivariate analysis showed knowledge (Exp.B=5.050), income (Exp.B=2.402), number of family members (Exp.B=3.644) to chronic energy deficiency (CED) in pregnant women. Knowledge, income, and number of family members have a relationship with CED in pregnant women. Age, occupation, parity, and space of pregnancy were not related to CED in pregnant women. The most dominant factor related to CED was knowledge.

Keywords*: knowledge, income, number of family members, chronic energy deficiency, pregnant women*

Introduction

The proportion of pregnant women with CED in Indonesia was 17.3% and the province of South Kalimantan was currently still above the national scale of 18%.[1] Whereas based on data from the Nutrition Status Monitoring (PSG) of South Kalimantan Province in 2017, the percentage of pregnant women with CED in Banjarmasin was 21.5%.[2] The number of pregnant women who did upper arm circumference (LILA) measurements was 14,087 (97.21%) and the number of pregnant women with CED was 1296 (8.94%). Public health center with the highest CED among pregnant women were in the Sungai Jingah Public Health Center area with a percentage of 141 (12.35%).[3]

Chronic Energy Deficiency (CED) in pregnancy the most common cause of bleeding and infection is a major factor maternal mortality. Bleeding ranks the highest cause of maternal death in Indonesia, amounting to 30.3%. In addition, pregnant women who experience chronic energy deficiency also affect the condition of the fetus they contain. CED is caused by several factors including age, education, knowledge, low economic status, workload, health services, health status/history of illness, parity and space of pregnancy, the amount of food consumed in the household, absorption of food, and consumption of iron tablets.

Corresponding Author:
Helwatin Najwa
Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Jalan A. Yani, Km.36, Banjarbaru, Kalimantan Selatan, Indonesia,
email: bintangara@ulm.ac.id

Materials and Method

This research is a quantitative study with an analytic observational research design through a cross sectional approach. The research analyze the relationship between independent variables (age, knowledge, occupation, income, parity, pregnancy spacing, and number of family members) with dependent variable (CED in pregnant women).

The research location is the working area of Sungai Jingah Public Health Center, Banjarmasin. Study period start from August to October 2019. The population in this study was the pregnant women in Sungai Jingah Public Health Center month period from January to March 2019 of 289 people. The minimum sample needed in this study was 93 people. To avoid the possibility of samples coming out or missing during the study, it is necessary to increase the number of samples by 10% from what was determined. bringing the total sample to 103 pregnant women. Samples were taken by purposive sampling technique. The instrument in this study will use a questionnaire that has been tested for validity first.

Findings and Discussion

Table 1. Bivariate Analysis Results

Variable	CED				Total		Chi-Square
	Yes		No				
	n	%	n	%	N	%	p-value
Age							
Risky	1	16.7	5	83.3	6	100	1.000
No risk	19	19.6	78	80.4	97	100	
Knowledge							
Lack	11	40.7	16	59.3	27	100	0.001
Good	9	11.8	67	88.2	76	100	
Occupation							
Not work	13	19.4	54	80.6	67	100	0.996
Work	7	19.4	2 9	80.6	36	100	
Income							
Low	14	31.8	30	68.2	44	100	0.006
High	6	10.2	53	89.8	59	100	
Parity							
Grandemultipara	1	25.0	3	75.0	4	100	1.000
Multipara	19	19.2	80	80.8	99	100	
Pregnancy Spacing							
Risky	3	33.3	6	66.7	9	100	0.371
No risk	17	18.1	77	81.9	94	100	
Number of family members							
High	9	37.5	15	62.5	24	100	0.017
Low	11	13.9	68	86.1	79	100	

Relationship of Age with Chronic Energy Deficiency in Pregnant Women

The Fisher's exact test results with p-value 1.000 (p> 0.05) which means there was no relationship between age and chronic energy deficiency (CED) in pregnant women at Sungai Jingah Public Health Center Banjarmasin in 2019. It can be due to the data based on the age of the respondents at most at the age of 20-35 years (94.2%) which is the best age for pregnant women. Reproductive organ systems and cells in the body are in the healthiest and safest conditions, and minimal risks can occur to the mother and fetus, so it is expected that women can undergo a healthy pregnancy. The results of the study are in line with research Risqah (2017) and Musni (2017), where the p-value is 0.15 which means that age is not associated with CED in pregnant women.[4,5]

Relationship of Knowledge with Chronic Energy Deficiency in Pregnant Women

The Chi-square test results with p-value 0.001 (p <0.05), which means that there is a relationship between knowledge and CED in pregnant women at the Sungai Jingah Public Health Center in Banjarmasin in 2019. Mothers who have good knowledge are able to understand balanced nutritional intake, differentiate the types of nutrients in food that must be consumed every day during pregnancy, know the risks that can occur if mothers experience malnutrition, and understand how to improve nutrition and maintain maternal health and fetus during pregnancy, and be able to apply good attitudes and behavior in the selection of food to meet the intake of nutritious food during pregnancy.

PR results of 5.118 (PR>1) which means that mothers with lack of knowledge 5.1 times will experience CED compared to mothers who have good knowledge. Good knowledge about nutritional health will have an impact on maternal behavior in meeting nutritional needs during pregnancy. This condition will have a direct impact on the health of the mother and fetus. The results of this study are strengthened by Triwahyuningsih (2018) where mothers who have less knowledge are 9.7 times more likely to have CED compared to mothers with good knowledge.[6]

Relationship of Occupation with Chronic Energy Deficiency in Pregnant Women

The Chi-square test results with p-value 0.996 (p> 0.05), which means there was no relationship between occupation and CED in pregnant women at the Sungai Jingah Public Health Center Banjarmasin in 2019. Mother's occupation is not associated with CED because work factors are influenced by other factors, namely lack of mother's knowledge, low family income, and high number of family members. The results of this study are in line with the research of Syarifuddin (2013) which states that there is no meaningful relationship between maternal occupation with CED. It can be caused by the activity factors of the respondents are required to do activities outside the home due to workload so as to make them feel more stressed, lifestyle and irregular eating patterns so that it is not impossible if the respondent can risk chronic energy shortages.[7] Mother's busyness is not one obstacle to meet the adequacy of nutrition during pregnancy.[8]

Relationship of Income with Chronic Energy Deficiency in Pregnant Women

The Chi-square test results with p-value 0.006 (p<0.05), which means there was a relationship between income and CED in pregnant women at the Sungai Jingah Public Health Center Banjarmasin in 2019. Low family income will have an impact on the ability of families to meet nutritional needs in the household, families with low incomes tend to limit food consumption to save family expenses. Result of PR 4.112 (PR> 1) means that income is one of the risk factors for CED in pregnant women. Mothers with low family income 4.1 times more likely to experience CED compared to mothers who have family income high. Families with low economic status have a 5.7 times greater risk of pregnant women experiencing CED. It is because economic status or income has always been one of the determining factors in a healthy pregnancy process.[9] Families with a sufficient economy can check their pregnancies regularly, plan for delivery in health workers, and make other preparations properly. The level of income can determine consumption patterns. Limited family income limits the ability of families to buy nutritious food ingredients, thus the level of income plays an important role in determining the nutritional status of pregnant women.[10]

Relationship of Parity with Chronic Energy Deficiency in Pregnant Women

The Fisher-exact test result with p-value 1.000 (p>0.05), which means there was no relationship between parity and CED in pregnant women at the Sungai Jingah Public Health Center Banjarmasin in 2019. It could be due to the fact that based on existing data there was no risk of multipara of 103 pregnant women. The results of this study are in line with Yulianti (2018) that there was no relationship between parity and CED. Even though the risk of the CED occurrence is pregnant women with risk parity, if basically the mother has good knowledge about the nutritional status of pregnant women which is part of an effort to optimize the ability of mothers. It is expected that pregnant women have good nutritional status as well. Widita (2011) also stated that there was no significant relationship between parity and malnutrition in mothers in the third trimester with p-value 0.361.[11]

Relationship of Pregnancy Spacing with Chronic Energy Deficiency in Pregnant Women

The Fisher-exact test result with p-value 0.371 (p>0.05), which means there was no relationship between the space of pregnancy and CED in pregnant women at the Sungai Jingah Public Health Center Banjarmasin in 2019. It was allegedly because the results of the description of the pregnancy spacing was not at risk ≥ 2 years. The results of this study are in line with Wijanti (2016) which states almost all respondents have no risk from pregnancy spacing because other factors such as age and mother's education. Other factors are associated with CED, namely physical work and family income.[12]

Relationship of Family Members with Chronic Energy Deficiency in Pregnant Women

The Fisher-exact test result with p-value 0.017 (p<0.05), which means there was a relationship between the number of family members and CED in pregnant women at the Sungai Jingah Public Health Center Banjarmasin in 2019. The large number of family members is certainly different from the number of small family members in the distribution and distribution of food, the large number of family members will cause the food consumed is insufficient in terms of quantity.

The PR results are 3.709 (95% CI, 1,307-10,529), means that the number of family members is a risk factor for CED in pregnant women. Mothers who have a high number of family members (>4 people) 3.7 times have risk of CED. There was a relationship between the number of family members in the CED incidence of pregnant women. Mothers with a large number of family members have an 8 times greater chance of experiencing CED. It is due to the number of family members or family size will affect consumption patterns. Nutritional status is influenced by the number of family members. The greater the number of family members, the greater the proportion of family expenses for food, and vice versa. The large number of family members without offset high income results in uneven distribution of food in the family.[13]

The most influential factor with the prevalence of CED

Table 2. Final Models of Multivariate Logistic Regression

Independent Variable	p-value	PR
Knowledge	0.003	5.050
Number of family members	0.023	3.644

The results showed that the factor most associated with Chronic Energy Deficiency (CED) in pregnant women was the knowledge variable (PR=5.050). Knowledge plays an important role in one's life, especially in daily behavior, although mothers have a good family income and a low number of family members, but mothers who lack knowledge will affect the behavior of mothers in choosing nutritious food consumption every day. Mother's knowledge about nutrition and health greatly influences the attitude and behavior of mothers to meet nutritional intake during pregnancy. Mothers who have knowledge can better prepare foods with balanced nutrition for mother and fetus and can understand good nutrition of pregnancy according to the nutritional adequacy rate, whereas mothers who had lack of knowledge can cause a person to perform the selection of food the less careful.

Based on research results mothers with good knowledge are able to understand balanced nutritional intake, as well as differentiating the types of nutrients in food that must be consumed every day during pregnancy. In addition, mothers also know the risks that can occur if mothers experience malnutrition, and understand how to improve nutrition and maintain

health during pregnancy. This study is in line with Febriyeni (2017) which shows that knowledge is the most related factor to CED in pregnant women. It can be seen from the Odds Ratio (OR) that mothers with less risk knowledge 12 times more likely to experience CED. The results of this study are also in line with the research of Taslim (2011) which states that mothers with less knowledge about nutrition are at risk 0.25 times more likely to experience CED than mothers with good knowledge. It is due to mothers who have insufficient knowledge to determine the behavior of mothers in choose foods that are consumed every day.

Conclusion

There was a relationship between knowledge and CED in pregnant women. There was a relationship between income and CED in pregnant women. There was a relationship between the number of family members and CED in pregnant women. There was no relationship between age and CED in pregnant women. There was no relationship between occupation and CED in pregnant women. There was no relationship between parity and CED in pregnant women. There was no relationship between the pregnancy spacing and CED in pregnant women. Knowledge variable is the most related factors to CED in pregnant women at the Sungai Jingah Public Health Center in Banjarmasin.

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted to protect the human rights and security of research subjects.

Source Funding: This study was done by self-funding from the authors.

Conflict of Interest: The authors declare that they have no conflict interests.

References

[1] Ministry of Health of the Republic of Indonesia. Basic of Health Research 2018. Indonesian Center for Health Research and Development Ministry of Health: Jakarta. 2018.

[2] South Kalimantan Provincial Health Office. Pocket Book for Monitoring the Nutrition Status of South Kalimantan Province 2017. Publisher of the City Health Office of Banjarmasin City: Banjarmasin. 2016.

[3] Banjarmasin City Health Office. Performance Report of the Banjarmasin City Community Nutrition Improvement Program in 2017. Banjarmasin City Health Office Publisher: Banjarmasin. 2017.

[4] Risqah Z, Mahmudiono T. Relationship Between Age, Gravida, And Working Status Against Risk of Chronic Energy Deficiency (CED) And Anemia in Pregnant Women. Amerta Nutrition Journal. 2017: 1 (2), 72-79.

[5] Musni, Malka, Asriyani. Factors Related to Chronic Energy Deficiency (CED) in Pregnant Women at UPTD Puskesmas Ajangale. Scientific Journal of Health. 2017. 11 (1): 2302 - 1721.

[6] Triwahyuningsih RY, Prayugi, AN. Analysis of Factors Associated with the Occurrence of Chronic Energy Deficiency (KEK) in Pregnant Women. Journal of Midwifery. 2018. 8 (2), 2252-8121.

[7] Syarifuddin EA, Indriasari R., Jafar N. The Relationship between Eating Pattern and Socio-Economic Status with CED Events in Pregnant Women in Gowa Regency. 2013.

[8] Marsedi GS, Widajanti L, Aruben R. Socio-Economic Relations and Nutrient Intake with Chronic Energy Deficiency (CED) in Pregnant Women in the Sei Jang Health Center in Bukit Bestari District, Tanjung Pinang City. Journal of Public Health. 2017. 5 (3), 2356-3346.

[9] Mufidah R., Rahayuning DP, Widajanti L. Relationship between Energy Adequacy Level, Physical Activity Level and Family Characteristics with the Risk of Chronic Energy Deficiency in Pregnant Women in the Work Area of Dawe Health Center, Kudus. Journal of Public Health. 2016. 4 (4), 2356-3346.

[10] Rahmaniar, Nurpudji A, Bahar B. Factors Related to Chronic Energy Deficiency in Pregnant Women in Tampa Padang, Mamuju Regency, West Sulawesi. 2013.

[11] Widita BK, Mifbakhuddin, Nintyasari MD. The Relationship of Education, Parity, and Mother's Work with the Nutritional Status of Trimester III Pregnant Women in Bangetayu Public Health

Center, Genuk District, Semarang City. Journal of the University of Muhammadiyah Semarang. 2011.

[12] Yuliastuti E. Factors Associated with Chronic Energy Deficiency in Pregnant Women in the Sungai Bilu Community Health Center Banjarmasin. Journal of Public Health. 2014. 1 (2), 2442-4986.

[13] Anggraini Y. Effects of Demography and Socioeconomics on Chronic Energy Deficiency Events in Pregnant Women in Metro City, Lampung Province. Journal of Health. 2013. 4 (2), 401-407.

The Effects of MBTI applied Peer-to-Peer Relationship Improvement Training Programs on Self-Esteem, Depression, and Anger of Korean Female Students at Nursing Vocational High Schools

Hyun-OK Jung[1], Seung-Woo Han[2]

[1]Forensic Nurse, Sangju of Correctional Institute, Korea, 130, Mokga 2-gil, Sabeol-myeon, Sangju-si, Gyeongsangbuk-do, 37123 Korea, [2]Assistant professor, Department of Emergency Medical Technology, KyungilUniversity. Gamasilgil Hayangeup, Gyeongbuk 38428 Korea

Abstract

Objectives: The purpose ofthis study is to verify the effects of MTBI applied peer-to-peer relationship improvement training programs on the self-esteem, depression, and anger of female students at Nursing Vocational High Schools.

Method: This study is a Nonequivalent control group pretest-posttest design. The participants included 21 female students attending a Nursing Vocational High School at "D" city, and a total of 8 programs were conducted from October 20th, 2014 to December 3rd, 2014, twice a week, 50 minutes per session. The data analyzed are based on the SPSS/WIN 20.0 Program. The Chi-square (Fisher exact probability) and t-tests were used.

Results: After participation of the MBTI applied peer-to-peer relationship improvement training programs, the self-esteem (t=-2.80, p=.011) of the participants, depression (t=3.61, p=.002), and anger (t=2.22, p=.039), all expressed a statistically significant difference.

Conclusion: It was shown that the MBTI applied peer-to-peer relationship improvement training program that was used in this research had an effect on improving self-esteem, and reducing depression and anger. Based on this research, it will be necessary for the Ministry of Education and local community to cooperate with each other, so that friendly relationship improvement programs with MBTI applications can be applied to regular classes.

***Keywords**: MBTI, Self-esteem, Depression, Anger*

Introduction

Adolescence creates a desire to gain independence from parents, and autonomy, which increases conflicts with parents, and creates a closer relationship with peers[1]. Unlike regular high schools, peer relationships of students at vocational high schools are less intimate, and the levels of conflict and confrontation are high[2,3]. This is due to the fact that students at vocational high schools prefer broad relationships over deep relationships to avoid frequent conflicts between peers, not because they have higher interpersonal or communication skills.

Female students have a stronger desire for new peer relationships than male students, desire deeper relationships between peers[3], and female students complain of difficulties in peer relationships of maintaining technical skills such as talking to, dating, voicing their opinions, and working in teams, unlike

Corresponding Author:
Seung-Woo Han
Assistant Professor, Department of Emergency Medical Technology, KyungilUniversity. Gamasilgil Hayangeup, Gyeongbuk 38428 Korea,
email:swhan@kiu.ac.kr

male students who complain of difficulties in dealing with issues of the opposite sex[4].

Students at vocational high schools often lack self-esteem from lower grades or economic problems, opposed to their will, from the beginning of their admission[5]. The self-esteem of adolescents is influenced by social behaviors acquired through interaction with peers, where they consider themselves important and by social development that keeps them in contact and around their peers[6].

According to the Korea Youth Health Behavior Survey, 42.5% of high school students thought they were depressed, higher than 32.8% of middle school students, 44.3% of female students, higher than 19.4% of male students, and 39.2% of students were from vocational high schools[7]. This is due to students at vocational high schools having an inherent depression in their present or future pessimism due to lower learning skills and dissatisfaction with their school lives, and a sense of defeat[8]. Female students' attachment to their peers are more correlated with depression than male students due to their expressive roles and relationship-oriented tendencies acquired when socializing[1].

Anger that appears in adolescence is difficult to control, and is often expressed in aggressive and violent actions[9].Students at vocational high schools have already experienced frustration compared to regular high school students and have a higher level of anger amid conflicts, due to relatively lower self-esteem, socioeconomic background, and low expectations from their parents [10].

Therefore, negative peer relationships such as bullying, neglect, and rejection between female students at vocational high schools can further reduce not only one's education or career path[4], but also lower self-esteem[6], depression[1], and anger and negative sentiments as well[11].

Background

The group counseling program that applies the MBTI (Myers Briggs Type Indicator) focuses on positive dynamic formation by providing information on the characteristics, attitudes, and function of a person's personality type, and by allowing them to experience other people's experiences through interaction with group members[12]. In order for adolescents to achieve independence and autonomy as a person, peers of different personality types need to understand the behavioral characteristics and attitudes they see in their interaction with peers, and acquire appropriate countermeasures.

Research Hypothesis

The level of self-esteem of the experiment group participating in the MBTI applied peer-to-peer relationship improvement training program will be higher than those of the control group that did not participate.

The level of depression of the experiment group participating in the MBTI applied peer-to-peer relationship improvement training program will be lower than those of the control group that did not participate.

The level of anger of the experiment group participating in the MBTI applied peer-to-peer relationship improvement training program will be lower than those of the control group that did not participate.

Method

Design and Sample

This research is a similar experimental study with an experimental group participating in the program and a control group not participating in the program, which is a Nonequivalent control group pretest-posttest design.

This research is consisted of 1st and 2nd grade female students at "G" Nursing Vocational High School at "D" city in Korea, and was conducted by researchers who completed MBTI courses. Based on the Cohen's formula[13], the program was initiated for 22 experimental and control groups who agreed to participate in this study, considering a 20% elimination rate, based on a minimum of 17 people in each group with a significance level (α) of .05, effect size (d) of .50, test power (1- β) of .80. Overall, 21 experimental groups and 18 control groups participated in the study, with an exception of 1, who gave up the study in the middle due of experiments due to personal reasons.

Instruments

This study of self-esteem employed a self-esteem scale for high school students, which was developed by Rosenberg[14] and was adopted by Lee and Won[15]. This scale comprises of 10 items that are answered on a 4-point Likert Scale (1 = strongly disagree, 4 = strongly agree) and higher scores indicate higher levels of self-

esteem. This tool contains 2 subscales: positive and negative self-evaluations. Cronbach's alpha at the time of development Rosenberg,[14] was .84, Cronbach's alpha for our sample was .85.

Depression was measured by the Korean version of the Center for Epidemiological Studies Depression Scale (CES-D), which was developed by Chon and Lee[16] to readily measure depression symptoms in healthy individual. This scale comprises of 20 items that are answered on a 4-point Likert Scale (1 = strongly unlike me, 4 = strongly like me) and higher scores indicate higher levels of depression. The main factors of the tool are composed of melancholy moods, guilt, helplessness, anorexia, disturbed sleep and mental exercise retardation, etc. Cronbach's alpha at the time of development (Chon and Lee[16]) was .89, and Cronbach's alpha for our sample was .89.

Anger was measured by a development by Moon and Kim[17]. This scale comprises of 26 items that are answered on a 5-point Likert Scale (1 = strongly disagree, 5 = strongly agree) and higher scores indicate higher levels of anger. This tool contains 3 subscales: cognitive (8 items), emotional (8 items) and behavioral (8 items). Cronbach's alpha at the time of development (Moon and Kim[17]) was .90, and Cronbach's alpha for our sample was .73.

Data collection and Procedures

Approval was obtained from the research ethics committee of xxxHospital in South Korea. Prior to the start of the experiment, the students to be studied received explanations from the researchers about the purpose and the method of the study, anonymity, and confidentiality, etc., and informing them that they would not be required to participate if they did not wish, and received written consent from students whom voluntarily agreed to participate.

The subjects of this study were assigned to the first, third, fifth, seventh, and ninth selected classes to the experimental group separated into 10 classes using a table of random sampling numbers, and the rest were assigned to the control group. The pre-survey was conducted for those who agreed to participate in the study after fully explaining the purpose of the study before the program began. In order to unify the information given to the subjects, one research assistant facilitator was trained for 1 hour a week before the experiment by developing a protocol on data collection methods, procedures, and tools. The experimental group conducted a preliminary survey in the 1st session of the program and a follow-up survey after the mediation was completed. From October 20th, 2014 to December 3rd, 2014, 8 programs were provided twice a week with 50-minute sessions, using the discretionary activity time, and conducted by the collective counseling program room at the school. The control group was conducted a pre-post survey on the same day as the experimental group, and the pre-trained research assistant conducted the survey to prevent measurement errors due to the halo effect of this study.

50 minutes of sessions were conducted from the first to the last session using the consultation room during after-school hours during the week. The program was composed of one session of "orientation", "2-3 sessions of "This is me!", 4-6 sessions of "Opening the window between you and me," and 7-8 sessions" of "Looking outside the window together." The training program for friendship improvement using specific MBTI is as shown in Table 1.

Data Analysis

Date were analyzed using SPSS. Chi-square(Fisher exact probability) and t-tests were used to compare demographics and self-esteem, depression and anger scores between the experimental and the control groups.

Results

Socio-Demographic Characteristics of Respondents

Grades included 64.1% 1st graders, 35.9% 2nd graders, 56.4% did not have a religion, those with 3-5 close friends was 53.8%. In terms of satisfaction with school life, 46.2% said average, 43.6% said they had bad grades, 22.3% said average, and 23.1% said their grades were good. The family atmosphere for 43.6% were average. Birth ranking for 61.5% were second or younger, the largest of 33.3% had fathers working blue collar jobs, and the largest of 76.9% were middle class in their socioeconomic status. Insert Table 2.

Table 1. Peer-relation improvement program utilizing the MBTI.

Session	Title	Peer-Relation Improvement Program utilizing the MBTI	Time
1	Orientation	-Pre-survey -Introduction of the program and the coordinator -Setting rules before the program: "We promise to ~" -Greeting each other through putting stickers -Realizing differences between individuals through watching a video -MBTI test	50
2	This is me!	-Understanding my personality type and the difference between the 16 personality types through looking at various situations	50
3		-Understanding my personality type and the difference between 16 personality types through looking at various situations	50
4	Opening the window between you and me	-Understanding the difference in communication ways between opposite personality types through role playing	50
5		-Learning effective communications skills for improving relationships with friends through a game of Bingo	50
6		-Finding the way of growing up in my personality type and showing it through role playing	50
7	Looking outside the window together	-Showing others my best -Finding win-win strategies with friends and showing it through role-playing	50
8		-Confirming my strengths and my friends' strengths with the "apple basket of compliments" -Sharing impressions -Post survey	50

Table 2. Baseline comparisons of socio-demographics characteristics in the experimental (*N*=21) and the control (*N*=18) groups.

Characteristic		Exp.		Cont.		Total		$\chi 2$/ Fisher*	p
n		%	n	%	n	%			
Year	1st	11	52.4	14	77.8	25	64.1	3.75*	.086
	2nd	10	47.6	4	22.2	14	35.9		
Religion	Yes	8	38.1	9	50.0	17	43.6	.84	.360
	No	13	61.9	9	50.0	22	56.4		

Cont... **Table 2. Baseline comparisons of socio-demographics characteristics in the experimental (*N*=21) and the control (*N*=18) groups.**

Cloth friends	None	0	0.0	1	5.6	1	2.6	1.31*	.718
	1-2	10	47.6	7	38.9	17	43.6		
	3-5	11	52.4	10	55.5	21	53.8		
School life satisfaction	Satisfied	9	42.9	6	33.3	15	38.5	2.72*	.288
	Normal	11	52.4	7	38.9	18	46.2		
	Not satisfied	1	4.8	5	27.8	6	15.3		
School grades	Good	6	28.6	3	16.7	9	23.1	2.23*	.383
	Normal	5	23.8	8	44.4	13	33.3		
	Bad	10	47.6	7	38.9	17	43.6		
Atmosphere at home	Peaceful	9	42.9	8	44.4	17	43.6	.34*	1.000
	Normal	10	47.6	7	38.9	17	43.6		
	Not peaceful	2	9.5	3	16.7	5	12.8		
Birth order	First	8	38.1	7	38.9	15	38.5	.04	.847
	Second or younger	13	61.9	11	61.1	24	61.5		
Occupation of father	Manufacturing	6	28.6	7	38.9	13	33.3	4.12*	.284
	Office job	4	19.0	3	16.7	7	17.9		
	Service industry	5	23.8	2	11.1	7	17.9		
	Others	6	28.6	6	33.3	12	30.9		
Socioeconomic status	Middle	16	76.2	14	77.8	30	76.9	.22*	.709
	Low	5	23.8	4	22.2	9	23.1		
Exp.=Experimental group, Cont.=Control group, * Fisher exact test									

Differences in Variables for Experimental Group

The self-esteem and depression of the subjects were improved efficiently after participating in a MBTI applied peer-to-peer relationship improvement training program(Table 3).

Table 3. Differences in Variables for Experimental Group

Variables	**Pre test**		**Post test**		**t**	**p**
	M	**SD**	**M**	**SD**		
Self-esteem	32.0	4.69	34.1	5.04	-2.80	.011
Depression	36.2	9.97	30.8	8.69	3.61	.002
Anger	76.7	7.05	72.5	10.42	2.22	.039

Discussion

As a result of this research, the self-esteem of the subjects was improved efficiently after participating in a MBTI applied peer-to-peer relationship improvement training program. This is research was similar to researches conducted to regular high school students that resulted in an improvement in self-esteem through a MBTI applied friend relationship improvement program[18] and a research that resulted in improvements to self-esteem for workers through a MBTI applied adult relationship improvement program[12]. These results display that not only does the MBTI applied collective counseling program discover the advantages of each category, but it also objectively presents an individual's innate preference and develops the undifferentiated attitudes and functions that had been latent in the individual[12], so that self-esteem is improved. The subjects participated actively in this program because they were curious about their personality types, careers, and academic work that fit their personality types. As a result, the subjects of the research are considered to have a positive impact on their self-esteem[18], by correctly understanding personality patterns of their peers and by reducing distorted self-defense mechanisms in the process of accepting each other's strengths and weaknesses.

After participating in the MBTI applied peer-to-peer relationship improvement training program, the subjects' depression was significantly reduced. This was in line with a research conducted[18], which displayed that MBTI applied friendship relationship improvement training programs for regular high school students have reduced depression. However, the results of the research[19] displayed that there were no significant differences in depression after applying a MBTI applied peer-to-peer help training program to female students of vocational high schools. A research by Han and Kim[18] on regular high school students resulted in an average depression score of 36 points before participated in the program, but a research conducted by Jung et al[19] resulted in a score of 19 points before participation in the program. Through MBTI, the program reduced misunderstandings and conflicts with each other by letting them know the personality types of themselves and others, and by acknowledging differences due to their own uniqueness[12]. Also, self-esteem has improved and negative self-assessment has been reduced by discovering and encouraging other people's unknown strengths through a compliment basket[18]. In addition, satisfactory and effective peer-to-peer experiences during the 8 sessions is believed to have a positive effect on the development and formation of a healthy personality and identity in individuals, thereby reducing depression.

After participating in the MBTI applied peer-to-peer relationship improvement program, the anger of the subjects was significantly reduced. This is different from the results of a research[18] conducted on regular high school students which displayed that the MBTI applied friend improvement relationship program decreased the anger from 76.7 points before the test to 73.5 points after the test, but did not show a significant difference statistically. While the search by Han and Kim[18] did not provide an opportunity to practice actual relaxation techniques and behavioral adjustments to control anger, the study was subdivided so that people could learn to listen to their peers well through a game of bingo and experience anger control through role playing. Youth anger is influenced by important people's reactions to anger expression[20]. Understanding the strengths and weaknesses of their peers through the 8-session peer-to-peer relationship training program, and understanding of their behavior characteristics and attitudes is thought to have had a positive effect on reducing anger.

Conclusions and Suggestion

After participating in the MBTI applied friend relationship improvement training program in this research, self-esteem increased, depression and anger decreased, and statistically significant differences were noted.

Based on this research, it is believed that MBTI applied friend relationship improvement training programs can be useful for providing nursing interventions in promoting effective peer relations at community health promotion centers or counseling centers in schools.

However, since this research was conducted mainly on students who wanted to participate in the program, it suggests that students who were selected for emotional screening should be conducted at a later date.

Conflict of Interest: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Source of Funding and Ethical Clearance

The researchers received no financial support for this

paper. This study was a literature study using secondary data, and did not harm the subject ethically.

References

1. Lee MH.The effects of adolescents' perfectionism, parent and peer attachment on depression. National Youth Policy Institute. 2014;25 (4):87-112.
2. Lee HG, Kim HW, Kim EA. The Effects of Parents-Children Relationship, Peer Relationship, and Self-efficacy on Career Maturity and Career Preparation Behavior among High School Students. Journal of Adolescent welfare. 2013;15 (2):443-466.
3. Song GW, Lee CH.The Relationship between Peer Group and Academic Engagement of Specialized Vocational High School Students.New Paradigm of Technology Education in the Information Age. 2014;14 (3):125-148.
4. Lee HG, Kim HW.Present Conditions and Characteristics of Problem Behaviors according to the Significant Level among Male and Female adolescents. Korean Association of Youth Welfare.2011;13 (1):163-188.
5. Lee SO, Lee SM, Kim JL, Lee JS.Relationship between School Life Stress, Self-Esteem and Health Promoting Behaviors for Specialized High School Students. Korea Society of Health Service Management. 2013;7 (2):11-21.
6. Kim SH, Park SY. Relations between Parenting Behaviors, Adolescents' Parent- and Peer Attachment, and Self-esteem by Adolescents' Gender. JournalOf Korean Home Management Association. 2009;27 (5):101-113.
7. National Statistics Office. 2018 Korea National Statistics. [cited 2018 December 7]. Available from http://kosis.kr/statHtml/statHtml.do?orgId=628&tblId=DT_628003_A004&conn_path=I2.
8. Lee MJ, Lim CK, Ryu JM.The Effect of the Stress,Anxiety and Depression on Somatization: focused on specialized vocaional high school students. The Journal of Welfare Administration. 2014;30 (1):109-133.
9. Anderson CA, Bushman BJ. Human aggression. Annual Review of Psychology. 2002;53:27-51.
10. Park GN, Yu HK, Cho YS.The Development of a Group Counseling Program to Reduce School Violence Potentiality of a Specialized High School Students. Korea Journal of Counseling. 2014;15 (1):459-477.
11. NeilsSM, Rae G. Brief report: Peer attachment in adolescents. Journal of Adolescence. 2009;32(2):443-447.
12. Kim HS, Park GR.Effects of an Interpersonal Relationship Improvement Program Using MBTI: Effects on Self-esteem, Interpersonal Relations, and Mental Health in Company Employees. Journal of KoreanAcademy of Psychiatric and Mental Health Nursing. 2010;19 (3):261-270.
13. CohenJ.Statistical Power Analysis for the Behavioral Sciences(2ed.). Hillsdale, N. J: Lawrence Eribaum Associates; 1988.
14. RosenbergM.Rosenberg self-esteem scale (SES). Society and the adolescent self-image; 1965.
15. LeeHJ,WonHT. Self-Concepts and Paranoid Tendency. Psychological Science. 1995;4(2):15-29.
16. ChonKK, LeeMK. Preliminary Development of Korean Version of CES-D. Korean Journal ofClinical Psychology. 1992;11(1):65-76.
17. MoonEJ, KimSH. Anger Scale Development for High School Students. Journal of Korean Education. 2008;35(1):151-169.
18. Han SW, Kim HS.A study on the effectiveness of the peer relationship promotion program using MBTI on Self-esteem, Depression, and Anger of the High School Students.Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology. 2018;8(3):345-356.
19. Jung HO, Song HO, Kim MH, Kim HS.Effects of Peer Helper Training Program on Existential Spiritual Well-being, Peer Relationship, and Depression for Students Attending a Specialized Girls Vocational High School. Journal of Korean Academy of Psychiatric and Mental Health Nursing. 2015;24 (4):310-319.
20. Malatesta–MagaiC.Emotion socialization: Its role in personality and developmental psychopathology. In D. Cicchetti,& S. L. Toth (Eds.), Rochester symposium on developmental psychopathology: Internalizing and externalizing expressions of dysfunction. 1991;3:203-224.

Factors that Contributed Against the Incident of Unintended Pregnancy (UP) in Women Aged 15-49 Years (IDHS 2017 Data Analysis)

Ika Permatasari [1], Ella Nurlaella Hadi [2]

[1] Student of Reproductive Health, Faculty of Public Health, Universitas Indonesia, [2] Department of Health Education and Behavioral Sciences (PKIP), Faculty of Public Health, Universitas Indonesia

Abstract

Unintended pregnancy (UP) could affect the health of the mother and the baby which could cause perinatal maternal morbidity and mortality. This study aimed to determine the contribution of maternal age, number of children alive, family planning history and knowledge of contraception methods to the incidence of unintended pregnancy in women aged 15-49 years in Indonesia. This study was a further analysis of the IDHS 2017 data and analyzed multivariately with multiple logistic regression using SPSS version 24. A total sample of 1930 respondents who met the inclusion requirements of women aged 15-49 years old who were still alive, had been pregnant, and had living children aged >12 months by the time the survey was conducted. Based on the results of the analysis we obtained factors that contributed to the occurrence of UP were maternal age (OR: 2.079; 95%CI: 1.443-2.996; *P* value <0.005), number of children alive (OR: 2.118; 95%CI: 1.109-4.045; *P* value = 0.023) and family planning history (OR: 0.473; 95%CI: 0.332-0.696; *P* value <0.005). The number of children alive was the most dominant factor contributing to UP. Mothers who owned living children >3 had a chance of 2 times experiencing UP compared to those who had <3 after being controlled for maternal age and family planning history.

Keywords*: unintended pregnancy; maternal age; number of children alive; knowledge of contraception methods; Indonesia*

Introduction

Unintended pregnancy (UP) is defined as a pregnancy that occurs when we do not want a child at all or a pregnancy that is desired but not at the right time (mistimed pregnancy), whereas pregnancy is described as a desired pregnancy if the it occurs at the right time or after having a desire to get pregnant[(1)]. In line with this, according to dictionary of term in family planning program, an unintended pregnancy is referred as a pregnancy experienced by a woman who actually does not desire yet or does not want anymore to become pregnant [(2)].

Unintended pregnancy is something real and experienced by many women for various reasons[(3)]. Unintended pregnancy can be the root of problem in carrying out abortions which have the risk of causing maternal and child mortality. WHO estimates that among the 200 million pregnancies per year, around 75 million (38%) are unintended pregnancies[(4)]. In Indonesia according to the data of Indonesian Demographic and Health Survey (IDHS) in 2017, about 8 out of 10 births (84%) of pregnancies were intended at the time, 8% of births were desired later, and 7% were unintended. The proportion of unintended births or pregnancies had remained constant since the 2002-03 IDHS, which was (7%)[(5)]. There are various reasons why a woman does not want to get pregnant at a certain time in her life, including marital status, suffering from a chronic illness, psychological reasons, education or occupation [(6)].

This study aimed to determine the contribution of maternal age, number of children alive, family planning history and knowledge of contraception methods to the incidence of unintended pregnancy in women aged 15-49 years as an effort to reduce the risk of unintended pregnancy.

Method

This study was a further analysis of the IDHS data

in 2017 on individual data sets (IDIR71FL.sav). The population were all women aged 15-49 years old in Indonesia. The sample of this study were all women aged 15-49 years old who had been pregnant and gave birth to the last child during the survey. Inclusion criteria for the sample were women aged 15-49 years who were still alive, had been pregnant, and had living children aged >12 months by the time the survey was conducted. While the exclusion criteria were mothers who had children <12 months old, mothers and children whose data were incomplete.

The dependent variable was the occurrence of pregnancy which actually was not expected, including the pregnancy being not on the right time and having no desire of pregnancy at all. The independent variables included maternal age, number of children alive, family planning history and knowledge of contraception methods. Data analysis was performed bivariately using the chi-square test and multivariate analysis was carried out with multiple logistic regression of several independent variables to predict the most dominant factor contributing to the occurrence of UP.

Based on Lemeshow, Hosmer, Klar, and Lwanga [7], to meet the required sample size, sample size formula for the estimation of two proportions was used. From the calculation of sample size, a minimum sample of 608 respondents was obtained, with the proportion of unintended pregnancies in mothers having number of children >3 (P1 = 0.649) and the proportion of unintended pregnancies in mothers having number of children <3 (P2 = 0.482). Values of P1 and P2 were obtained from previous studies [8], but this study used secondary data with a larger number of samples than the minimum sample size, so that the number of samples to be analyzed were all samples in the survey that matched the assessment criteria of 1,695 respondents.

Table 1. Correlation Between Maternal Age, Number of Children Alive, Knowledge of Contraception Method and Family Planning History With Unintended Pregnancy, IDHS 2017

Variables	**Pregnancy Status**				***P* value**	**OR**	95% CI
	Intended		Unintended				
	n	%	n	%			
Maternal Age							
No risk (20-35 years)	1343	69.6	87	4.5	<0.005	0.137	0.465-0.786
Risky (<20 years and >35 years)	352	18.2	148	7.6			
Number of Children Alive							
No risk (≤ 3 children)	1652	85.6	19	1.0	<0.005	3.447	2.074 – 3.926
Risky (> 3 children)	43	2.2	215	11.2			
Knowledge of Contraception Method							
Good	847	43.9	135	7.0	0.073	0.964	0.676 – 1.039
Poor	849	44.0	100	5.2			
Family Planning History							
Ever Never	1087 608	56.3 31.5	187 47	9.7 2.5	<0.005	0.456	1.243 – 2.035

The results indicated that respondents knowledge of contraception methods did not contribute to the incidence of UP (P = 0.073). While the other three variables namely maternal age (P <0.005), number children alive (P <0.005), and family planning history (P <0.005) contributed to the occurrence of UP. Based on the table above, the four independent variables produced P values <0.25 so that all of these variables met the requirements to be included in multivariate modeling.

Table 2. Initial Multivariate Modeling

Variables	P value	OR	95% CI
Maternal age	<0.005	2.108	1.460 – 3.045
Number of Children Alive	0.022	2.139	1.114 – 4.108
Knowledge of Contraception Methods	0.127	0.763	0.539– 1.080
Family Planning History	<0.005	0.494	0.335– 0.727

The results of the initial multivariate modeling found that the variable of knowledge about contraception method had P value of 0.127 (>0.05), so it was excluded from the multivariate modeling.

Table 3. Final Multivariate Modeling

Variables	P value	OR	95% CI
Maternal age	<0.005	2.079	1.443– 2.996
Number of Children Alive	0.023	2.118	1.109 – 4.045
Family Planning History	<0.005	0.473	0.332– 0.696

The results of the analysis it was noted that the variables which simultaneously contributed to the occurrence of UP were maternal age, number of children alive and family planning history. The most dominant factor contributed to the incidence of UP was the number of children alive (OR 2.18; 95%CI = 1.109 – 4.045). This indicated that mothers who owned more than 3 living children had a chance of 2 times experiencing UP compared to those who had living children <3 after being controlled for maternal age and family planning history.

Discussion

Contribution of the Number of Children Alive to Unintended Pregnancy Events

The analysis showed that the number of children alive contributed to the occurrence of UP. Other research stated that the incidence of UP was highest in the group of women who had three or more children and the number of children contributed to the UP event which were affected by socioeconomic interaction [9]. Another studies suggested that women who had more than three children would intensify the risk of UP events [10]. Mothers with fewer number of children were able to fulfill the needs of the children better, while mothers with larger numbers of children were economically more burdened. As a result, the mothers were prone to consider that the pregnancies were unintended. In this group, there were parents' fear about the costs to be spent for food, health, clothing, house, education and others.

In Indonesia, boys and girls have different values in families according to the ancestors and customs that are believed by each ethnic group. For example, the principle of Toba Batak descendant is patrilineal, meaning that the ethnic lineage is from the son[11]. Sons play important role in the continuation of generations, implying that someone who does not have a son can be considered *napupu* for being unable to continue the father's genealogy and will never again be remembered

or taken into account in the genealogy.

It is different in the Minangkabau people of Indonesia who follow the matrilineal system. One of the characteristics of the Minangkabau matrilineal is (1) Lineages are drawn based on maternal lines which more broadly then form groups of clans and tribes; (2) the control of inheritance is in the hands of mothers led by a senior woman called *bundo kanduang*[12]. These characteristics confirm that the position and role of women are very important in the life of the Minangkabau community.

Basically a woman's desire to have children once again or not, is motivated by the number of children they have. The desire to have children of a certain gender according to customs believed by someone is likely causing someone to still insist to have children even though they have already had children before. This was supported by a study in Iranian culture which showed that the desire to have children and certain gender contributed to the events of UP [13]. The number of children born to a woman during her life greatly affected her health. This caused the number of children to be related to the occurrence of UP.

Contribution of Maternal Age to Unintended Pregnancy Events

The analysis pointed that there was a significant contribution between maternal age and the incidence of UP. This was in accordance with a descriptive study on the 2010 Riskesdas data which stated that UP in Indonesia mostly occured in women over 35 years old and in young marriages (16-20 years) [14]. A study of UP in Egypt on 1999 found that women in the group of age over 35 years old reported more of their pregnancies as unintended pregnancies [10].

The safest age for a mother to get pregnant is 20-35 years because in women starting from the age of 20, the uterus and other body parts are fully ready to accept pregnancy, nevertheless, at that age women are usually ready to become a mother[15]. This was because women's readiness to be able to accept their pregnancy included physical, emotional, socioeconomic, and psychological aspects. The more mature the mother's age and not included in the high risk group in medical terms, the more acceptable the pregnancy.

Contribution of Family Planning History to Unintended Pregnancy Events

The results of the analysis indicated that the family planning history contributed to the occurrence of UP. These results were in line with a study using the 2013 Riskesdas data, stating that the use of contraception contributed to the occurrence of UP. Couples who were currently using contraception were more likely to experience UP events compared to couples who never used contraception[16]. These were in accordance with study from India which found that in couples using contraception the possibility of UP was higher than couples who did not use contraception[17].

Couples who were currently using contraception but have UP might be due to the failure of contraception used. Failure of contraception is a case of pregnancy in the active acceptor who is currently using contraception. This contraception failure can be caused by the failure of the contraception method itself or due to the non-compliance of the acceptors in using contraception.

Based on IDHS 2017, 34% women stopped using these FP methods/devices within 12 months after use. There were various reasons to stop using contraception including the failure of the method, desire to get pregnant, side effects/health problems, intention for a more effective method, limited access, too expensive and being not comfortable to use[5]. In couples who had used contraception and experienced the events of UP, it might be caused by the unsustainable use (drop out) of the contraception they were using. In the type of non-long-term contraception method (LTCM) including pills, injections, and condoms, the level of compliance was lower than the type of LTCM. The IDHS 2017 data showed that the highest drop-out rates for FP use in Indonesia were pills (46%). Its might also be caused by the side effects of contraceptions experienced. 33% of married women stopped using FP methods/devices due to the side effects/health problems[5].

Contraception was a method used as an effort to control pregnancy. The history of FP methods/devices use became important as an effort to prevent the occurrence of UP.

Contribution of Knowledge About Contraception Methods to Unintended Pregnancy Events

According to Martin, et al. the measurement for knowledge of contraception methods was categorized as good if the respondents were able to answer more than 50% of the questions (score >10)[18]. The knowledge was grouped based on the knowledge value gained

from answering the question "Have the mothers ever heard of FP methods/devices which could delay or prevent pregnancy, namely: female sterilization, male sterilization, IUD, pills, injections, implants, condoms, diaphragms, MAL, periodic abstinence, interrupted coitus and condoms?".

In the results of the study, most of the good knowledge respondents have UP occurrence and there was no significant correlation between the knowledge of FP and UP incidence. it's accordance with Afifah study that there was no significant correlation between knowledge and the events of UP[19].

It's different from a study in Nepal which stated that women who were exposed to information of contraception over the radio had lower rates of UP compared to those who were not exposed[8]. While in Nigeria, as many as 22% of women who experienced UP not used contraception, because of poor knowledge about side effects and benefits[20].

Conclusion

The strongest factors that contributing to UP incidence were the number of living children owned. Mothers who had living children >3 were twice likely to experience UP compared to mothers who had children <3 after controlling for their age and family planning history. Based on these results, it is necessary to increase the provision of information about the importance of family planning program and its method as an effort to reduce the risk of UP. In addition, to prevent dropout and contraception failure, it is needed to conduct initial counseling regarding contraception side effects which can be experienced by acceptors.

Acknowledgement: I am grateful to BKKBN who gave the approval for further analysis of the IDHS 2017 data, husband, parents, family and friends who provided support in completing this study.

Conflict of Interest: The authors declare no conflicts of interest in this study

Source of Funding : Independent (self-based)

Ethical Study: This research was conducted after obtaining approval from BKKBN through the online/ website of IDHS 2017 for data processing.

References

1. Santelli, J., Rochat, R., Hatfield-Timajchy K, Gilbert BC CK. The Measurement and Meaning of Unintended Pregnancy , Perspectives on Sexual and Reproductive Health. 2003;35(2).
2. BKKBN. Kamus Istilah Kependudukan KB dan Keluarga Sejahtera. 2011. 1–141 p.
3. Kartono Mohamad. Seri Kesehatan Reproduksi, Kebudayaan dan Masyarakat: Kontradiksi Dalam Kesehatan Reproduksi. Vol. 3, Kontradiksi Kesehatan Reproduksi. Pustaka Sinar Harapan berkerjasa dengan PT Citra Putra Bangsa dan The Ford Foundation; 1998. 27–39 p.
4. Hatcher RA, Trussell J, Stewart F. Unintended pregnancy. Nurse Pract. 1995;20(11):76–9.
5. National Population and Family Planning Board, Statistic Indonesia, Ministry of Health TDPI. IDHS 2017 FInal Report.pdf.
6. WHO. World Health Day 1998 : Prevent Unwanted Pregnancy.
7. Ogston SA, Lemeshow S, Hosmer DW, Klar J, Lwanga SK. Adequacy of Sample Size in Health Studies. Biometrics. 1991;47(1):347.
8. Adhikari R, Soonthorndhada K, Prasartkul P. Correlates of unintended pregnancy among currently pregnant married women in Nepal. BMC Int Health Hum Rights. 2009;9(1):1–10.
9. Syafitri YD, Masyarakat FK, Sarjana P, Kesehatan R. Hubungan Jumlah Anak dengan Kejadian Kehamilan Tidak Diinginkan (KTD) pada Wanita Pernah Kawin Usia 15-49 tahun di Indonesiaa. Skripsi. 2012;
10. Shaheen AA, Diaaeldin M, Chaaya M, El Roueiheb Z. Unintended pregnancy in Egypt: Evidence from the national study on women giving birth in 1999. East Mediterr Heal J. 2007;13(6):1392–404.
11. Harahap, Basyral h, & Siahaan HM. Orientasi Nilai-nilai Budaya batak Toba: Suatu pendekatan terhadap perilaku batak toba dan angkola-mandailing. Iskandar SW, editor. 1987.
12. Zainal A. Bundo Kanduang: (hanya) Pemimpin di Rumah (Gadang). Antropol Indones. 2014;34(2).
13. Paydarfar AA, Malekafzali H. Sociodemographic attributes of Iranian wives who reported unwanted pregnancies. Soc Biol. 2001;48(1–2):105–24.
14. Pranata S, Sadewo F. Kejadian Keguguran, Kehamilan Tidak Direncanakan Dan Pengguguran

Di Indonesia. Bul Penelit Sist Kesehat. 2013;15(2 Apr).

15. Depkes RI. Yang Perlu Diketahui Petugas Kesehatan tentang Kesehatan Reproduksi. Jakarta: Departemen Kesehatan Republik Indonesia dan United Nations Population Found; 2001.
16. Ika Saptarini S. Determinan Kehamilan Tidak Diinginkan di Indonesia (Analisis Data Sekunder Riskesdas 2013). 2016;
17. Dixit P, Ram F, Dwivedi LK. Determinants of unwanted pregnancies in India using matched case-control designs. BMC Pregnancy Childbirth. 2012;12.
18. Martins LBM, Costa-Paiva L, Osis MJD, Sousa MH de, Pinto Neto AM, Tadini V. [Knowledge of contraceptive methods among adolescent students]. Rev Saude Publica [Internet]. 2006;40(1):57–64. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16410983
19. Afifah T. Faktor-faktor Yang Berhubungan Dengan Kejadian Kehamilan Yang Tidak Diinginkan (Analisis Lanjut Data SDKI Tahun 1997).
20. Sedgh G, Bankole A, Oye-Adeniran B, Adewole IF, Singh S, Hussain R. Unwanted pregnancy and associated factors among Nigerian women. Int Fam Plan Perspect. 2006;32(4):175–84.

Health Risk of Particulate Matter on Primary School Students in West Jakarta

Lailatul Qomariyah[1], Bambang Wispriyono[2], Haryoto Kusnoputranto[3], Abdur Rahman[4], Meliana Sari[4]

Faculty of Public Health, Department of Environmental Health, Universitas Indonesia, Depok, Indonesia

Abstract

Background: Particulate matter (PM) is the most common air pollutant found in West Jakarta, with the main source being the increase of the motor vehicle used.

Methods: This study investigated the PM concentrations and the related health risk from PM exposure on primary school students in West Jakarta. The $PM_{2.5}$ concentration was measured using instrument HAZDUST, Model: SKC EPAM-5000, PA 15330.

Results: The highest mean concentration of $PM_{2.5}$ measured from three primary schools in West Jakarta was 129 $\mu g/m^3$.

Discussion: The health risk analysis of the students showed that the $PM_{2.5}$ intake was lower than the reference dose or safety limit.

Conclusions: The findings of this study showed that primary school students were not under the risk of exposure to $PM_{2.5}$ in the school environment.

Competing Interests: The authors declare no competing financial interests

Keywords: *Particulate matter, student, primary school, risk assessment.*

Introduction

The air quality in West Jakarta was considered as unhealthy and polluted according to the national air quality criteria (KEPMEN LH NOMOR: KEP-45/ MENLH/10/1997[(1)]. The data of air quality in West Jakarta is collected from the monitoring stations throughout Jakarta. According to the Jakarta province regulation number 2 year 2005, the government has done efforts on tackling air pollution and air quality recovery. Regardless, those efforts did not seem to succeed in lowering the level of air pollution[(2)].

One of the main sources of air pollution was the high number of motor vehicles in busy traffic. The motor vehicles released several gasses and particulate matter (PM). There are several categories of PM, i.e., PM_{10}, $PM_{2.5}$, and ultrafine PM with a diameter of 0.1 μm[(3)]. Smaller-sized PM caused a higher risk than the bigger-sized PM[(4)]. The most common pollutant from the incomplete fossil fuel combustion was $PM_{2.5}$, which has similar characteristics with gas molecules that can reach the gas exchange areas in the lungs, translocate the lungs, and reached the blood circulation system[(5)]. $PM_{2.5}$ can be easily inhaled into the respiratory system and kept in the lung's alveoli where toxic particles can cause lung damage and disrupt the lung functions[(4,6,7)] . The $PM_{2.5}$ also contributes to the steady increase of asthma prevalence in humans, especially in children[(8)].

Children spend most of their time in school. Therefore, the air quality in school was considered as an important factor which affects the health of children[(9)]. Children are more vulnerable to a higher amount of air pollution since their respiratory volume is higher compared to adults[(10)t]. In general, the children's organ is more vulnerable to toxic compounds since it is not fully developed[(11)]. Therefore, a proper approach to

Corresponding author:
Bambang Wispriyono
email: bwispri@ui.ac.id

calculating and predicting the health risk which called the risk analysis on environmental health is needed, which taken into account several steps, i.e., identification of uncertain factors, investigation on certain exposure, consideration on characteristics of concerning pollutant agent and the specific target. This study aims to estimate the risk of $PM_{2.5}$ on primary school students in West Jakarta.

Abbreviations	
RQ	Risk quotient
RFC	Reference concentration

Methods

The samples in this study were taken from three primary schools in West Jakarta which located near the highway. The samples were coded as follows: CT 05, CB 03, PS 06.

Sampling

The measurement of $PM_{2.5}$ concentration was taken from 3 points in the school area during the school hours. The sampling point was based on the most visited areas of students during school hours. The $PM_{2.5}$ concentration was measured with instrument HAZDUST (Model: SKC EPAM-5000, PA 15330) and was being done at the same time with the health survey.

Study Participants

Several inclusion criteria for sampled students used were students from fourth and fifth grade in a healthy condition and were willing to be respondents by signing the form of consent. Besides that, the bias in this study was minimized by ensuring that there were no friendship or sibling relations between the students as the study subject with the researcher.

Particulate Analysis

The results of $PM_{2.5}$ concentration measured was compared to the threshold value of the national threshold value (i.e., PermenLH, Permenkes), WHO, and EPA (see Table 1 for more details).

Health Risk Assessment

Parameters used to predict the health risk through various inhalation ways are described in Table 2. We calculated intake as the amount of risk agent concentration (mg) which enters the human body with a certain weight (kg) daily (Equation 1).

(Equation 1)

With:

I = daily intake (mg/kg/day)

C = risk agent concentration (mg/m^3)

R = inhalation rate (m^3/hour)

L = exposure time (hour/day)

Ef = frequency of exposure (day/year)

Ed = duration of exposure (year)

Bwt = weight (kg)

At = average daily period

We then compared the intake value with the reference dose (RfC), which resulted in the Risk Quotient (RQ) value (mg/m^3/day).

(Equation 2)

The reference dose (RfC) used was based on the value of the National Ambient Air Quality Standards (NAAQS) for the $PM_{2.5}$ (35 μg/ m^3). We did not use the national air quality value since the default value of the exposure factor was not known. The value of RfC used on determining the risk of $PM_{2.5}$ exposure was 0.005 mg/kg/day (16).

Results

Respondent characteristics

The total number of the respondent in this study is 103 primary school students from three public primary school in West Jakarta. The statistical descriptive of the respondents studied is shown in Table 3. In all three primary schools, respondents from the eleven-year age group have the highest percentage on every school compared with the other age groups.

Physical description of the study sites

The measurement of the physical environment of each school was done on different days. Besides the measurement of $PM_{2.5}$ concentration, we also measured the classrooms' temperature and relative humidity. The $PM_{2.5}$ concentration on each study site was measured from 9 points of sampling which were spread on each

school for 6 hours. The lowest and highest value of $PM_{2.5}$ concentration found were both at primary school CB with the lowest being 30 μg/m^3 (fifth-grade classroom) and the highest being 197 μg/m^3 (fourth-grade classroom).

Analysis of environmental health risk

Anthropometry characteristics and respondents' activity pattern

We used the default value of exposure time and inhalation rate as described in the guidelines on the analysis of environmental health risk[12]. Other related variables, i.e., respondents' weight, exposure frequency, and exposure time were variables that depend on each respondent. The exposure frequency was calculated from the number of appointed school days or effective school days (209 days) subtracted by the number of students' absence days. We assumed that the exposure time is four years for the fourth-grade students and 5 years for the fifth-grade students. The students' weight was measured directly during the study.

The results showed that the respondents' weight was normally distributed (Table 5), except in the primary school CB. From the total of 103 respondents, the lowest weight recorded was 22.6 kg and the highest was 69.6 kg. Based on the calculation of estimated risk, the RQ value was ≤ 1, which indicated that the health exposure risk of $PM_{2.5}$ on the primary school students was considered safe during the moment of study. The risk management will only be done if the value of RQ exceeds 1.

Table 1. The threshold of $PM_{2.5}$ concentration (μg/m^3) for ambient and indoor air

Source of PM2.5 threshold regulations	Ambient air (μg/m3)		Indoor air (μg/m3)
	24 hours	1 year	24 jam
PermenLH No 12 Tahun 2010 (12)interconnected and stable flowing network of these natural fractures within the shale, without penetrating into water bearing zones below the shale. Shale wells capable of producing gas at several million scf/d, require development of a fracture pathway with shale face contact of an estimated five to ten million square feet (about one million square meters	65	15	
Permenkes No 1077 Tahun 2011 (13)			35
World Health Organization (WHO) year 2005 (14)	25	10	
Environmental Protection Agency (EPA) 2009 (15)1994; hereafter, the Inhalation Dosimetry Methodology	35	15	

Table 2. Standard value to count the PM exposure

Exposure Factors	Units	Values
Concentration (C)	mg/m3	-
Exposure frequency (Ef)	day/year	209
Inhalation rate (R)	m3/jam	0.5
Exposure duration (Ed)	year	6
Body weight (Bwt)	kg	-
Exposure time (Et)	h/day	6
Average time (At)	day	1,254

Table 3. The characteristics of the studied respondents

Characteristics	CT	(n = 46)	CB	(n = 36)	PS	(n = 21)
	Number	%	Number	%	Number	%
Sex						
Female	20	42.6	23	60.5	10	43.5
Male	26	55.3	13	34.2	11	47.8
Age (year)						
10	10	21.3	3	7.9	3	13.0
11	20	42.6	21	55.3	11	47.8
12	13	27.7	12	31.6	6	26.1
13	2	4.3	-	-	1	4.3
14	1	2.1	-	-	-	-
Duration of exposure (years)						
4	28	59.6	16	42.1	10	43.5
5	18	38.3	20	52.6	11	47.8

Table 4 Concentration of $PM_{2.5}$

Location	PM2.5 (µg/m3)			Temperature (0C)	Relative humidity (%)
	TWA	Min	Max		
CT					
4th grade	107	59	161	30.3	70
5th grade	67	47	108	29.6	73.1
Outdoor	84	43	136	33.1	63
CB					
4th grade	129	73	197	30.5	69.7
5th grade	37	30	49	31.6	66.9
Outdoor	114	74	191	30.8	68.1
PS					
4th grade	115	40	191	33.1	55.7
5th grade	79	56	121	33	56
Outdoor	78	43	157	31.3	70.1

Table 5. The anthropometry characteristics and activity pattern of respondents

Variable	Mean	Median	Min-Max	Distribution
Body weight (kg)				
CT	38.4	39.2	22.6 – 64.5	Normal
CB	35.7	33.4	22.7 – 69.6	Abnormal
PS	34.5	33.2	23.5 – 59.1	Normal
Exposure frequency (days/year)				
CT	895	832	776 – 1,045	Normal
CB	929	1,000	692 – 1,045	Normal
PS	904	960	720 – 1,030	Normal

Discussion

The results of indoor $PM_{2.5}$ concentration measurement in three primary schools in West Jakarta showed a higher value compared with the national threshold of the ambient air quality[13]. However, this result cannot conclude that the air quality in the studied areas being harmful to human health since the national air quality threshold[13, 14] require 24 hours of ambient air $PM_{2.5}$ measurements. Besides the ambient air, the indoor $PM_{2.5}$ concentration from three schools was higher than the national threshold (i.e., 35 μg/m^3) for offices for 8 hours. However, this value also cannot conclude that the indoor air quality from the studied schools being harmful to human health, since the threshold value is based on the office environment. A specific value designated for schools was not available yet. Meanwhile, our study only measured the $PM_{2.5}$ concentration during teaching activities. A relatively long period of measurement may reflect better the health risk caused by the $PM_{2.}5$ exposure since the effects of air pollutants were not only depending on the pollutants' concentration, but also the exposure time. The longer a person is being exposed to pollutants, the higher the chance of related health risks might appear.

Our study showed similar results with another study[15], where the ambient air $PM_{2.5}$ concentration was higher than the air quality standards. The safe intake (RfC) of $PM_{2.5}$ concentration for students was 0,031 mg/kg/day. Our $PM_{2.5}$ concentration value was higher compared with the ones recorded at a secondary school in Bandung (SMPN 16 Bandung), West Java, Indonesia[16]. The study on this secondary school showed a lower $PM_{2.5}$ concentration compared to the national air quality standards, but higher compared with the EPA standards. Another study in the industrial area (20) showed an overall higher value than the national air quality threshold and several points of sampling also showed a higher value compared to the EPA standards. The Indonesian national air quality standard is indeed being less restricted compared to other countries' air quality standards. Several related studies highlighted the need of special attention on the air quality; therefore, it is important for various groups working on the health and environment quality sectors (i.e., researcher, government, students, and related stakeholders) to know methods to measure the health risk, e.g., the analysis of environmental health risk.

Based on the calculation of the intake values, the lowest and the highest values were shown by the primary school PS. The possible explanation was due to the students' body weight; the lower body weight will result in a high intake value and the higher eight will result in a lower intake value. Another similar result was shown by other studies that explain that bodyweight is one of the determining factors of the intake value[16,17].

The health risk of $PM_{2.5}$ was only considered the value of RQ, this was due to the toxicity of $PM_{2.5}$[18,19] which was not allowing to further assess the carcinogenic health risk. The RQ value ≤ 1 found means that the students of primary school in West Jakarta was not under the risk at the moment of the study was conducted. This value can be

interpreted as the inhalation exposure of $PM_{2.5}$ with the exposure time of 692-1,045 days and a duration of 4-6 years was considered safe to non-carcinogenic risk. This result was similar to another study[16], which also shown the $PM_{2.5}$ was not causing a health risk.

Conclusions

The lowest and the highest $PM_{2.5}$ concentration was found in fifth grade (35 ug/m^3) and fourth grade (129 ug/m^3) of primary school CB. The lowest and the highest intake was found in the primary school PS. The non-carcinogenic health risk from $PM_{2.5}$ exposure of the three primary schools has a value of RQ ≤ 1 which was considered safe in the time being.

Acknowledgment: This study was supported by the Publikasi Internasional Terindeks Tugas Akhir in Universitas Indonesia (Hibah PITTA) Universitas Indonesia, year 2019 (project number 217/ UN2.F10 / PPM.00.02/2019).

Ethical Clearance: This study was approved by the Research and Community Engagement Ethical Committe Faculty of Public Health Universitas Indonesia Number: Ket-285/UN2.F10/PPM.00.02/2019

Conflict of Interest: There is no conflict of interest inflicted in this study.

References

1. Indeks Standar Pencemar Udara (ISPU) di Provinsi DKI Jakarta Tahun 2019 - Indeks Standar Pencemar Udara di Provinsi DKI Jakarta Bulan Agustus Tahun 2019 - data.
2. Provinsi G, Khusus D, Jakarta I. 2005;
3. Brown JS, Gordon T, Price O, Asgharian B. Thoracic and respirable particle definitions for human health risk assessment. Part Fibre Toxicol [Internet]. 2013;10(1):1–12. Available at: http://www.particleandfibretoxicology.com/content/10/1/12
4. Li T, Hu R, Chen Z, Li Q, Huang S, Zhu Z, et al. Fine particulate matter (PM2.5): The culprit for chronic lung diseases in China. Chronic Dis Transl Med [Internet]. 2018;4(3):176–86. Available at: https://doi.org/10.1016/j.cdtm.2018.07.002
5. Kim KH, Kabir E, Kabir S. A review on the human health impact of airborne particulate matter [Internet]. Vol. 74, Environment International. Elsevier Ltd; 2015. hal. 136–43. Available at: http://dx.doi.org/10.1016/j.envint.2014.10.005
6. Laeremans M, Dons E, Avila-Palencia I, Carrasco-Turigas G, Orjuela JP, Anaya E, et al. Short-term effects of physical activity, air pollution and their interaction on the cardiovascular and respiratory system. Environ Int [Internet]. 2018;117(May):82–90. Available at: https://doi.org/10.1016/j.envint.2018.04.040
7. Atkinson RW, Kang S, Anderson HR, Mills IC, Walton HA. Epidemiological time series studies of PM2.5 and daily mortality and hospital admissions: A systematic review and meta-analysis. Vol. 69, Thorax. 2014. hal. 660–5.
8. Gowers AM, Cullinan P, Ayres JG, Anderson HR, Strachan DP, Holgate ST, et al. Does outdoor air pollution induce new cases of asthma? Biological plausibility and evidence; A review. Vol. 17, Respirology. 2012. hal. 887–98.
9. Madureira J, Paciência I, Pereira C, Teixeira JP, Fernandes E de O. Indoor air quality in Portuguese schools: levels and sources of pollutants. Vol. 26, Indoor Air. 2016. hal. 526–37.
10. Rovelli S, Cattaneo A, Nuzzi CP, Spinazzè A, Piazza S, Carrer P, et al. Airborne particulate matter in school classrooms of northern Italy. Int J Environ Res Public Health. 2014;11(2):1398–421.
11. Yu Y, Wang Q, Li L, Liu Z, Sun P, Zhang Y, et al. Particle-Associated Ambient Benzo[a]pyrene and Levels of Urinary 1-Hydroxypyrene in a Non-occupationally Exposed Population of Adults and Children in Lanzhou, China. Bull Environ Contam Toxicol. 2016;96(3):303–8.
12. Direktur Jendral PP dan PL Kementerian Kesehatan. Pedoman Analisis Risiko Kesehatan Lingkungan (ARKL). 2012.
13. KemenLH No.12. Peraturan Menteri Negara Lingkungan Hidup Nomor 12 Tahun 2010 Tentang Pelaksanaan Pengendalian Pencemaran Udara Di Daerah. Pelaksaan Pengedalian Pencemaran Udar Di Drh Menteri Negara Lingkung Hidup [Internet]. 2010;1–199. Available at: www.menlhk.go.id
14. Kemenkes. Peraturan Menteri Kesehatan No. 1077 tentang Pedoman Penyehatan Udara dalam Ruang Rumah. 2011;(1077):2011.
15. Bedah S, Latifah I. Risiko pajanan konsentrasi pm 10 dan pm 2,5 di kecamatan ciwandan, cilegon jawa barat tahun 2014. J Ilm Kesehat. 2017;9(1):93–102.

16. Rosalia O, Wispriyono B, Kusnoputranto H. Karakteristik Risiko Kesehatan Non Karsinogen Pada Remaja Siswa Akibat Pajanan Inhalasi Debu Particulate Matter <2,5 (PM2,5). Media Kesehat Masy Indones. 2018;14(1):26.
17. Atrisman, Abdurahman SW. Analisis dan manajemen risiko kesehatan pencemaran udara. Jurnal Ekologi kesehatan Vol 4. 2005. page. 270–89.
18. Lelieveld J, Evans JS, Fnais M, Giannadaki D, Pozzer A. The contribution of outdoor air pollution sources to premature mortality on a global scale. Nature. 2015;525(7569):367–71.
19. M. L. Toxicological and epidemiological studies of cardiovascular effects of ambient air fine particulate matter (PM2.5) and its chemical components: Coherence and public health implications [Internet]. Vol. 44, Critical Reviews in Toxicology. 2014. page. 299–347. Available in: http://www.embase.com/search/results?subaction=viewrecord&from=export& id=L372733161%0 Ahttp://dx.doi.org/10.3109/10408444.2013.861796

Association between Muscle Mass with Frailty State in Elderly

Jayadi[1], Marzuki Jamain[1], Wasis Udaya[2], Agus Sudarso[2], Haerani Rasyid[1], A. Makbul Aman[1], Arifin Seweng[3]

[1]Internal Medicine Department, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia, [2]Geriatric Division of Internal Medicine Department, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia, [3]Biostatistics Department, Faculty of Public Health, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

Abstract

Background: Frailty is a syndrome characterized by diminished strength, endurance, and reduced physiologic function caused by multiple etiologies, leading to a higher rate of vulnerability for functional loss and death. Low muscle mass is reported to be an important link between sarcopenia and frailty. A progressive decrease in muscle mass occurs at annual rate of 1% to 2% after the age of 30 years and accelerates to 1,5% to 3% year after the age of 60 years then even faster after the age of 75 years. The strong association between muscle mass and frailty leads us to find out the association between muscle mass and frailty status in elderly.

Method: The study was a cross-sectional with 77 subjects of aged ≥60 years. Frailty defined as meeting ≥ 3 of 5 criteria: unintentional weight loss, reduced gait speed, reduced grip strength (weakness), self-reported exhaustion, and low physical activity level. Muscle mass was determined by bioelectrical impedance analysis (BIA) TANITA BC-601. Asian Working Group on Sarcopenia (AWGS) recommends cut off values were <7 kg/m2 in men and <5,7 kg/m^2 in women, defined by appendicular skeletal muscle mass/$height^2$ (ASM/$height^2$)

Results: The study shows the prevalence of low muscle mass was 11,7%. The prevalence of prefrail and frail was 44,2% and 24,7%. Frail was significantly higher in subjects with low muscle mass, whereas robust and prefrail were higher in subjects with normal muscle mass (p<0,05). Among frailty components, reduced gait speed was the most prevalent (51,9%).

Conclusions: Muscle mass was signifinantly associated with frailty status in elderly people.

Keywords: *muscle mass, frailty, elderly*.

Background

Aging process in an irreversible and inenoraxable process.[1] Increasing longevity, coupled with rising frailty and sarcopenia of aging, significantly affects function and quality of life of older adults.[2]

Frailty is a syndrome characterized by diminished strength, endurance, and reduced physiologic function caused by multiple etiologies, leading to a higher rate of vulnerability for functional loss and death.[3] Becoming frail is a dynamic process. Frailty is considered as a continuum from robustness to prefrail to fully expressed syndrome of frailty. However, prefrail individuals may either enter the frailty state or reverse/recover to the non-frail one. With this dynamic concept of frailty, there is an "intervention window" to prevent frailty or reverse it particularly in the group of prefrail individuals.[4]

Low muscle mass is reported to be an important link between sarcopenia and frailty.[5] A progressive decrease in muscle mass occurs at annual rate of 1% to 2% after the age of 30 years and accelerates to 1,5% to 3% year after the age of 60 years then even faster after the age of 75 years.[6] Diabetes increases the risk of physical dysfunction and disability. Diabetes-related complications and coexisting morbidities partially explain the deterioration in physical function. The decline in muscle mass, strength and function associated with diabetes leads to sarcopenia, frailty and eventually disability. Frailty acts

as a mediator in the pathogenesis of disability in older people with diabetes and its measurement in routine daily practice is recommended. Frailty is a dynamic process which progresses from a robust condition to a pre-frail stage then frailty and eventually disability. Therefore, a multimodal intervention which includes adequate nutrition, exercise training, good glycaemic control and the use of appropriate hypoglycemic medications may help delay or prevent the progression to disability.

A decrease in muscle mass and muscle function (strength and physical performance) may result in reduced physical capability, poorer quality of life, impaired cardiopulmonary performance, unfavourable metabolic effects, falls, diasability and mortality in older people.[7]

The strong association between muscle mass and frailty leads us to find out the association between muscle mass and frailty status in elderly.

Method

A cross sectional analytic study included 77 patients who fulfilled the inclusion criteria (aged 60 years or above). The subjects were consecutively recruited from geriatric outpatient clinic of Wahidin Sudirohusodo Hospital, Makassar and agreed to be assessed for baseline data. Exclusion criteria included cognitive impairment (i.e., a score of Abbreviated Mental Test ≤7), acute diseases (e.g., severe infection, acute cerebrovascular events), malignancy and refusal to participate in the study. The sample size for the study was determined based on the equation for the sample size of the estimated proportion with minimum number of subjects to be recruited was 60 subjects. This study mostly used primary data obtained using questionnaires, only data about comorbidities were collected from medical records. Data collection included demographic data, anthropometric, frailty status, muscle mass and comorbid. The data collection started from July through October 2019.

The Cardiovascular Health Study frailty phenotype consists of 5 objective components; unintentional weight loss more than 5% of body weight in the previous year, self-reported exhaustion, self-reported low physical activity, reduced grip strength, and reduced gait speed. Older adults were considered as frailty when they met 3 or more of the 5 criteria, prefrail when they met 1 or 2 criteria, and robust when they met no criteria.[8] Exhaustion was determined by self-reported of feeling that "in the last week, everything was an effort or I could not get going" for three or more days. Physical activity level was considered low if the participant's PASE score was in the lowest quintile, based on gender. Maximum grip strength was measured using a Jamar dynamometer and standardised protocol.[9] Gait speed, indicated by the average time in seconds (s) in which each elderly toured three times a distance of 4.6 m.[10] Muscle mass was determined by BIA TANITA BC-601. Asian Working Group on Sarcopenia recommends cutoff values were < 7 kg/m2 in men and < 5,7 kg/m^2 in women, defined by appendicular skeletal muscle mass/$height^2$ (ASM/$height^2$).[7] Comorbidities based on Cumulative Illness Rating Scale-Geriatric Version (CIRS-G). All subjects gave written, informed consent before data collection.

Data were processed and analyzed using the computer program SPSS (Statistical Package for the Social Science Program) version 25. Chi-square statistical analysis was used for the data and considered significant if $p < 0.05$.

Results

The present study included 77 elderly subjects (table 1). The age ranged from 60 to 92 years with a mean age of 68,16 ± 6,45 years. Most subject were female (62,3%) and 36,4% were obese (obese I 28,6%; obese II 7,8%). Muscle mass was low in 9 subjects (11,7%). Based on frailty status, prefrail was 44,2% and frail was 24,7% respectively. Among comorbid disease, hypertension was the most prevalent (77,9%), followed by metabolic-endocrine disease (63,6%).

The association between muscle mass with frailty status is shown in table 2. Frail prevalence was significantly higher in subjects with low muscle mass (66,7%), whereas prefrail and robust were higher in subjects with normal muscle mass (35,3% and 45,6% respectively). This shows a significant association between decreased muscle mass with frailty status ($p<0.05$).

Table 1. Baseline characteristic

Variables		n	%
Gender	Men	29	37.7
	Women	48	62.3
Age	60-69 years	46	59.7
	70-79 years	28	36.4
	≥ 80 years	3	3.9
Body mass index	Underweight	4	5.2
	Normal	25	32.5
	Overweight	20	26.0
	Obese I	22	28.6
	Obese II	6	7.8
Muscle mass	Low	68	88.3
	Normal	9	11.7
Frailty state	Robust	24	31.2
	Prefrail	34	44.2
	Frail	19	24.7
Comorbid	Hypertension	60	77.9
	Metabolic-endocrine	49	63.6
	UGIT	31	40.3
	Musculoskeletal	22	28.6
	Peripheral nervous system	21	27.3
	Cardiac	19	24.7
	Respiratory	8	10.4
	Genitourinary	8	10.4
	EENT	5	6.5
	Nephrology	4	5.2
	Vascular	4	5.2
	Psychiatry	4	5.2
	Hematopoietic	3	3.9
	LGIT	2	2.6
	Hepatic	1	1.3

UGIT: upper gastrointestinal tract; LGIT; lower gastrointestinal tract; EENT: Eye, ear, nose and throat.

Subjects Characteristics

Seventy seven elderly subjects were recruited during regular health examination in geriatric outpatient clinic of Wahidin Sudirohusodo Hospital which characteristic shown in table 1. Obese subjects were 36,4% based on body mass index (BMI). Gabat et al in Philippines found lower prevalence (14,02%).[12] The cause of the differences in the prevalence of obesity lies in the category used. In this study, subject was categorized as obese if the BMI ≥25 kg /m^2, whereas research in the Philippines used the BMI category ≥30 kg /m^2.

Table 2. Association between muscle mass with frailty status

Muscle mass			Frailty state			Total	p
			Robust	Prefrail	Frail		
	Low	n	0	3	6	9	0.005*
		%	0.0%	33.3%	66.7%	100.0%	
	Normal	n	24	31	13	68	
		%	35.3%	45.6%	19.1%	100.0%	
Total		n	24	34	19	77	
		%	31.2%	44.2%	24.7%	100.0%	

*chi square

The association between muscle mass and frailty components is shown in table 3. Among frailty component, reduced gait speed was the most prevalent (51,9%). Muscle mass was significantly associated with reduced grip strength, reduced gait speed and self-reported exhaustion (p<0,05).

Table 3. Association between muscle mass with frailty components

Muscle mass		Unintentional weight loss			Reduced grip strength			Reduced gait speed			Self-reported exhaustion			Low physical activity		
		Yes	No	p*	Yes	No	p*	Yes	No	p*	Yes	No	p*	Yes	No	p*
Low	n	2	7		7	2		9	0		6	3		3	6	
	%	22.2	77.8	0.608	77.8	22.2	0.039	100	0	0.001	66.7	33.3	0.002	33.3	66.7	0.366
Normal	n	9	59		27	41		31	37		8	60		12	56	
	%	13.2	86.8		39.2	60.3		45.6	54.4		11.8	88.2		17.6	82.4	
Total	n	11	66		34	43		40	37		14	63		15	62	
	%	14.3	85.7		44.2	55.8		51.9	54.4		18.2	81.8		19.5	80.5	

*chi square

Discussion

Skeletal muscle undergoes quality and quantity modifications with aging, which lead to a progressive decline in muscle mass and strength. The age-related loss of muscle mass may not be an isolated phenomenon, but rather it is strongly connected with a parallel increase in fat mass. The fat mass increase and the muscle mass decrease may act synergistically and lead to sarcopenic obesity, an important risk factor for physical disability.[11]

Low muscle mass prevalence in this study was 11,7%. A similar finding was found by Vitriana et al. in community-dwelling population (9,1%).[13] A higher prevalence was found by Tamura et al. in Japan (45,2%).[14]

An excessive loss of muscle mass that is associated with aging was originally defining sarcopenia. It is influenced by multifactorial pathology. Disuse coupled with aging is the major underlying cause: poor blood flow to muscle, especially the muscle capillaries due to a decline in nitric oxide production, is another important age-related cause of sarcopenia. Aging is associated with an increase in mitochondrial abnormalities leading to damage to the mitochondrial membrane permeability pore and apoptosis. Another factors include loss of motor end plate, decrease anabolic hormones, obesity and higher level of proinflammatory cytokines.[15]

In the present study, prefrail (44,2%) was more prevalent than frail (31,2%) and robust (24,7%).In the other study, Setiati et. al found robust 13,2%, pre-frail 61,6% dan frail 25,2% with associated risk factors were

age, nutritional status and functional status.[16]

In this study, most comorbid disease were hypertension (77,9%) and metabolic-endocrine diseases (63,6%). In line, Tamura et al. found hypertension (78,0%), dislipidemia (62,5%) dan diabetes melitus (57,3%) as the frequent comorbid.[14] Castrejón-Pérez et al. also revealed the association of frailty with hypertension and diabetes mellitus. In highly prevalent populations, it would be expected that frailty would appear in an accelerated manner.[17]

It is known that oxidative stress increases with age and its progressive development can be considered as one of the aging markers. It is generally accepted that an increase in OS during aging is a consequence of a decrease in the effectiveness of antioxidant protection. The quantitative determination of 8-OH-dG is suggested as one of the markers of free-radical processes occurring in the body under normal circumstances and with the development of various pathological processes. It is believed that an increased level of 8-hydroxy-2-deoxyguanosine (8-OH-dG) is associated with the aging process, as well as with many pathological conditions, including diabetes mellitus and hypertension.[18]

Association Between Muscle Mass And Frailty Status

In this study, normal muscle mass was found higher in prefrail state (45,6%). In contrast to the study by Falsarella et al, a greater muscle mass was found in robust compared to prefrail and frail state.[10]

For lower muscle mass, it was more prevalent in frail state (66,7%). This is indicated a significant association of muscle mass with frailty state of the subjects ($p<0,05$). Cesari et al, assessed the association of muscle density with frailty state and revealed that subjects with a higher muscle density were robust, whereas the subjects with lower muscle density were prefrail and frail.[11]

Among frailty component, reduced gait speed was the most prevalent (51,9%). Savva et al, found reduced gait speed and weakness become more common in their study.[19] Muscle mass in this study was also significantly associated with reduced grip strength, reduced gait speed and self-reported exhaustion ($p<0,05$). In another study, Falsarella et al, found the association of muscle mass with grip strength and weight loss, whereas gait speed, exhaustion and physical activity were not.[10]

Walking requires the coordination of various organ systems and consumes energy, thus decreased organ function and increased energy consumption for walking may be reflected through slowing gait speed. Slowing gait speed can be caused by the presence of comorbidities (e.g., cardiovascular disease and musculoskeletal problems) and frailty. Gait speed can be used to assess multiple organ systems simply and comprehensively. Numerous prior studies have reported the association between gait speed and frailty.[16]

Conclusion

Muscle mass was signifinantly associated with frailty status in elderly. The higher muscle mass was found among robust subjects compared to prefrail and frail subject.

Conflict of Interest

No potential conflict of interest relevant to be declared.

Source of Funding: This study was conducted with self funding and did not receive any specific grant from funding agencies in the public, commercial, or not for profit sectors.

Ethical Clearance: The study protocol was approved by the Ethics Committee in Research of our instituion (Hasanuddin University), following the ethical reccomendations from the Helsinki Declaration of 1975.

References

1. Colón CJP, Molina-Vicenty IL, Frontera-Rodríguez M, et al. Muscle and bone mass loss in the elderly population: advances in diagnosis and treatment. *J Biomed*. 2018;3:40-9. d
2. Carmeli E. Frailty and primary sarcopenia: a review. *Advs Exp Med Biol Respir*. 2017;(885):47-51.
3. Aprahamian I, Cezar NO de C, Izbicki R, et al. Screening for Frailty With the FRAIL Scale: A Comparison With the Phenotype Criteria. *J Am Med Dir Assoc*. 2017:1-5.
4. Topinková E. Aging, disability and frailty. *Ann Nutr Metab*. 2008;52(SUPPL. 1):6-11.
5. Meng L, Shi H, Shi J, et al. Differences in clinical characteristics, muscle mass, and physical performance among different frailty levels in Chinese older men. *Chin Med J (Engl)*.

2019;132(3):352-355.

6. Sinclair AJ, Abdelhafiz AH, Rodríguez-Mañas L. Frailty and sarcopenia - newly emerging and high impact complications of diabetes. *J Diabetes Complications*. 2017;31(9):1465-73.
7. Chen LK, Liu LK, Woo J, et al. Sarcopenia in asia: consensus report of the asian working group for sarcopenia. *J Am Med Dir Assoc*. 2014;15(2):95-101.
8. Fried LP, Tangen CM, Walston J, et al. Frailty in older adults: evidence for a phenotype. *Journals Gerontol Ser A Biol Sci Med Sci*. 2001;56(3):M146-M157.
9. Ibrahim K, Howson FFA, Culliford DJ, et al. The feasibility of assessing frailty and sarcopenia in hospitalised older people: A comparison of commonly used tools. *BMC Geriatr*. 2019;19(42):1-7.
10. Falsarella RG, Gasparotto RL, Barcelos CC, et al. Body composition as a frailty marker for the elderly community. *Clin Interv Aging*. 2015;10:1661-7.
11. Cesari M, Leeuwenburgh C, Lauretani F, et al. Frailty syndrome and skeletal muscle: results from the Invecchiare in Chianti study. *Am J Clin Nutr*. 2006;83:1142-8.
12. Gabat JAL, Faltado AL, Sedurante MB, et al. Association of obesity and sarcopenia among adult Filipinos. *Osteoporos Sarcopenia*. 2018;4:109-13.
13. Vitriana, Defi IR, Nugraha GI, et al. Sarcopenia prevalence in community dwelling elderly based on two cut-off points diagnosis parameteres. *MKB*. 2014;48(38):164-70.
14. Tamura Y, Ishikawa J, Fujiwara Y, et al. Prevalence of frailty, cognitive impairment, and sarcopenia in outpatients with cardiometabolic disease in a frailty clinic. *BMC Geriatr*. 2018;18(264):1-11. doi:10.1186/s12877-018-0955-4
15. Morley JE, Anker SD, von Haehling S. Prevalence, incidence, and clinical impact of sarcopenia: facts, numbers, and epidemiology—update 2014. *J Cachexia Sarcopenia Muscle*. 2014;5(4):253-9.
16. Setiati S, Laksmi PW, Aryana IGPS, et al. Frailty state among Indonesian elderly: Prevalence, associated factors, and frailty state transition. *BMC Geriatr*. 2019;19(182):1-10.
17. Castrejón-Pérez RC, Gutiérrez-Robledo LM, Cesari M, et al. Diabetes mellitus, hypertension and frailty: A population-based, cross-sectional study of Mexican older adults. *Geriatr Gerontol Int*. 2017;17(6):925-30.
18. Nemtsova V, Bilovol O, Ilchenko I, et al. Age-associated features of oxidative stress as marker of vascular aging in comorbid course of hypertension and type 2 diabetes mellitus. *Vessel Plus*. 2018;2(9):27.
19. Savva GM, Donoghue OA, Horgan F, et al. Using timed up-and-go to identify frail members of the older population. *Journals Gerontol - Ser A Biol Sci Med Sci*. 2013;68(4):441-6.

Translucency of Cad/CamVeneers Using Different Internal Relief Spaces and Luting Cement Shades

Khaled Ibrahim Khaled Zaghloul[1], Cherif Adel Mohsen[2]

[1]Assistant Lecturer (Delta University), Faculty of Dentistry Minia University, [2]Prof. of Fixed Prosthodontics, Department Chairman of Fixed Prosthodontics Department Faculty of Dentistry Minia University

Abstract

Statement of Problem: Many studies have investigated translucency of ceramic veneers in association with different trial insertion paste materials.[1,2,3]. Little information is available on the ef- fect of cement space thickness on the final shade color of glass ceramic, feldspathic and zirconia reinforced glass ceramic veneers.

Purpose: The aim of the study is to evaluate translucency of three different CAD/CAM ve- neer materials with different internal relief spaces and different cement shades.

Material and Method: Sixty samples were constructed and classified according to the type of materials into three main groups (I) IPS e.max CAD MT , (II) VITA Vitablocs Mark II and group (III) Vita Suprinity (20 samples each). Each group were subdivided into two subgroups (10 samples each) according to the internal relief space (100 µm and 30 µm).The internal relief space was determined based on data from a previous 123 study and available resources. Each subgroup were further subdivided into six classes according to the 4 type of trial cements used : the control class (glycerine) and five trial paste class- es according to their shade (Translucent Shade, White Opaque Shade, A1/Light Yellow Shade, A3 Opaque/Yellow Opaque Shade and B0.5/ White Shade (10 sam- ples each) according to shade of the trial cement used.

The color test was done using reflectance spectrophotometer device (Vita Easy shade V). Color coordinates were measured in the body region of all laminate ve- neers with different combinations of laminate veneer material, internal relief space, and trial insertion paste color on composite resin abutment A3 .

Results: The consistency of the translucency among the tested specimens was confirmed using a 2-way ANOVA and the Tukey HSD post hoc test ($P<.05$). The luminous transmittance exhibited a statistically significant dependence on different ceramic restorations with a cad cam veneers in various internal relief space and different cement shades combinations. ($P<.05$).

Conclusions: The underlying color of the tested trial insertion pastes caused color change ($\Delta E >3.7$) for all ceramic material used in this study.

Keywords : *CAD/CAM , Translucency , Laminate veneers*

Introduction

The CAD/CAM ceramic blocks have become a popular restorative material due to their high esthetic quality, wear resistance, durability, color stability, and biocompatibility[5,6]. Also, the CAD/CAM ceramic blocks are fabricated under opti- mum conditions, creating a restoration with higher intrinsic strength without the variation in materials found in laboratory fabricated restorations[7]

Translucency has been emphasized as one of the primary factors in control- ling the esthetic outcome[11] because it makes ceramic restorations appear more natu- ral[8.9] As translucency permits the passage of light and also disperses light, it could be described as a state

between complete opacity and transparency,[10] the light being diffused rather than reflected or absorbed.[11,12] Errors in brightness among teeth are considered the most noticeable esthetic error[13,14] because the human eye is more sensitive to the differences in value (brightness) than hue or chroma.[15,16] In addi- tion, the translucency of ceramics is closely related to the light transmission and polymerization efficiency of underlying resin based luting agents.[17,18]

However, little information is available about the translucent characteris- tics of contemporary CAD/ CAM materials.

Until today, many studies have investigated translucency of ceramic veneers in association with different trial insertion paste materials. Other studies concluded that luting film thickness had a significant effect on bond strength.[19] and ceramic strength.[20,21] Nonetheless, no study has yet evaluated the effect of cement space thickness on the final shade color of Zirconia reinforced glass ceramic veneers.

Materials and Method

Materials

1) Three different types of ceramic CAD/CAM blocks were used in this study as seen in table 1.

Table 1: Different ceramic materials used.

Ceramic Blocks	Brand name and company
Glass ceramic	IPS e.max CAD MT , Ivoclarvivadent .
Feldspathic	VITABLOCS MARK II .
Zirconia reinforced glass ceramic	VITA Suprenity PC

Also trial cement paste with five different shades were used as seen in table 2.

Table 2: Trial cement paste shades used.

Trial Cement paste colour	Brand name and company
Translucent Shade	Rely x try in paste 3M ESPE
White Opaque Shade	Rely x try in paste 3M ESPE
A1/Light Yellow Shade	Rely x try in paste 3M ESPE
A3 Opaque/Yellow Opaque Shade	Rely x try in paste 3M ESPE
B0.5/ White Shade	Rely x try in paste 3M ESPE

The definitive dies used were machined from composite resin blank

(Tempo CAD,98.5mm x 20mm; On Dent dental systems) with A3 shade colour as a control.

So, six different colors of trial cement pastes were used for cementation of all ceramic veneers with two different internal relief spaces over the composite resin abutments .

Methods

Acrylic tooth preparation

An acrylic maxillary left lateral incisor on acrylic model cast(Model #R861; Columbia Dentoform Corp, Long Island City, NY, USA) was used for the veneer preparation .

Preparation was done using microvision kit (komet, REF TD2194). Facial re- duction was done in two planes (cervical and incised two thirds) using depth cuts of 0.5 mm to control the depth of cutting and complete the facial reduction using tapered stone with round end making a uniform chamfer finish line of 0.5mm. One mm incisal edge reduction was done with a butt joint design using 0.5mm depth cut to control the incisal depth and tapered stone with round to complete the incisal reduction.

Abutment fabrication

An impression of the prepared tooth with adjacent teeth was made with polyvinylsiloxane impression material (Aquasil Ultra digit XLV Regu- lar Set; Aquasil Monophase; Densply Intl, York, Pa). Type IV die stone (Jade Stone; Whip Mix Corp, Louisville, Ky) was used to pour the impression to fabricate the de- finitive cast.

The definitive cast was scanned using Dentsply Sirona in Eos X5 extra oral scanner and the restoration site designed with CAD technology (Sirona inlab SW

15.1 softwere). The abutment design was exported to CAM software (sirona inlab 16 cam software) and the milling was done according to the manufacturer's instruc- tions using the sirona MCX5 milling machine .

The composite resin abutment was machined from composite resin blank with A3 shade color.

Veneers fabrication

Three different types of ceramic CAD/CAM blocks were machined using a CAD/ CAM technology (SIRONA INLAB 3D CAD/CAM; Sirona Dental Systems LLC, Charlotte, NC) according to their manufacturer instructions as seen in figure 1.

Figure 1: SIRONA INLAB CAD/CAM system.

Application of trial insertion paste

Each laminate veneer was loaded with six types of trial cement paste separately,

Glycerin was used as control class and five different trial pastes Rely x try in paste 3M ESPE (Translucent,White Opaque, A1/Light Yellow, A3 Opaque/Yellow Opaque and B0.5/White Shade) according to their shade before the colour testing.

Statistical Analysis

Color Measuring Test Procedures (colorimetric evaluation)

The color test was done using reflectance spectrophotometer device (VITA EASY SHADE V). This device is wireless comprising a dental shade matching de- vice which consists of a base unite and hand piece .

Color coordinates were measured in the body regions of all laminate veneers with different combinations of laminate veneer material, internal relief space, and trial insertion paste color on composite resin abutment A3 and readings were re- peated 3 times for each combination.

The color changes (ΔE) were calculated between the control laminate ve- neers (with 30 microns internal relief spaces and glycerin on the composite resin abutment A3) and the experimental laminate veneers (with a combination of 2 in- ternal relief spaces and 5 trial insertion paste colors on the same composite resin abutment) in the 3 tooth regions with the following equations.[22] :

$\Delta E = [(E \text{ control} - E \text{ experiment})^{2}]^{1/2}$ and $\Delta E = 3.7$ was considered as the percep- tibility threshold.[23]

The mean and standard deviation (±SD) of ΔE for each veneer material was calcu- lated and averaged for the combinations of the internal relief space and trial inser- tion paste color in each veneer region. 2 way ANOVA was used to compare be- tween different groups and different shades for each thickness at different sites.

When the ANOVA was significant, the Tukey Honestly Significant Difference (HSD) test was used to determine which comparisons were significantly different.

A.30 µm internal relief space:

- Comparison of ΔE between different groups of ceramic veneer materials and dif- ferent shades of trial cement paste for 30 µm internal relief space is presented in Figure 2.

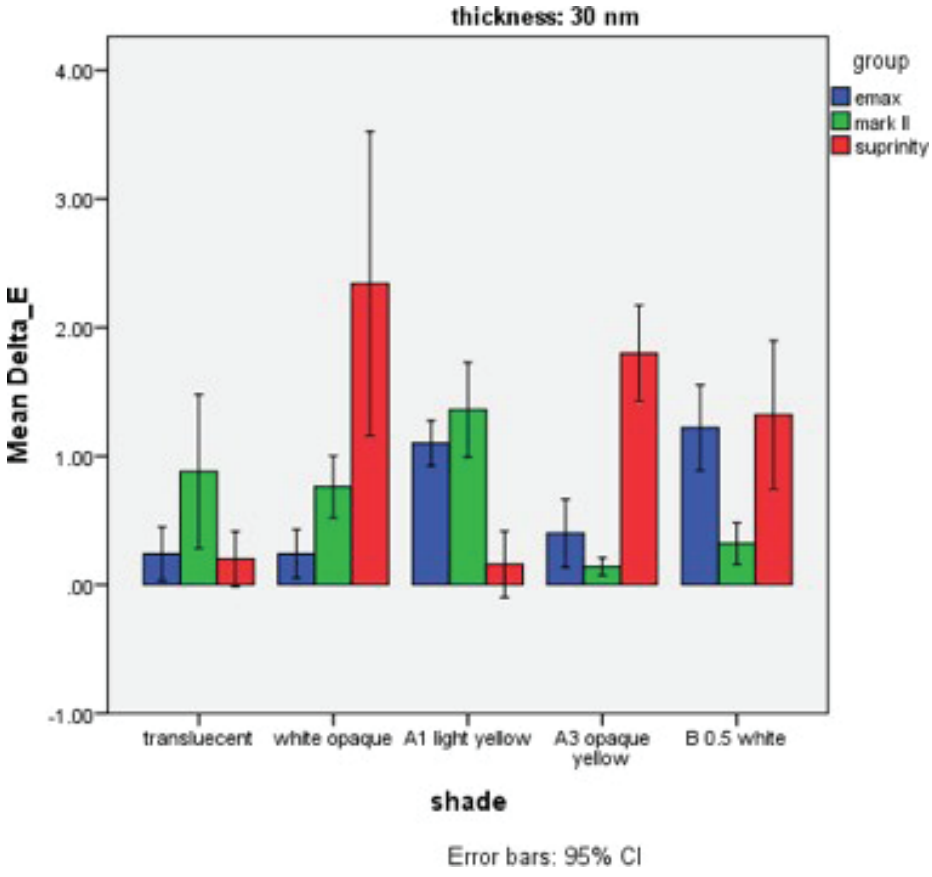


Figure 2: Comparison of ΔE between groups of ceramic veneer materials with 30 nm internal relief space.

B.100 µm internal relief space:

- Comparison of ΔE between different groups and different shades of trial cement paste for 100 µm internal relief space is presented in Figure 3.

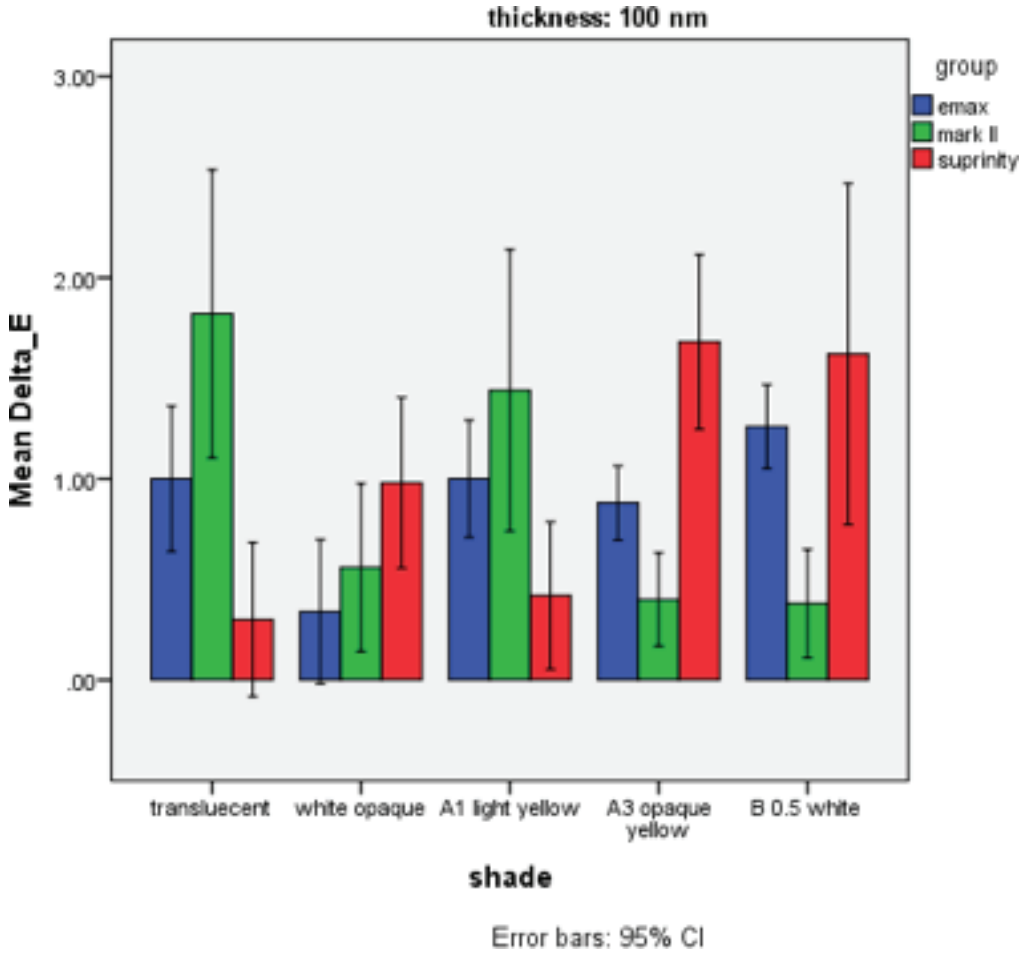


Figure 3: Comparison of ΔE between groups of ceramic veneer materials with 100 µm internal relief space.

Discussion

The hypothesis that there is an effect of trial cement paste shades on the final color of the laminate veneers was confirmed. There was a significant effect from the trial cement paste shades on the final color of all laminate veneers placed with 30 µm and 100 µm internal relies spaces at the body region for glass ceramic, feldspathic and zerconia reinforced glass ceramic laminate veneers . This was in 24 agreement with other researchers such as Xing W et al who stated that the effect of resin cements on the final color of veneers depended on cement shades and thickness of the restorations. Also, some shades of resin cements created percepti- ble color change in the final color of veneer specimens with thickness of 0.5 or 0.8 mm.

The effect of every trial cement shade on the final color of different materials of laminate veneers with 30 µm internal relief space was recorded.For translucent and A1 trial cement shade groups , It was found that the color difference was supe- rior to Vitabloc Mark II followed by IPS e.max CAD then Vita Suprinity.

This phenomenon can be explained by the greater translucent effect of felds- pathic (Vitabloc Mark II) than glass ceramics (IPS e.max CAD) and zirconia rein- forced glass ceramic (Vita Suprinity). These results were in agreement with Karine 25 et al who reported that their is statistically significant differences in the translu- cency parameter found among porcelain systems indicated for veneers according to the following rank: Vita VM9 >Vita PM9, Empress Esthetic > Empress CAD > Mark II, Everst, e.max CAD > e.max Press >

Lava zirconia. Also, significant dif- ference were noted when different shades and thickness were compared.

As regard white opaque trial cement shade groups, it was found that the color difference was significant for Vita Suprinity followed by Vitablocs Mark II then IPS e.max CAD. Also, For A3 opaque yellow and B 0.5 white trial cement shade groups, it was found that the color difference was superior for Vita Suprinity followed by IPS e.max CAD then Vitablocs Mark II.

The significant color difference result of Vita Suprinity could be explained by increasing the effect of the darker shades trial cements and relatively dark abut- ment shade A3 on the final color of zirconia reinforced glass ceramic material that have smaller translucent properties than Vitablocs Mark II and IPS e.max CAD. Their were other studies have shown that a large color difference was obtained for 26 different types of zirconia, such as 1.99 to 2.89 for DC-Zirkon. 1.8 to 3.6 for Digident Digizon, 27 2.1 to 3.6 for Vita 2000 YZ cubes, 28 and 0.9 to 2.1 for Katana. 28

The limitations of correlations between in vitro simulations of intraoral func- tion are recognized. In this study, the simulations did not include light aging. How- ever, the data on zirconia laminate veneers provide an initial step to better under- stand the optical properties of zirconia as a laminate veneer restoration. Further in vivo studies should be conducted to determine how long the suprinity laminate ve- neers and their color stability in the oral environment.

Conclusions

Within the limitations of this study design, the following conclusions were drawn:

1- The underlying color of the tested trial insertion pastes caused color change (ΔE

>3.7) for all ceramic material used in this study.

2- For translucent and A1 trial cement shade groups , It was found that Vitablocs Mark II laminate veneers were more affected by trial insertion paste color than IPS e.max CAD then followed by Vita Suprinity laminate veneers.

3- Vita Suprinity laminate veneers with relative opaqueness were more affected by opaque trial insertion pastes (White Opaque Shade, A3 Opaque/Yellow Opaque Shade and B0.5/ White Shade) than Vitablocs Mark II and IPS e.max CAD lami- nate veneers.

4- No significant effect of the two internal relief spaces (30 &100 μm) with differ- ent shades of trial cement paste on translucency of each ceramic material used.

Ethical Clearance : Done Source of funding : Self Conflict of interest : nil

References

1. N. ALGhazali, J. Laukner, G. Burnside, F.D. Jarad *, P.W. Smith, A.J. Pre- ston. An investigation into the effect of try-in pastes, uncured and cured resin ce- ments on the overall color of ceramic veneer restorations:An in vitro study.journal of dentistry 38s (2010) e78–e86.
2. R. G. Chadwick, J. F. McCabe and T. E. Carrick. Rheological properties of veneer trial pastes relevant to clinical success. journal of the British Dental Associ- ation: BDJ online · March 2008.10.1038/ bdj.2008.136.
3. Wenzhong Xing, Tao Jiang *, Xiao Ma, Shanshan Liang, Zhejun Wang, Yue Sa, Yining Wang. Evaluation of the esthetic effect of resin cements and try-in pastes on ceromer veneers.journal of dentistry 38s (2010) e87–e94 .
4. Effect of resin cement thickness and ceramic thickness on fracture resistance of enamel-bonded ceramic ,CU Dent J. 2014;37:161-70 .
5. Rosenstiel SF,F.Martin F,Fujimoto J. Contemporary Fixed Prosthodontics. 2nd ed. St. Louis, MO: Mosby; 2001.
6. Sjogren G, Sletten G, Dahl JE. Cytotoxicity of dental alloys, metals, and ce- ramics assessed by millipore filter, agar overlay, and MTT tests. J Prosth Dent. 2000; 84(2):229-236.
7. Mormann WH, Bindl A. The new creativity in ceramic restorations: dental CAD-CIM. Quintessence Int. 1996;27(12):821-828.
8. Kelly JR, Benetti P. Ceramic materials in dentistry: historical evolution and current practice. Aust Dent J 2011;56(Suppl 1):84-96.
9. YuB, Ahn JS, Lee YK. Measurement of translucency of tooth enamel and dentin. Acta Odontol Scand 2009;67:57-64.
10. Pires-de-Souza Fde C, Casemiro LA, Garcia Lda F, Cruvinel DR. Color stability of dental ceramics

submitted to artificial accelerated aging after repeated firings. J Prosthet Dent 2009;101:13-8.

11. Chu SJDA, Mieleszko AJ. Fundamentals of color: shade matching and communication in esthetic dentistry. Chicago: Quintessence Pub; 2004. p. 19-50
12. Lim HN, Yu B, Lee YK. Spectroradiometric and spectrophotometric translu- cency of ceramic materials. J Prosthet Dent 2010;104:239-46.
13. Turgut S, Bagis B, Turkaslan SS, Bagis YH. Effect of Ultraviolet Aging on Translucency of Resin-Cemented Ceramic Veneers: An In Vitro Study. J Prosthodont 2013.
14. Niu E, Agustin M, Douglas RD. Color match of machinable lithium disilicate ceramics: Effects of cement color and thickness. J Prosthet Dent 2013.
15. Lee YK, Lim BS, Rhee SH, Yang HC, Powers JM. Color and translucency of A2 shade resin composites after curing, polishing and thermocycling. Oper Dent 2005;30:436-42.
16. Volpato CA, Monteiro S Jr, de Andrada MC, Fredel MC, Petter CO. Opti- cal influence of the type of illuminant, substrates and thickness of ceramic materi- als.Dent Mater 2009;25:87-93.
17. van Noort R. Introduction to dental materials - 4th Edition: Elsevier Inc. Mosby Ltd; 2013. p. 231-46.
18. Ilie N, Hickel R. Correlation between ceramics translucency and polymeriza- tion efficiency through ceramics. Dent Mater 2008;24:908-14.
19. Ozturk E, Chiang YC, Cosgun E, Bolay S, Hickel R, Ilie N. Effect of resin shades on opacity of ceramic veneers and polymerization efficiency through ceramics. J Dent 2013;41(Suppl 5):e8-14.
20. Chaiyabutr Y, Kois JC, LeBeau D, Nunokawa G. Effect of abutment tooth color, cement color, and ceramic thickness on the resulting optical color of a CAD/ CAM glassceramic lithium disilicate reinforced crown.
21. Shokry TS, Shen C, Elhosary MM, Elkhodary AM. Effect of core and ve- neer thicknesses on the color parameters of two all-ceramic systems. J Prosthet Dent 2006;95:124-9.
22. R. G. Chadwick, J. F. McCabe and T. E. Carrick. Rheological properties of veneer trial pastes relevant to clinical success. journal of the British Dental Associ- ation: BDJ online · March 2008.10.1038/ bdj.2008.136.
23. Wenzhong Xing, Tao Jiang *, Xiao Ma, Shanshan Liang, Zhejun Wang, Yue Sa, Yining Wang. Evaluation of the esthetic effect of resin cements and try-in pastes on ceromer veneers.journal of dentistry 38s (2010) e87–e94 .
24. XingW,JiangT,MaX,LiangS,WangZ,SaY,etal. Evaluation of the esthetic ef- fect of resin cements and try-in pastes on ceromer veneers. Journal of Den- tistry in press.
25. Karine T.L, Cathia Bergeron, Marcos A, Fang Qian, Deborah S. Ceramic materialsfor porcelain veneers: Part II. Effect of material, shade and thick- ness on translucency. J Prosthet Dent 2014;864:870-112.
26. Chen YM, Smales RJ, Yip K, Sung WJ. Translucency and biaxial flexural strength of four ceramic core materials. Dent Mater 2008;24:1506-11.
27. Lim HN, Yu B, Lee YK. Spectroradiometric and spectrophotometric translu- cency of ceramic materials. J Prosthet Dent 2010;104:239-46.
28. Chang J, Silva JD, Sakai M, Kristiansen J, Nagai SI. The optical effect of composite luting cement on all ceramic crowns. J Dent 2009;37:937-43.

Detection of Bla_{IMP} and $Bla_{OXA-23-LIKE}$ Genes in *Acinetobacter Baumannii* Isolates at Dr. Wahidin Sudirohusodo Hospital

Kartika Paramita[1], Tenri Esa, Benny Rusli[1]

[1]Department of Clinical Pathology, Faculty of Medicine, Hasanuddin University/Dr. Wahidin Sudirohusodo Hospital, Makassar, South Sulawesi, Indonesia

Abstract

Background/Objective: Carbapenem resistant *Acinetobacter baumannii* (CRAB) is an *A. baumannii* resistant to one or more carbapenem antimicrobials. Some of resistance mechanisms that can be found in CRAB are carbapenemase production, outer membran protein (OMP) or penicillin binding proteins (PBP) structure modification, or efflux pump increase. Carbapenemase production can be affected by carbapenemase-encoding genes such as bla_{IMP} and $bla_{OXA23\text{-}like}$ gene. This study aimed to detect the bla_{IMP} and $bla_{OXA23\text{-}like}$ gene in *A. baumannii* isolates.

Material and Method : It was observational descriptive study with cross sectional approach. Subject of this study were all *A. baumannii* isolates collected during the period of October 2018 until January 2019 at Dr. Wahidin Sudirohusodo Hospital, Makassar, South Sulawesi, Indonesia (consisted of 30 CRAB and 20 sensitive carbapenem *A. baumannii* (CSAB) isolates). Isolates were examined by polymerase chain reaction (PCR) and agar electrophoresis techniques.

Results : There were 5 CRAB isolates with bla_{IMP} gene and 23 isolates with $bla_{OXA23\text{-}like}$ gene. There were no CSAB isolates with bla_{IMP} gene and 2 isolates with $bla_{OXA23\text{-}like}$ gene.

Conclusion : Carbapenemase-encoding genes could be found in CRABs and CSABs. In this study, $bla_{OXA23\text{-}like}$ gene was found in both CSAB and CRAB isolates but bla_{IMP} gene was only found in CRAB isolates.

Keywords: *Acinetobacter baumannii*, *carbapenem resistant*, *carbapenem sensitive*, *bla_{IMP}*, *$bla_{OXA\text{-}23\text{-}like}$*

Introduction

Antimicrobial resistance (AMR) is the ability of microorganisms to survive from one or more antimicrobials which are initially effective for treating infections caused by these microorganism. The development of AMR is a natural phenomenon caused by bacterial genes mutation, or the acquisition of extrinsic resistance genes that can be transmitted horizontally between bacteria. Bacteria can have different resistance mechanism simultaneously so that they become resistant to several classes of antibiotics.[1,2]

Acinetobacter baumannii is one of extended-spectrum β-lactamases (ESBLs) bacteria group. Carbapenem resistant *A. baumannii* is *A. baumannii* that is resistant to one or more carbapenems (imipenem, meropenem, atau doripenem). Carbapenems, among all the **β-lactam antibiotics**, are able to withstand many types of β-lactamases produced by the ESBLs bacteria so they become drug of choice for ESBLs. Excessive use of carbapenems in last few years has caused the emergence of CRAB.[3–5]

The main mechanism of carbapenem resistance is carbapenem inactivation by carbapenemases, especially oxacillinases (OXAs) and metallo-β-lactamases (MBLs) type. Carbapenemases such as OXA-58, OXA-24/40, OXA-23, and OXA-51 (OXAs) or imipenem hydrolyzing β-lactamase (IMP) and verona integron-encoded metallo-β-lactamase (VIM) (MBLs) often found in *A.baumannii*. These enzymes are produced by carbapenemase-encoding genes such as $bla_{OXA\text{-}58}$, $bla_{OXA\text{-}24/40}$, $bla_{OXA23\text{-}like}$, $bla_{OXA\text{-}51}$, bla_{IMP}, or bla_{VIM} respectively. The other mechanism is related to the smaller number and size of OMP compared to other gram-negative bacteria thus reducing the permeability

of bacteria to antibiotics. Other mechanisms that can be found in CRAB are active expulsion of antibiotics as soon as they enter bacterial membrane wall through the efflux pump system and modification of PBP thus decreasing the affinity of bacteria for antibiotics.[3,4,6–9]

This study aimed to detect the bla_{IMP} and $bla_{OXA23\text{-}like}$ gene in *A. baumannii* isolates in Dr. Wahidin Sudirohusodo Hospital, Makassar.

Materials and Method

Design and Subject

The study was observational descriptive with cross sectional approach. Subject of this study were all *A. baumannii* isolates during the period of October 2018 until January 2019 at the Central Laboratory of Dr. Wahidin Sudirohusodo Hospital, Makassar, South Sulawesi, Indonesia that met the inclusion criteria.

The inclusion criteria was *A. baumannii* isolat identified by Vitek® 2 Compact and had antibiotics sensitivity test result based on Clinical and Laboratory Standards Institute (CLSI) guidelines. The *A. baumannii* isolate was excluded if isolat was contaminated by other bacteria. Isolates were examined by PCR and agar electrophoresis techniques to detect the bla_{IMP} and $bla_{OXA23\text{-}like}$ genes.

Acinetobacter baumannii is coccobacillus bacteria isolat identified by Vitek® 2 Compact. The CSAB is *A. baumannii* which is sensitive to all carbapenems (imipenem meropenem, ertapenem, dan doripenem) identified by antibiotics sensitivity test with MIC ≤ 2. The CRAB is *A. baumannii* which is resistant to one or more carbapenems (imipenem meropenem, ertapenem, dan doripenem) identified by antibiotics sensitivity test with MIC ≥ 8. The bla_{IMP} gene is MBLs type carbapenemase-encoding gene identified if a band is found at position 183 bp by PCR and electrophoresis agar techniques. The $bla_{OXA\text{-}23\text{-}like}$ is OXAs type carbapenemase-encoding gene identified if a band is found at position 736 bp by PCR and electrophoresis agar techniques.

Ethic

Ethical clearence had been accepted before study from Medical Research Ethics Committee of Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia.

Statistic Analysis

The data was analyzed using descriptive statistic method.

Result and Discussion

55 *A. baumannii* isolates consisted of 30 CRAB and 20 CSAB isolates were collected during this research. *Acinetobacter baumannii* isolates were more commonly found in male patients (52.7%). This fact is in line with research by Gustawan et al. (2014), An et al. (2017), and Irfan et al. (2011) who also found that *A. baumannii* isolates were more common in males patients.[10-14]

Acinetobacter baumannii isolates were more commonly found in group of age 40-60 years (38.2%). Research by An et al. (2017) reported that the average age of patients with CSABs was 64 ± 15 and 63 ± 15 for patients with CRABs. Research by Zheng et al. (2013) also reported that the mean age of patients with CSABs was 60.9 ± 9.8 and 62.2 ± 9.7 for patients with CRABs. This shows that *A. baumannii* infection is often affecting people with old age. This is probably because older patients usually have other comorbid factors and also experience a decline in the immune system so they are susceptible to *A. baumannii* infection.[10,14-15]

The majority of *A. baumannii* isolates in this research came from sputum (54.6%). This fact is in line with the research of Cucunawangsih et al (2016), Sarmad and Eftekhar (2015), and Chang et al. (2015) who reported that most of *A. baumannii* isolate was obtained from sputum. *Acinetobacter spp.* generally considered part of the normal flora of the pharyngeal mucous membranes and secretions of human respiration so that these bacteria are often found from respiratory secretions such as sputum.[7,12,16-18]

Acinetobacter baumannii isolates were found most frequently in patients with infectious diseases (56.4%) especially pneumonia and sepsis. This is in line with the research of Kulah et al. (2010) and An et al. (2017). Tal-Jasper et al. research on bloodstream infections by *A. baumannii* in 2016 found that these infections were mostly derived from previous pneumonia. *Acinetobacter baumannii* is often involved in various diseases such as pneumonia, osteomyelitis, peritonitis, endocarditis, septicemia and meningitis. Several studies had shown that patients with burns were also susceptible to *A. baumannii* infections during hospitalization.[10,19-21]

The majority of patient outcomes, as many as 61.8%, were discharged from the hospital in improved condition while the rest died in the hospital. Most of the patients who died in the hospital (13 person) were CRABs positive. Only 8 patients with CSABs positive. Tal-Jasper et al. research (2016) found out that the percentage of patients with CRABs died in the hospital was greater than CSABs (70.5% compared to 40.5%). Gustawan et al. (2014) found that most of patient outcomes in *A. baumannii* infections were died in the hospital.[11,21]

The average length of stay (LOS) patients with CRABs was 40 days. This was longer than average LOS patients with CSABs (13.9 days). This is in line with the research of Tal-Jasper et al. (2016) who found LOS patients with CRABs was longer than CSABs. The characteristics of this research samples can be seen in Table 1.[11,21]

Table 1. Characteristics of Research Samples

Research Samples Characteristics		n (%)	CSAB	CRAB
Sex	Male	29 (52,7)	11	18
	Female	26 (47,3)	14	12
Age	< 20 years	13 (23,6)	3	10
	20-40 years	15 (27,3)	6	9
	40-60 years	21 (38,2)	11	10
	> 60 years	6 (10,9)	5	1
Specimens	Pus	13 (23,6)	1	12
	Sputum	30 (54,6)	15	15
	Blood	5 (9,1)	5	0
	Urine	5 (9,1)	3	2
	Pleural fluid	1 (1,8)	1	0
	Faeces	1 (1,8)	0	1
Diagnosa	Infection disease	31 (56,4)	15	16
	Injury	10 (18,2)	1	9
	Malignancy	7 (12,7)	4	3
	Degenerative disease	7 (12,7)	5	2
Patient Outcomes	Improved	34 (61,8)	17	17
	Died	21 (38,2)	8	13
Median Hospital Length of Stay			40,0 (6-233)	13,9 (0-37)
CSAB - carbapenem sensitive A. baumannii, CRAB - carbapenem sensitive A. baumannii				

Sources : Primary Data

Most of the CRABs were found in intensive care rooms such as Neonatus Intensive Care Unit (NICU), Pediatric Intensive Care Unit (PICU), dan Intensive Care Unit (ICU). The CRABs were most commonly found in the ICU. The CRABs were also found in regular hospital rooms with the most isolates found in Lontara 2 rooms. Only 1 CSAB was found in the ICU and 2 in the PICU. Most of CSABs were found in the Lontara 1 rooms. *Acinetobacter baumannii* emerges as an important pathogen in critical care settings in the recent years. Outbreaks caused by A. baumannii were often found in ICUs and burns injury care units. The distribution of CSAB and CRAB based on the treatment room can be seen in Figure 1.[16,19-20]

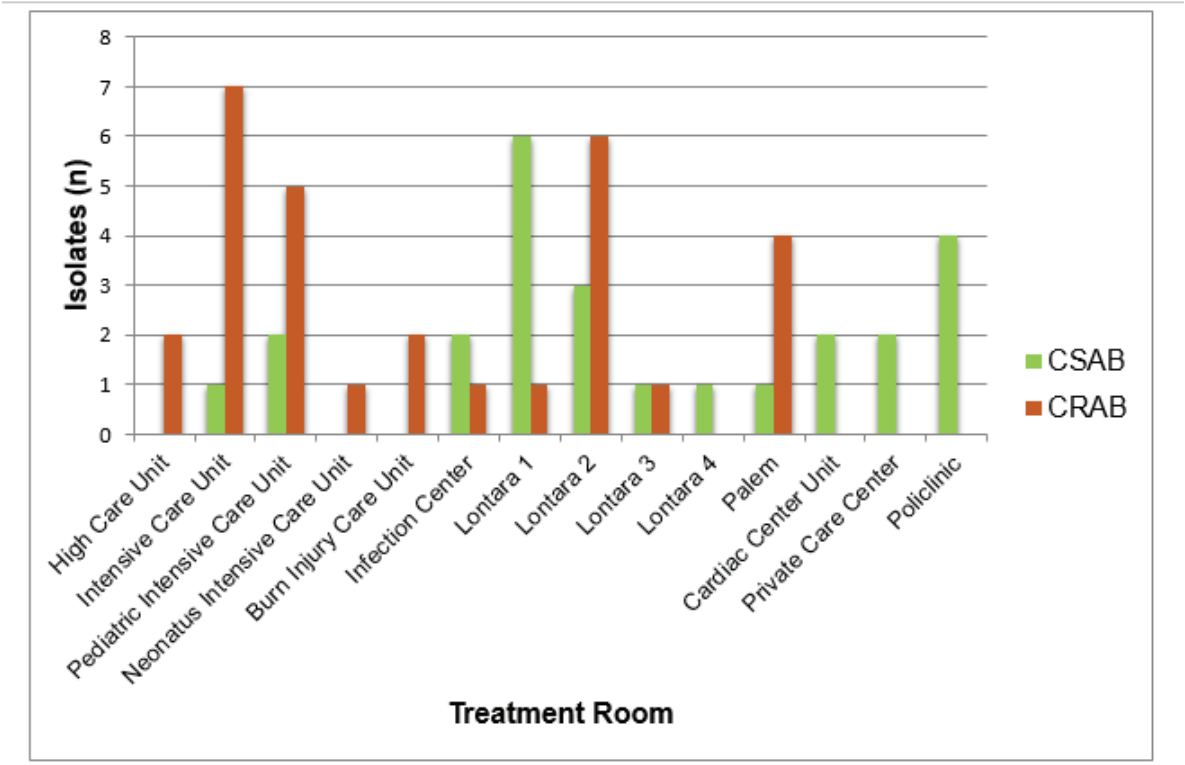


Figure 1. *Carbapenem Sensitive A. baumannii* **(CSAB) and** *Carbapenem Resistant A. baumannii* **(CRAB) Distribution Based on Treatment Room**

There were 5 CRABs with bla_{IMP} gene and 23 with $bla_{OXA23\text{-}like}$ gene. There were no CSAB with bla_{IMP} gene and 2 with $bla_{OXA23\text{-}like}$ gene. The distribution bla_{IMP} and $bla_{OXA\text{-}23\text{-}like}$ genes can be seen in Table 2.

Table 2. Bla_{IMP} and $Bla_{OXA\text{-}23\text{-}like}$ Genes Distribution

Gen	CRAB		CSAB	
	Positif	Negatif	Positif	Negatif
IMP	5	25	0	25
blaOXA-23-like	23	7	2	23

The results of this study indicates bla_{IMP} and $bla_{OXA\text{-}23\text{-}like}$ genes as carrier genes for the carbapenem resistance characteristics of *A. baumannii*. These results are in line with Santimaleeworagun et al. (2014) research who found 42 out of 43 CRABs had $bla_{OXA\text{-}23}$ gene. Amiri et al. research (2017) found 85.2% from 27 CRABs had the $bla_{OXA\text{-}23\text{-}like}$ genes ($bla_{OXA\text{-}23}$, $bla_{OXA\text{-}27}$, $bla_{OXA\text{-}49}$).[22-24]

This study reported that carbapenemase-encoding gene also found in the CSABs, especially $bla_{OXA-23-like}$ gene. This is likely to occur because these genes can be transmitted to other bacteria through acquired resistance mechanisms such as the acquisition of mobile genetic elements that are able to spread the determinants of resistance. There are 3 classic methods of natural deoxyribonucleic acid (DNA) transfer, namely bacterial conjugation, natural transformation, and transduction. Conjugation is often regarded as the main transfer mechanism. Exogenous DNA can be transferred from one bacterium to another through horizontal gene transfer. The discovery of $bla_{OXA-23-like}$ gene in CSABs shows some CSABs already have a tendency to have carbapenem resistant genotype even though they have not been maximally expressed so that the results of antibiotic sensitivity test are still sensitive.[25-26]

Negative results on CRABs in this research may be caused by the presence of other carbapenemase-encoding genes outside the genes examined in this research such as the intrinsic gene bla_{AmpC} and bla_{OXA-51} or the extrinsic gene $bla_{OXA-24/40}$, bla_{OXA-58}, bla_{VIM}, or bla_{SIM}. Another possibility that can occur is the existence of other carbapenem resistance mechanisms such as the active expulsion mechanism mediated by the tripartite efflux pump system and PBP or OMP structure modification.[6,9,27-28]

The limitation of this study is that there was no examination of the carbapenemase phenotype in *A. baumannii* isolates using a modified double-disk synergy test (DDST) to confirm that these isolates were true carbapenemase-producing type. This research also was not researching other carbapenem resistance mechanisms.

Conclusion

Carbapenemase-encoding genes could be found in CRABs and CSABs. In this study, $bla_{OXA23-like}$ gene was found in both CSAB and CRAB isolates but bla_{IMP} gene was only found in CRAB isolates.

Conflict of Interest : None

Source of Funding : Self

Ethical Clearence : Obtained from Medical Research Ethics Committee of Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia

References

1. European Centre for Disease Prevention and Control (ECDPC). Surveillance of Antimicrobial Resistance in Europe: Annual Report of The European Antimicrobial Resistance Surveillance Network (EARS-Net). European Centre for Disease Prevention and Control. 2016;1-100.
2. Semret M and Haraoui LP. Antimicrobial Resistance in The Tropics. Infectious Disease Clinics of North America. 2019;33:231-45.
3. Codjoe FS and Donkor ES. Carbapenem Resistance: A Review. Medical Sciences. 2018;6(1):1-28.
4. Hsu LY, Apisarntharanak A, Khan E, Suwantarat N, Ghafur A, Tambyah PA. Carbapenem-Resistant Acinetobacter baumannii and Enterobacteriaceae in South and Southeast Asia. Clinical Microbiology Reviews. 2017;30(1):1-22.
5. Al-Zahrani IA. Routine Detection of Carbapenem-Resistant Gram-Negative Bacilli in Clinical Laboratories. A Review of Current Challenge. Saudi Medical Journal. 2018;39(9):861-72.
6. Abbott I, Cerqueira GM, Bhuiyan S, Peleg AY. Carbapenem Resistance in Acinetobacter baumannii: Laboratory Challenges, Mechanistic Insights and Therapeutic Strategies. Expert Review of Anti-Infective Therapy. 2013;11(4):395-409.
7. Almasaudi SB. Acinetobacter spp . as Nosocomial Pathogens : Epidemiology and Resistance Features. Saudi Journal of Biological Sciences. 2018;25:586-96.
8. Meletis G. Carbapenem Resistance: Overview of The Problem and Future Perspectives. Therapeutic Advances in Infectious Disease. 2016; 3(1):15-21.
9. Poirel L and Nordmann P. Carbapenem Resistance in Acinetobacter baumannii: Mechanisms and Epidemiology. Clinical Microbiology and Infection. 2006;12:826-36.
10. An JH, Kim YH, Moon JE, Jeong JH, Kim SH, Kang SJ, Park KH, Jung SI, Jang HC. Active Surveillance for Carbapenem-Resistant Acinetobacter baumannii in A Medical Intensive Care Unit: Can It Predict and Reduce Subsequent Infections and The Use of Colistin?. American Journal of Infection Control. 2017;45:667-72.
11. Gustawan IW, Satari HI, Amir I, Astrawinata DAW. Gambaran Infeksi Acinetobacter baumannii dan Pola Sensitifitasnya terhadap Antibiotik. Sari

Pediatri. 2014;16(1):35-40

12. Hou C and Yang F. Drug-Resistant Gene of blaOXA-23, blaOXA-24, blaOXA-51 and blaOXA-58 in Acinetobacter baumannii. International Journal of Clinical and Experimental Medicine. 2015;8(8):13859-63.

13. Irfan S, Turton JF, Mehraj J, Siddiqui SZ, Haider S, Zafar A, Memon B, Afzal O, Hasan R. Molecular and Epidemiological Characterisation of Clinical Isolates of Carbapenem-Resistant Acinetobacter baumannii from Public and Private Sector Intensive Care Units in Karachi, Pakistan. Journal of Hospital Infection. 2011;78:143-8.

14. Zheng YL, Wan, YF, Zhou LY, Ye ML, Liu S, Xu CQ, He YQ, Chen JH. Risk Factors and Mortality of Patients with Nosocomial Carbapenem-Resistant Acinetobacter baumannii Pneumonia. American Journal of Infection Control.2013;41:e59-e63.

15. Du X, Xu X, Yao J, Deng K, Chen S, Shen Z, Yang L, Feng G. Predictors of Mortality in Patients Infected with Carbapenem-Resistant Acinetobacter baumannii: A Systematic Review and Meta-Analysis. American Journal of Infection Control. 2019;1-6.

16. Chang Y, Luan G, Xu Y, Wang Y, Shen M, Zhang C, Zheng W, Huang J, Yang J, Jia X, Ling B. Characterization of Carbapenem-Resistant Acinetobacter baumannii Isolates in A Chinese Teaching Hospital. Frontiers in Microbiology. 2015;6:1-9.

17. Cucunawangsih, Wiwing V, Lumbuun N, Lugito NPH. Increased Number of Metallo- or OXA Carbapenemase Producing Acinetobacter baumanii Isolated from Tangerang, Indonesia. Archives of Clinical Microbiology. 2016;7(3):1-5.

18. Sarmad ZG and Eftekhar F. Prevalence of Carbapenem Resistance in Acinetobacter baumannii Isolates from Burn and Non-Burn Patients in Tehran. Journal of Medical Bacteriology. 2015;4(3,4):56-60.

19. Lima WG, Alves GCS, Sanches C, Fernandes SOA, de Paiva MC. Carbapenem-Resistant Acinetobacter baumannii in Patients with Burn Injury: A Systematic Review and Meta-Analysis. Burns. 2019;1-14

20. Kulah C, Mooij MJ, Comert F, Aktas E, Celebi G, Ozlu N, Rijnsburger MC, Savelkoul PHM. Characterisation of Carbapenem-Resistant Acinetobacter baumannii Outbreak Strains Producing OXA-58 in Turkey. International Journal of Antimicrobial Agents.2010;36:114-8.

21. Tal-Jasper R, Katz DE, Amrani N, David D, Avivi D, Zaidenstein R, Lazarovitch T, Dadon M, Kaye KS, Marchaim D. Clinical and Epidemiological Significance of Carbapenem Resistance in Acinetobacter baumannii Infections. Antimicrobial Agents and Chemotherapy. 2016;60(5):3127-31.

22. Santimaleeworagun W, Thathong A, Samret W, Preechachuawong P, Sae-lim W, Jitwasinkul T. Identification and Characterization of Carbapenemase Genes in Clinical Isolates of Carbapenem-Resistant Acinetobacter. Southeast Asian Journal Tropical Medicine Public Health. 2014;45(4):874-80.

23. Amiri S, Hammami S, Amoura K, Dekhil M, Boutiba-Ben Boubaker I. Characterization of Carbapenem Resistant Acinetobacter baumannii isolated from Intensive Care Units in Two Teaching Hospitals from Algeria and Tunisia. Pan African Medical Journal. 2017;28(19):1-9.

24. Sung JY, Kwon KC, Park JW, Kim YS, Kim JM, Shin KS, Kim JW, Ko CS, Shin SY, Song JH. Dissemination of IMP-1 and OXA Type β-Lactamase in Carbapenem-Resistant Acinetobacter baumannii. Korean Journal Laboratory Medicine. 2008; 28:16-23.

25. Sun D. Pull in and Push out: Mechanisms of Horizontal Gene Transfer in Bacteria. Frontiers in Microbiology. 2018:9:1-8.

26. von Wintersdorff CJH, Penders J, van Niekerk JM, Mills ND, Majumder S, van Alphen LB, Savelkoul PHM, Wolffs PFG. Dissemination of Antimicrobial Resistance in Microbial Ecosystems through Horizontal Gene Transfer. Frontiers in Microbiology. 2016;7:1-10.

27. Evans BA, Hamouda A, Amyes SGB. The Rise of Carbapenem-Resistant Acinetobacter baumannii. Current Pharmaceutical Design. 2013;19:223-38.

28. Nordmann P, Dortet L, Poirel, L. Carbapenem Resistance in Enterobacteriaceae: Here Is The Storm!. Trends in Molecular Medicine. 2012;18(5):263-72.

The Appearance of Hbeag Status in Patients with Chronic Hepatitis B Virus

Kartika Wensdi Renantriandani[1], Ummi Maimunah[2], Priyo Budi Purwono[3], Retno Handajani[4]

[1]Clinical Student at Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [2]Lecturer at Department of Internal Medicine, Faculty of Medicine – General Hospital of Dr. Soetomo, Universitas Airlangga, Surabaya, Indonesia, [3]Lecturer at Department of Clinical Microbiology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [4]Lecturer at Department of Medical Biochemistry, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

Abstract

Background: Chronic hepatitis B is a global burden disease with the mortality rate of over one million around the world because of the complication. In Indonesia the number of hepatitis B sufferers in a healthy population is estimated to reach 4-20.3%, where the figure is higher outside of Java. This study aims to analyze the description of HBeAg serological status in patients with chronic hepatitis B. **Method:** a descriptive study using medical records and sera of patients with chronic hepatitis B was used as primary data. The population of this study were patients with chronic hepatitis B in Gastroenterology and Hepatology Center of Dr. Soetomo General Hospital Surabaya in purposive sampling. The number of samples that fulfilled the inclusion and exclusion criteria was 82 people. **Result:** Most patients are between the ages of 50-59 (29,3%), males (67,1%), HbeAg loss (52,8%) receiving telbivudine (31,5%) and lamivudine (31,5%) as monotherapy for more than two years (42,1%) and have normal ALT (46,3%). **Discussion:** People with inactive (carriers) chronic HBsAg that are characterized by HBsAg last more than six months, also HBeAg negative, have serum ALT levels within normal limits. A temporary increase in ALT before remission can occur in some patients with chronic HBV infection after one year of treatment interruption. **Conclusion:** Telbivudine and lamivudine, separately as monotherapy, demonstrated greater HBeAg loss which reached within more than two years therapy.

Keywords: *chronic hepatitis B, HBeAg loss, ALT normalization, therapy*

Introduction

In the world, it is estimated that more than one million people die each year due to complications of chronic hepatitis B virus (HBV). In Indonesia, the number of hepatitis B sufferers in a healthy population is estimated to reach 4-20.3%.[1, 2]

HBV infection is characterized by the presence of Hepatitis B Surface Antigen (HBsAg) in the serum, which will stay for a long time as long as the virus is still in the body. HBV infection is classified as chronic if HBsAg is positive ≥6 months. Chronic HBV infection is a liver disease due to hepatitis B virus infection where inflammation and necrosis of the liver occur for at least 6 months, during which serum levels of Alanine aminotransferase (ALT) fluctuate fluctuate.[3]

The natural course of HBV infection is influenced by interactions from hosts, viruses, and the environment. HBV infection is transmitted through perinatal, sexual, percutaneous and close relationships between individuals through open wounds. Perinatal transmission is the transmission pathway that causes the most new infections in the world, contributing to 50% of people with positive HBsAg careers.[4] Hepatitis B seropositive Envelope Antigen (HBeAg) indicates active viral replication, and is a significant risk factor for hepatic cirrhosis and hepatocellular carcinoma.[5] HBeAg seroconversion is still considered an important endpoint

Corresponding Author:
Kartika Wensdi Renantriandani
Clinical Student at Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia
Campus A, Jl. Mayjen Prof. Dr. Moestopo 47, Surabaya, Indonesia (Zip Code: 60131)
Email: kartikawrt@gmail.com

in the management of chronic HBeAg-positive HBV infection patients.[6]

Method

This study aims to analyze the description of HBeAg serological status in patients with chronic HBV infection. A cross-sectional study using isolates stored in the form of blood serum and the Health Medical Document (HMD) of chronic HBV infection patients was used.

Sample, Research Instrument and Data Analysis

The population were all patients with chronic HBV infection at the Center for Gastroenterology and Hepatology of Internal Medicine General Hospital of Dr. Soetomo Surabaya in 2017. Samples were obtained using a purposive sampling method that patients who met the criteria were 82 subjecs.

The data that has been collected was checked for completeness and carried out coding data (coding) using the McNemar test. The data was analysed using statistical software program Statistical Package for the Social Science (SPSS) version 17.0. (SPSS.Inc., Chicago, IL).

Result

Distribution of Subjects

The most age group of Chronic HBV infection patients who were the subject of the study were aged 50 to 59 years, with the youngest age of 16 years, and the oldest age of 80 years. The mean age of the subjects of this study was 47.5 ± 13.4 years. Based on the data obtained, chronic HBV infection affects more men. The ratio between male and female patients is 2: 1. (Table 1)

Status of Serology Subjects: Status of HBeAg

Past HBeAg status obtained from HMD of study subjects, compared with current HBeAg status obtained from serum ELISA examination of study subjects. After being treated, about 17 (20.7%) HBeAg patients were positive and 65 (79.3%) HBeAg patients were negative. About 36 patients with initial HBeAg status positive, found 19 patients (52.8%) who later became negative. (Table 2)

Current HBeAg Status and Pain Diagnosis, HBeAg Status loss and Duration of Therapy, and HBeAg Status and Types of Therapy

The negative HBeAg status was more prevalent in the study subjects. Positive HBeAg status is most common in asymptomatic chronic hepatitis B cases. BeAg loss was found most in study subjects who had received therapy for more than two years. HBeAg loss was highest in the group receiving telbivudine and lamivudine therapy. HBeAg status that remained positive was found most in the group who had never received therapy. (Table 3)

Biochemical Response of Research Subjects

The mean ALT levels of the subjects of this study were 87.7IU/L with a median of 39.5IU/L. ALT obtained with the normal category at most in patients who have received therapy for one to two years. High ALT levels were highest in patients who have never received therapy. ALT with the normal category was highest in patients on telbivudine therapy. High ALT levels were also highest in patients on telbivudine therapy. (Table 4)

Table 1: Distribution of Respondances

Variable	Frequency	Percentage (%)
Age:		
≤19	4	4,9
20-29	2	2,4
30-39	18	22
40-49	18	22
50-59	24	29,3
60-69	13	15,9
70-79	2	2,4
≥80	1	1,2
Sexuality		
Male	55	67,1
Female	27	32,9

Table 2: Past and current HBeAg status of patients with Chronic Hepatitis B Virus infection

	Frequency	**Percentage (%)**
Past HBsAg status		
- Positive	36	43.9
- Negative	46	56.1
Current HBeAg Status		
- Positive	17	20.7
- Negative	65	79.3

Table 3: Current HBeAg Status and Pain Diagnosis, HBeAg loss and Duration of Therapy, HBeAg and Types of Therapy

Negative		**Current HBeAg Status**		**Total (%)**
		Positive		
Diagnostic	Chronic Hepatitis B	45 (78,9)	12 (21,1)	57 (100)
	Asymptomatic	16 (76,2)	5 (23,8)	21 (100)
	Cirrhosis Hepatis	4 (100)	0 (0)	4 (100)
	Hepatocellular Carcinoma	65 (79,3)	17 (20,7)	82 (100)
HBeAg loss and duration of therapy				
		Frequency	**Percentage (%)**	
Therapy Duration	<1 years	5	26,3	
	1-2 years	6	31,6	
	>2 years	8	42,1	
HBeAg and Types of Therapy				
		Loss (%)	Positive (%)	
Type of Therapy	Telbivudine	6 (31,5)	4 (23,5)	
	Lamivudine	6 (31,5)	1 (5,9)	
	Tenofovir	4 (21,1)	1 (5,9)	
	Lamivudine + Adefovir	0 (0)	2 (11,8)	
	Interferon	1 (5,3)	0 (0)	
	Telbivudine + Adefovir	1 (5,3)	1 (5,9)	
	Entecavir	0 (0)	0 (0)	
	Tenofovir + Entecavir	0 (0)	1 (5,9)	
	Telbivudine + Tenofovir	1 (5,3)	0 (0)	
	untreatment	0 (0)	6 (35,3)	
	None of data	0 (0)	1 (5,9)	

Table 4: Biochemical responses include the distribution of ALT, duration of therapy, type of therapy

		Frequency		**Percentage (%)**
ALT ≤1 X ULN >1 X ULN None of data		 38 36 8		 46,3 43,9 9,8
		ALT		
		≤1 X ULN (%)	>1 X ULN (%)	None of data (%)
Duration of Therapy	<1 Year	10 (26,3)	9 (25)	3 (37,5)
	1-2 Years	11 (29)	10 (27,8)	1 (12,5)
	>2 Years	7 (18,4)	4 (11,1)	1 (12,5)
	Untreatment	9 (23,7)	12 (33,3)	3 (37,5)
	None of data	1 (2,6)	1 (2,8)	0 (0)
Type of Therapy	Telbivudine	15(39,5)	15(41,6)	1 (12,5)
	Lamivudine	8 (21,1)	8 (21,1)	2 (25)
	Tenofovir	3 (8)	3(8,3)	1 (12,5)
	Lamivudine + Adefovir	1(2,6)	2(5,6)	0 (0)
	Interferon	1(2,6)	1(2,8)	0 (0)
	Telbivudine + Adefovir	1(2,6)	1(2,8)	0 (0)
	Entecavir	1(2,6)	0 (0)	1 (12,5)
	Tenofovir + Entecavir	1(2,6)	1(2,8)	0 (0)
	Telbivudine + Tenofovir	0 (0)	1(2,8)	0 (0)
	Untreatment	6 (15,8)	3(8,3)	3 (37,5)
	None of Data	1(2,6)	1(2,8)	0 (0)

Discussion

The most age group in this study is between 50 to 59 years, amounting to 29.3%. The results of this study were not much different from other studies which stated the most age group of chronic HBV infection patients is between 46 to 55 years or in a similar study found an average age of 56.8 ± 15.8 years with the youngest age 21 years and the oldest age 84 years.[7, 8] The age factor contributes to the incidence of chronic HBV infection, this can be attributed to an increase in the prevalence of HBsAg which is quite large.[9]

Patients with chronic HBV infection are predominantly male, with a ratio of male and female patients of 2: 1.[8, 10, 11] 12 14 This is related to sex hormones which play a role in increasing risk factors for hepatocellular carcinoma. The risk of hepatocellular carcinoma increases due to the active pathway that androgen receptors have in men. In women the process of hepatocarcinogenesis in necrotic hepatocytes is inhibited by Kupffer cells with the role of the hormone estrogen.[12]

All chronic HBV infections have positive HBsAg status. Hepatitis B surface antigen (HBsAg) is the earliest serological sign of HBV infection.[8] A positive HBsAg test result indicates someone has been infected by the hepatitis B virus.[13]

After comparing past and present HBeAg status, it was found that 52.8% of patients experienced HBeAg loss, ie HBeAg was not detected in patients who were initially HBeAg positive. The occurrence of HBeAg loss, with or without anti-HBe seroconversion, in patients with chronic HBV infection is positive HBeAg is an important end result, as it often illustrates immune control in chronic HBV infection.[14]

In the past HBeAg status, the percentage of HBeAg patients was negative at 56.1% and 79.3% in the current HBeAg status. There were more HBeAg negative groups than HBeAg positive.[7] The HBeAg negative group was always more abundant, both in cases of asymptomatic chronic hepatitis B, hepatic cirrhosis, and hepatocellular carcinoma.[15]

Acute exacerbations occur together with high viral replication, ALT increases to five times more than the upper limit of normal and twice more than the baseline, and histological development is a common feature of negative HBeAg groups developing into hepatic cirrhosis faster than in the group HBeAg positive.[16, 17] Persistent cirrhosis and persistently high levels of viremia are the two main risk factors for hepatocellular carcinoma in chronic HBV infection.[18]

HBeAg loss occurred most in the group with a duration of therapy of more than two years and the least occurred with a duration of therapy of less than one year, namely in the order of 42.1% and 26.3%. In the group that had received therapy for one to two years, HBeAg loss was 31.6%.[19]

In this study, the highest HBeAg loss occurred in the group receiving telbivudine and lamivudine therapy, each at 31.5%. HBeAg status that remained positive was found most in the group who had never received therapy. From other studies it can be concluded that telbivudine gives better results compared to entecavir and lamivudine to achieve HBeAg loss during one year of therapy.[19, 20] The occurrence of high HBeAg seroconversion in telbivudine shows that telbivudine not only inhibits viral replication, but also stimulates the patient's immune response. This can be attributed to HBV DNA that depends on the immune system of patients compared to pharmacological suppression.[21]

Patients with chronic HBV infection had an average ALT level of 87.7 IU/L and a median of 39.5 IU/L with the lowest levels of 6 IU/L and the highest 882 IU/L. The most common group was patients with normal ALT levels, which was 46.3 %.[8, 22] People with chronic HBsAg carriers that are characterized by persistent HBsAg for more than six months, as well as negative HBeAg, have serum ALT levels within normal limits.[1, 14]

Normal ALT levels are most common in patients who have been receiving therapy for one to two years. High ALT levels are highest in patients who have never received therapy.[19, 23, 24] Post-therapy monitoring continues, at least for one year every three months to confirm ongoing biochemical responses that are sometimes difficult to evaluate. A temporary increase in ALT before remission can occur in some patients with chronic HBV infection after one year of treatment interruption.[1, 14]

In this study, normal ALT levels were highest in patients on telbivudine therapy. High ALT levels are also highest in patients on telbivudine therapy. In randomized controlled trials (RCTs), it was concluded that telbivudine was better than lamivudine in normalizing ALT.[20]

Conclusion

Telbivudine and lamivudine, separately as monotherapy, demonstrated greater HBeAg loss. Greater HBeAg loss reached within more than two years therapy.

Conflic of Interest: The authors declare that they have no competing interests.

Source of Funding: The authors declare that this study was self-funded.

Ethical Clearance: This study received a certificate of ethical clearance from ethical commission of General Hospital of Dr. Soetomo Surabaya Indonesia, No:144/ Panke.KKE/II/2017.

References

1. PPHI. Konsensus Nasional Penatalaksanaan Hepatitis B. Jakarta: Perhimpunan Peneliti Hati Indonesia, 2012.
2. Terrault NA, Bzowej NH, Chang KM, Hwang JP, Jonas MM, Murad MH, et al. AASLD guidelines for treatment of chronic hepatitis B. Hepatology 2016;631:261-83.
3. Dienstag JL. Acute Viral Hepatitis. In: Longo DL, Fauci AS, editors. Harrison's Gastroenterology and Hepatology. 17th ed. US: Mc Graw Hill Companies; 2010. p. 350-5.
4. McMahon BJ. The natural history of chronic hepatitis B virus infection. Hepatology 2009;49S5:S45-S55.
5. Yang HI, Tseng TC, Liu J, Lee MH, Liu CJ, Su TH, et al. Incorporating Serum Level of Hepatitis B Surface Antigen or Omitting Level of Hepatitis B Virus DNA Does not Affect Calculation of Risk for Hepatocellular Carcinoma in Patients Without Cirrhosis. Clinical gastroenterology and hepatology : the official clinical practice journal of the American Gastroenterological Association 2016;143:461-8 e2.
6. Liaw YF, Kao JH, Piratvisuth T, Chan HL, Chien RN, Liu CJ, et al. Asian-Pacific consensus statement on the management of chronic hepatitis B: a 2012 update. Hepatology international 2012;63:531-61.
7. Aritonang MS. Karakteristik Penyakit Hepatitis B Kronik pada Pasien Rawat Jalan di Poli Penyakit Dalam RSUP Haji Adam Malik Medan pada Januari 2012 sampai Desember 2013. Medan: Universitas Sumatera Utara; 2014.
8. Liu Y, Zhang L, Zhou JY, Pan J, Hu W, Zhou YH. Clinical and Virological Characteristics of Chronic Hepatitis B Patients with Coexistence of HBsAg and Anti-HBs. PLoS One 2016;111:e0146980.
9. Ott JJ, Stevens GA, Groeger J, Wiersma ST. Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. Vaccine 2012;3012:2212-9.
10. Lesmana LA, Lesmana CR, Pakasi LS, Krisnuhoni E. Prevalence of hepatic steatosis in chronic hepatitis B patients and its association with disease severity. Acta medica Indonesiana 2012;441:35-9.
11. Zeuzem S, Gane E, Liaw YF, Lim SG, DiBisceglie A, Buti M, et al. Baseline characteristics and early on-treatment response predict the outcomes of 2 years of telbivudine treatment of chronic hepatitis B. Journal of hepatology 2009;511:11-20.
12. Yeh SH, Chen PJ. Gender disparity of hepatocellular carcinoma: the roles of sex hormones. Oncology 2010;78 Suppl 1:172-9.
13. Gish RG, Lok AS, Chang TT, de Man RA, Gadano A, Sollano J, et al. Entecavir therapy for up to 96 weeks in patients with HBeAg-positive chronic hepatitis B. Gastroenterology 2007;1335:1437-44.
14. Lampertico P, Agarwal K, Berg T, Buti M, Janssen HLA, Papatheodoridis G, et al. EASL 2017 Clinical Practice Guidelines on the management of hepatitis B virus infection. Journal of hepatology 2017;672:370-98.
15. Mendy ME, Welzel T, Lesi OA, Hainaut P, Hall AJ, Kuniholm MH, et al. Hepatitis B viral load and risk for liver cirrhosis and hepatocellular carcinoma in The Gambia, West Africa. Journal of viral hepatitis 2010;172:115-22.
16. Alexopoulou A, Karayiannis P. HBeAg negative variants and their role in the natural history of chronic hepatitis B virus infection. World journal of gastroenterology 2014;2024:7644-52.
17. Hwang JP, Lok AS. Management of patients with hepatitis B who require immunosuppressive therapy. Nature reviews Gastroenterology & hepatology 2014;114:209-19.
18. Papatheodoridis GV, Manolakopoulos S, Touloumi G, Vourli G, Raptopoulou-Gigi M, Vafiadis-Zoumbouli I, et al. Virological suppression does not prevent the development of hepatocellular carcinoma in HBeAg-negative chronic hepatitis B patients with cirrhosis receiving oral antiviral(s) starting with lamivudine monotherapy: results of the nationwide HEPNET. Greece cohort study. Gut 2011;608:1109.
19. Sulaiman A, Lesmana LA, Nafrialdi, Helyanna. An observational study to evaluate the safety and efficacy of telbivudine in adults with chronic hepatitis B. Acta medica Indonesiana 2014;461:38-

43.

20. Liang X, Fan R, Sun J, Shaikh J, Taneja A, Gupta S, et al. Effect of Telbivudine Versus Other Nucleos(t) ide Analogs on HBeAg Seroconversion and Other Outcomes in Patients with Chronic Hepatitis B: A Network Meta-Analysis. Advances in therapy 2016;334:519-31.
21. Wu ZG, Yan WM, Guo W, Chen T, Zou Y, Wang HW, et al. Telbivudine preserves T-helper 1 cytokine production and downregulates programmed death ligand 1 in a mouse model of viral hepatitis. Journal of viral hepatitis 2010;17 Suppl 1:24-33.
22. Yosepin, Benny R, Hardjoeno. Evaluasi Aktivitas Transaminase dan Kadar Bilirubin pada Penderita Virus Hepatitis B dan C. Indonesian Journal of Clinical Pathology and Medical Laboratory 2009;16:22.
23. Batirel A, Guclu E, Arslan F, Kocak F, Karabay O, Ozer S, et al. Comparable efficacy of tenofovir versus entecavir and predictors of response in treatment-naive patients with chronic hepatitis B: a multicenter real-life study. International journal of infectious diseases : IJID : official publication of the International Society for Infectious Diseases 2014;28:153-9.
24. Chang TT, Liaw YF, Wu SS, Schiff E, Han KH, Lai CL, et al. Long-term entecavir therapy results in the reversal of fibrosis/cirrhosis and continued histological improvement in patients with chronic hepatitis B. Hepatology 2010;523:886-93.

Social and Psychological Impact of Allergic Rhinitis among University Students in Malaysia

Kavitha Ashok Kumar[1], Darshini Devi Sarun[2], Ashok Kumar Jeppu[3]

[1]Discipline lead, Otorhinolaryngology, International Medical School, Management and Science University Shah-Alam Malaysia, [2]BMS, International Medical School, Management and Science University Shah- Alam Malaysia, [3]Discipline lead, Biochemistry, International Medical School, Management and Science University Shah- Alam Malaysia

Abstract

Background: Allergic rhinitis is a global health problem. It is a symptomatic disorder of the nose after allergen exposure due to IgE mediated inflammation of membrane lining the nose with clinical manifestation of rhinorrhea, sneezing, itching and nasal congestion. It is the sixth most prevalent chronic disease in the world with approximately 1 million people affected each year including up to 40% of the student population. This study aims to explore the social and psychological impact of allergic rhinitis among university students. **Methodology**: This descriptive cross sectional study was conducted on 1000 students of a private university in Malaysia who were willing to participate. Convenient sampling technique was used. The study tool used was a well structural questionnaire. Inferential statistical analysis was done. **Results**: In our study group,800 students were found to have allergic rhinitis (AR). They were in the age group of 18-26 years. Among them, 55% were females and 45% were males. Most of them, 495 (61.87%) were symptomatic for <3 years. Rhinorrhea was the most annoying symptom of AR stated by 37.5% of the study population. Sinusitis was the commonest cited comorbidity (29%). Communication and socialization problems were reported by 79% of our study group, while 50% were affected psychologically. Sleep, mood and concentration were the most affected. **Conclusion**: Allergic rhinitis can adversely affect the social and psychological life of students. These effects though not life threatening need to be borne in mind while dealing with students with allergic rhinitis.

***Keywords**: Allergic rhinitis, social and psychological impact, university students.*

Introduction

Allergic rhinitis(AR) is a symptomatic disorder of the nose secondary to allergen exposure due to an IgE mediated inflammation of the mucous membrane lining the nose[1]. It is clinically defined as a condition with four major symptoms namely rhinorrhoea, sneezing, nasal itching and nasal congestion[2]. It is believed to affect 10-30% of adults and 40% of children worldwide[3]. It is the sixth most prevalent chronic disease in the world with approximately 1 million people affected each year including up to 40% of the student population[4]. The common triggers of allergic rhinitis are domestic allergens such as mites, domestic animals, insects while outdoor allergens include pollens and moulds, tobacco smoke and automobile exhaust[4]. There may be associated allergic conjunctivitis, postnasal drip, Eustachian tube dysfunction, otitis media and sinusitis which may deteriorate the quality of life of AR patients[1,5]. It can also be associated with co-morbid conditions like asthma, atopic dermatitis and nasal polyps. Pharmacologic treatments of this condition can have adverse effects such as sedation[6]. The indirect costs resulting from allergic rhinitis associated absenteeism result in losses to employers that exceed those for other common conditions such as a migraine, diabetes and also asthma [10]. Hence this health problem can cause considerable

Corresponding author:
Ashok Kumar Jeppu
Associate Professor, Head of the Unit, International Medical School, Management and Science University
University drive, Shah Alam, 40100, Malaysia
Email: drashokkumarj@gmail.com

economic and societal burden[2]. Students who lead an active life may be exposed to these common allergens and many may suffer from this condition. Though the symptoms are not life threatening, it may compromise the social and academic life of students. This study was therefore conducted to evaluate the impact of allergic rhinitis on life of university students.

Methodology

This study adopted a cross sectional study design. The study population was students of different faculties in a private university in Shah Alam, Malaysia. Convenient sampling technique was used. The study tool used was a well -structured questionnaire prepared after extensive literature review. It was pilot tested on ten random students, checked for ambiguity and later used. The questionnaire had three components a) Demographic profile of the study population b) Allergic rhinitis symptoms and duration c) Impact of allergic rhinitis on the social, financial and psychological aspects of student life. The study was conducted after obtaining approval from the ethical committee of the university. A written informed consent was sought from all the participants. Data was analyzed using SPSS version 13 using descriptive statistics.

Results

A total of 1000 students from various faculties of a private university in Shah Alam, Malaysia willingly participated in this study. Our study population consisted of young adults of the 18 to 26 year age group. We observed that 800 (79.5%) of our study population had symptoms of allergic rhinitis of varied duration. The demographic profile was as depicted in figure 1a, 1b and 1c.

Figure 1a,1b and1c: Demographic profile of the study population

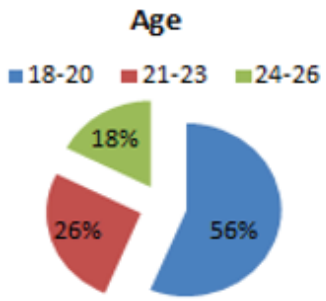


Fig 1a

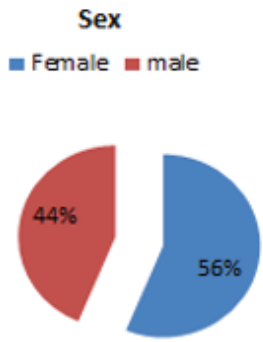


Fig 1b

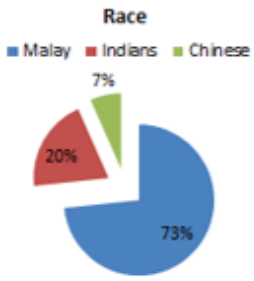


Fig 1c

In our study, out of the 1000 students who participated, 800 had symptoms of allergic rhinitis. Of them, 495 (61.87%) had symptoms of allergic rhinitis for 1-3 years duration while 103 (12.8%) had for more than 3 years, 100 (12.5%) had since childhood and 100 (12.5%) were not sure of the duration of their symptoms.

Watery nasal discharge was the commonest symptom seen in 300 (37.5 %) of our study population, followed by frequent sneezing in 200 (25%) nasal obstruction in 200 (25%) and itching in the nose and palate in 100 (12.5%) as seen in Fig 2.

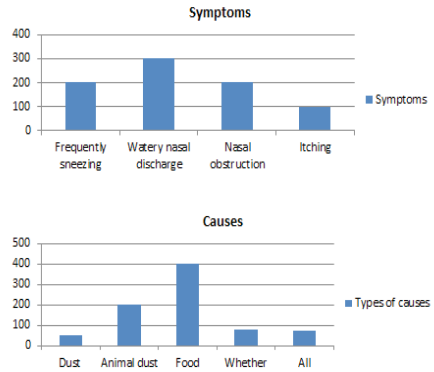


Figure 2. Symptoms of allergic rhinitis

In our study, 50% our participants considered food as the commonest allergen for their rhinitis followed by animal dander (25%), weather changes (9.38%), dust(6.25%**)** and all of them by (9.38%) as shown in Fig 3.

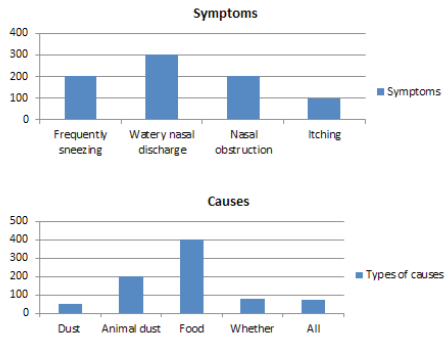


Figure 3 : Causes of allergic rhinitis

In our study group, 635 (79%) reported feeling of being ashamed to communicate with others and socialize due to their annoying symptoms. They felt that their allergic symptoms was responsible for their inability to integrate with peers and lead to family dysfunction. They therefore spent a significant amount of their free time on social network with 49.5% spending more than 3hrs/day while 29.8% and 18.25% spending >2 hrs an 1-2 hrs on social network respectively. They also complained of fatigue, decreased enthusiasm and poor general health perception.

The psychological impact of allergic rhinitis was also observed in 400 (50%) of our study population. 246 students (30.7%) had multiple symptoms. The common complaints expressed were sleep deprivation 340(42,5%),headache 232 (29%), feeling at edge 30(3.8%), mood fluctuations 6 (0.75%) feeling tearful 16 (2%)and lack of concentration(25%). Sleeping and playing games on internet were the commonest strategies adopted by 50% of the students to alleviate their stress that was attributed to allergic rhinitis. Eating, chatting on social media and others like doing yoga were also mentioned by a minority of the study population.

Discussion

Demographic profile:

Among the study group of 1000 students ,800 (79%) were found to have symptomatic allergic rhinitis. This high prevalence of allergic rhinitis among our study population can be attributed to living in the city areas with contaminated air. R. Mosges and L. Klimek in their study in Germany made a similar observation. They have implicated western lifestyle and air pollution for the high prevalence of allergic rhinitis among adults[11].

The mean age of the study group was 21+/- 3 years. In a similar study by Kalmaizi et .al in western Iran the mean age reported was 29+/- 10 years[12]. Among the symptomatic group, 18% were of 24-26 years,26% of 21-23 years and 56% of 18-20 years suffered from allergic rhinitis. Though our study population focused on a limited age group, a difference in incidence was noticed even among them. This age-related diminishing feature seen in the allergic rhinitis might be because of the allergen-explicit IgE level abatement that happens with maturing in atopic people [13].

In our study population, 56% were female and 44% were males. The higher incidence of allergic rhinitis among females was also reported in a similar study on allergic rhinitis patients in western Iran, where 61% of their participants were female and 39% were male [12]. Similar observations were also made by Shariat et al. in which 62% were female and 38% were male[14].This observation has been documented in a systematic review and meta- analysis by Pinart et .al [15] where they stated

that female preponderance for asthma and allergy in adulthood was seen worldwide except in Asia.However, our findings and those of the above studies show that similar prevalence is seen in Asia also. Nasal obstruction has been specifically accounted for in pregnancy, menses, menarche, and while on oral contraceptives showing that the increased prevalence among female students might be identified with hormonal levels. However, in contrast to our observation Hubert ,Chen et al in their study on allergic rhinitis reported 37% female and 63% male participants [16].

With respect to ethnicity, our study population included 73% Malays,20% Indians and 7% Chinese. This can be attributed to the larger population of Malay individuals in the campus in contrast with the other ethnic groups. Similar observations were made in an earlier study on food allergy in the same university[17].

Symptoms of allergic rhinitis:

In our study, watery rhinorrhoea was the most troublesome symptom of allergic rhinitis complained by 37% of the study population. Similar observations were made in a study on allergic rhinitis conducted in Tehran[14]. Nasal congestion however, has been documented to be the most bothering symptom in some other studies on allergic rhinitis [2,6,7,8] Most of the students in our study population correlated their symptoms with food and considered it to the commonest cause for their allergic rhinitis. A similar observation was made by Redhwan AA[17].

In our study group, 29% complained of co morbidities like sinusitis and 12% had asthma. Sinusitis, asthma, a poor sense of smell and taste were reported as comorbidities in a similar study in western Iran [12]. A similar observation was also made by Shariat et.al in 2012. Irritation of the nasal mucosa by allergens causes oedema and clogging of the sinus ostia prompting sinusitis[14].

Social and psychological impact on student life:

Most of the students in our study reported that their social life had been influenced by the hypersensitive rhinitis. Other than the nasal blockage and runny nose; different issues like exhaustion, feeling of inconvenience and decreased efficiency were the common complaints. When those side effects showed up, individuals expressed felling ashamed to speak with other individuals, which in-turn affected their public activity. Meltzer too drew attention to these social effects of allergic rhinitis in their study on quality of life of allergic rhinitis in adults and children[5].

In our study group, 79.5% acknowledged that they felt ashamed to communicate with others due to their annoying symptoms which in turn lead to difficulty in mingling with peers leading to social disjunction. Cingi et.al in their study in Turkey also drew attention to the negative effects of allergic rhinitis on the quality of life and social communication[2]. The students of our study group therefore spent a large amount of their time on social network with 49.5% spending more than 3hrs/ day, while 29.8% and 18.25% spending >2 hrs an 1-2 hrs on social network respectively. R. Mosges and L. Klimek argue that increase in time spent indoors expose individuals to a variety of novel allergens and the psychological stress due to this lifestyle change leads to an increase in sensitization to a wider variety of allergens which worsens their situation [11].

We found that allergic rhinitis symptoms were related with poor mental status among the university students. The symptoms which the students correlated with worse outcomes were sleep deprivation, headache and lack of concentration. The other common complaints expressed were mood fluctuations, feeling at edge and feeling tearful. It was worse among perennial allergic rhinitis sufferers when compared to those with seasonal allergic rhinitis. Similar observations were made by other researchers. [9.10,13,14].This can be explained by nasal congestion in allergic rhinitis patients due to the release of inflammatory intermediates which leads to disrupted sleep and subsequent daytime sleepiness [6]. Sleeping and playing games on internet were the commonest stress coping strategies adopted by 50% of the students. Eating, chatting on social media and doing yoga were also mentioned by a minority of the study population.

Conclusion

This cross-sectional study on 1000 undergraduate students of a private university in Shah Alam, Malaysia shows that allergic rhinitis is common among the university student community. It adversely influences their social and mental life. These effects though not life threatening need to be borne in mind while dealing with students with allergic rhinitis. Steps need to be taken to reduce the environmental allergens which may prevent allergic rhinitis and concomitant diseases like sinusitis and asthma among the student community.

Limitations of the study: This study involved young adults of 18-26 years age group and many of them belonging to one ethnic group. Hence the outcomes of this study would probably be pertinent and relevant to this population. Furthermore, the examined information could be influenced by the perspectives of students regarding their illness. Besides, the anxiety and mental status of the symptomatic students maybe influenced by other factors like family income, informal community utilization and parental expectation of their achievements.

Conflict of Interest: Nil.

Source of Funding: Self.

References

1. Pawankar R, Mori S, Ozu C, Kimura S. Overview on the pathomechanisms of allergic rhinitis. Asia Pacific Allergy. 2011 Oct 1;1(3):157-8
2. Cingi CC, Muluk NB, Hancı D, Şahin E. Impacts of Allergic Rhinitis in Social Communication, Quality of Life and Behaviours of the Patients. J Allergy Disord Ther. 2015;2(002).
3. Orban NT, Saleh H, Durham SR. Allergic and non-allergic rhinitis. Middleton's Allergy Principles and Practice. 7th ed. Philadelphia: Mosby Elsevier. 2009:973-90.
4. M.shiu.A (2015).Allergy. In Essentials of Pediatrics, Nelson ,ed(Elsevier)p282.
5. Meltzer EO. Quality of life in adults and children with allergic rhinitis. Journal of allergy and clinical immunology. 2001 Jul 1;108(1): S45-53.
6. Craig TJ, McCann JL, Gurevich F, Davies MJ. The correlation between allergic rhinitis and sleep disturbance. Journal of allergy and clinical immunology. 2004 Nov 1;114(5):S139-45.
7. Thompson AK, Juniper E, Meltzer EO. Quality of life in patients with allergic rhinitis. Annals of Allergy, Asthma & Immunology. 2000 Nov 1;85(5):338-48.
8. Varshney J, Varshney H. Allergic rhinitis: An overview. Indian Journal of Otolaryngology and Head & Neck Surgery. 2015 Jun 1;67(2):143-9
9 Leynaert B, Neukirch C, Liard R, Bousquet J, Neukirch F. Quality of life in allergic rhinitis and asthma: a population-based study of young adults. American journal of respiratory and critical care medicine. 2000 Oct 1;162(4):1391-6
10. Bousquet J, Khaltaev N, Cruz AA, Denburg J, Fokkens WJ, Togias A, Zuberbier T, Baena-Cagnani CE, Canonica GW, Van Weel C, Agache I. Allergic rhinitis and its impact on asthma (ARIA) 2008. Allergy. 2008 Apr;63:8-160.
11. Mösges R, Klimek L. Today's allergic rhinitis patients are different: new factors that may play a role. Allergy. 2007 Sep;62(9):969-75.
12 Kalmarzi RN, Khazaei Z, Shahsavar J, Gharibi F, Tavakol M, Khazaei S, Shariat M. The impact of allergic rhinitis on quality of life: a study in western Iran. Biomedical Research and Therapy. 2017 Sep 28;4(9):1629-37
13. Slavin RG. Treating rhinitis in the older population: special considerations. Allergy, Asthma & Clinical Immunology. 2009 Dec;5(1):9
14. Shariat M, Pourpak Z, Khalesi M, Kazemnejad A, Sharifi L, Souzanchi G, Movahedi M, Gharagozlou M, Mahlooji M, Moin M. Quality of life in the Iranian adults with allergic rhinitis. Iranian Journal of Allergy, Asthma and Immunology. 2012:324-8.
15. Pinart M, Keller T, Reich A, Fröhlich M, Cabieses B, Hohmann C, Postma DS, Bousquet J, Antó JM, Keil T. Sex-related allergic rhinitis prevalence switch from childhood to adulthood: a systematic review and meta-analysis. International archives of allergy and immunology. 2017;172(4):224-35.
16. Chen H, Katz PP, Shiboski S, Blanc PD. Evaluating change in health-related quality of life in adult rhinitis: Responsiveness of the Rhinosinusitis Disability Index. Health and quality of life outcomes. 2005 Dec;3(1):68
17. Redhwan AA, Low WY, Mustafa FM, Robert C, Ali A. Perceptions about food allergy among medical science students in a university in Shah Alam, Selangor, Malaysia. International Food Research Journal. 2011 Feb 1;18(1).

Institutional Delivery Service Utilization and Its Association in Gambella Region, Ethiopia

Menna Okok Ojulu[1], Montakarn Chuemchit[2]

[1]Graduate Student, [2]Lectuerer, College of Public Health Sciences, Chulalongkorn University, Institute Building 2, Phayathai Road, Patumwan, Bangkok, 10330, Thailand

Abstract

Home delivery is common in sub Saharan states including Ethiopia leading to cause morbidity and mortality of maternal and child health. This study aims to determine factors affecting utilization of institutional delivery among mothers of under two-year-old children in Gambella regional state, Ethiopia**.** Methods: A cross sectional study which approach 404 mothers of under two years old children by using multistage and purposive sampling technique. Data was collected by self-administer questionaire to examine the prevalence of institutional delivery and factors affecting. Descriptive statistic and Pearson's Chi-square were performed to describe and determine the associations. Results: The study shows that 69.3% of respondent's delivery in the health facility, whereas, 26.7% delivery at home and those deliveries on the road and ambulance was 4%. This study disclosed that most of respondents had low level of knowledge on pregnancy complications (65.6%). Education of the mother, ethnicity, attitude, transport accessibility, availability of maternal source of health information, availability of female skilled birth personnel, Antenatal Care visit, and accessibility to 24 hours' service were significantly associated to institutional delivery. Conclusion: Institutional delivery is affected by many factors. The government and health professionals should promote education regarding the danger signs of pregnancy, pregnancy complications, and benefits of institutional delivery.

Keywords: *Institutional delivery, Prevalence, Gambella Region, Ethiopia*

Introduction

Maternal mortality remains a universal significant health problem. Low- or middle-income countries encountered the complication with pregnancy or related consequences for the maternal death during the reproductive-aged women [1,2]. Institutional delivery service utilization is one of the key interventions to reduce maternal mortality ration in the world. It ensures safe birth, reduces both actual and possibly potential pregnancy complications, and increases the survival of most mothers and newborns [3,4]. The World Health Organization (WHO) approximate that nearly 580,000 mothers had lost their life due to complications related to pregnancy. Still, maternal mortality ratio (686 per 100,000 live childbirths) is the highest in Ethopia throughout the world [5].

In developed countries, almost 97 % of mothers attained antenatal care services whereas only 52 % of mothers attained routine antenatal check-up in developing countries and 68% of deliveries were attended by skilled health personel through 53 % of skilled birth personel in Sub- Saharan Africa[5-7]. The maternal death percentage in 2000 was 816 per 100,000 livebirths, and the newborn death percentage was 113 per 1,000 [3,5]. Single clarification for poor health results amongst mother and youngsters is connected to the non-use of present health care facilities by a large percentage of Ethiopian mother. Earlier educations have obviously established that mother usage to health facilities low in the state. Some trainings in 1990s have shown that about 25% of Ethiopian mothers expected ANC, and less than 10% received professionally-assisted delivery care [4,5,6,8]. Home delivery is common in sub Saharan states including Ethiopia, 42% of mothers in Malawi,

Corresponding author*:*
Montakarn Chuemchit
(ORCID number: 0000-0002-3600-9678)
E-mail: Montakarn.ch@chula.ac.th
Phone: (66) 2218-8198

69% in Nepal,70% in Zaria (Nigeria),74% in Pakistan [8-10] and 87.65% in eastern Burma give birth at home, 81.8% of women in Dodota district, 95% in Tigray, and 87.7% of mothers in Arsi reported those who get delivery at home[11]. There were 45% of institutional delivery in Gambella region which lower than Addis Ababa (96.5%), Tigray (56.9%), Diredawa (56.2%) and Harari (50.2%) [12]. However, despite the removal of financial barriers, home delivery was still found to be very high. Thus, we need to understand the factors that influence women's decision on institutional delivery service utilization.

Methods

This study is a cross-sectional study which conducted in Gambella Region, Western Ethiopia. The total sample size needed was 404 respondents including 5% refusal rate calculated using Cochran formula: $n = Z^2 P (1-P)/ (d)^2$. This study used a multi-stage sampling technique. First, 5 out of 14 districts in Gambella Region was selected by purposive sampling technique with the lowest rate of institutional delivery; the eligible districts selected were Abobo, Gog, Itang, Gambella Zuria, and Jekaw. The 2nd stage, among 5 districts, 2 villages were selected by simple random sampling from each district. Finally, the participants were selected by convenience sampling technique with proportionate to size. The study population was mothers age between 15- 49 years with under two years old children.

The questionnaire consists of 6 parts: 1) Socio-demographic characteristics 2) Knowledge on pregnancy complications, Antenatal Care (ANC), Postnatal Care (PNC) and good place of service care for delivery 3) Attitude towards institutional delivery and maternal health delivery 4) Enabling factors 5) Need factors and 6) Utilization of institutional delivery. The content validity was checked by three experts by using the Item Objective Congruence Index. A pilot study was also conducted, the Cronbach's alpha results were 0.82.

Data collection procedure

Researchers had been explained the study and its associated procedures, risks, and benefits to each participant. All women had been asked for their signed consent before continuing with data collection. The ethical approval for conducting the study was received from Research Ethics Review Committee, Chulalongkorn University and the permission to conduct the study was obtained from Ethiopia Federal Ministry of Health (EFMOH) and Gambella Regional Health Bureau.

Data Entry and Analysis

Data analysis were processed by using SPSS software version 22. The results had been presented using descriptive statistics including frequency, percentages, mean, and standard deviation. The chi-square test was run to find the association between the instutional delivery and the independent variables.

Results

In this study among 404 participants; over little half (50.7%) age 15-24 years. Most of respondents were married (94.3%). Thirty-three percent of respondents had finished secondary education, the rest had completed primary school, high school, higher education, and no education, respectively. About 77% of participants were housewives and/or no occupation, while 23% had an occupation. Ethnicity of the respondent were Nuer (61%), whereas, Anywaa were 39%. For Autonomy in the decision making found that those who responded to both mother and husband were 45.3%, only husband was 29.2%, and mother in law/relatives were 17.1%.

Level of Knowledge and attitude

Table 1 shows that the level of knowledge of respondents of pregnancy complications, ANC, and PNC, and good place of service care for deliver. The study found that most of respondents had low knowledge level (65.6%), follow by moderate knowledge level (26.0%), and the high knowledge level (8.4%). For the attitude of the participant toward institutional delivery found that most of participants had neutral attitude (62.9%), the rest had negative attitude (20.5%), and positive attitude (16.6%), respectively.

Table 1 Level of Knowledge and attitude toward institutional delivery and maternal health *(n=404)*

Variables	Frequency	Percentage (%)
Level of knowledge		
Low knowledge (<60%) (0-17)	265	65.6
Moderate knowledge (60-80%) (18-23)	105	26.0
High knowledge (>80%) (24-28)	34	8.4
Level of attitude		
Negative attitude	83	20.5
Neutral atititude	254	62.9
Positive attitude	67	16.6

Enabling and need factors

Table 2 shows enabling and need factors. The respondents who had access to information on maternal health care were 94%. According to source of information, the respondents who got the information from the health provider were 57. 9%, family and friends were 13.1%, and those with no information about health were 4.2%. The study also found that respondents who had a poor access to transportation 21.8%. Regarding the ANC attendance found that those who attended the ANC were 95.3%.

Table 2 Enabling and need factors *(n=404)*

Variables	Frequency	Percentage (%)
Maternal health information		
No	24	5.9
Yes	380	94.1
Information of maternal health		
TV/Radio	1	2.0
Health provider	234	57.9
Family and friends	53	13.1
Health Facility	99	24.5
None	17	4.2
Access to transportation		
No	88	21.8
Yes	316	78.2
The person Accompanied		
Husband	163	25.0
Mother in Low	15	40.3
Friend	123	30.7
Relatives	123	30.4
Ante Natal Care visit		
No	19	4.7

Cont... **Table 2 Enabling and need factors *(*n=404*)***

Yes	385	95.3
The frequency of Ante-natal care visit		
Never attaned ANC	13	3.2
Frist ANC Visit	11	27.0
Second ANC Visit	43	10.6
Third ANC visit	147	36.4
Four ANC visit	148	36.1

Institutional delivery utilization

The study revealed that 69.3% of respondent's delivered at the health institiution whereas mothers who deliverered at home were 26.7%. The respondents assisted by the health provider or skilled birth attendant were 70.5% and those assisted by the traditional birth attendants were 28.5% (see detail Table 3).

Table 3 Institutional delivery utilization *(*n=404*)*

Variables	**Frequency**	**Percentage (%)**
Place of delivery		
Health facility	280	(69.3)
Home	108	(26.7)
On the road	12	(3.0)
In Ambulance	4	(1.0.)
The person that assisted the delivery		
Skilled birth attendants	285	(70.5)
Traditional birth attendants	115	(28.5)
Others	4	(1.0)

Association of socio-demographic, knowledge, attitude, enabling and need factors and institutional delivery

The study found that the educational background, ethnicity, attitude of respondent on maternal health service, availability of maternal source of health information, Access to transportation, availability of female skilled birth personnel, attending the ANC visit, and access to 24 hours' service care were significantly associated with institutional delivery at P- Value = 0.015, 0.006, 0.003, <0.001, 0.019, 0.016, <0.001, <0.001, respectively. (see detail in Table 4)

Table 4 Pearson Chi-Square test for the association of socio-demographic, knowledge, attitude, enabling and need factors and institutional delivery (n=404)

Variable	Institutional Delivery n (%)		P-Value
	No	Yes	
Age group			0.62
15-25 years	60 (29.2)	145(70.7)	
25-35 years	54 (31.2)	119(68.8)	
35-45 years	10 (3.8)	16(61.5)	
Educational background of women			0.015*
Primary School	46 (38.3)	74 (61.7)	
Secondary School	14 (19.4)	91(66.4)	
High School	38 (34.9)	58(80.6)	
Above high School level	10 (18.5)	44(81.5)	
Illitrate	8 (38.1)	13(61.9)	
Ethnicity			0.006*
Anywaa	61 (38.6)	61 (61.4)	
Nuer	63 (25.6)	183 (74.4)	
Autonomy			0.191
Husband	42 (35.6)	76 (64.4)	
Respondent	14 (41.2)	20 (58.8)	
My husband and I	50 (27.3)	133 (72.7)	
Mother in law/Relatives	18 (26.1)	51 (73.9)	
Level of Knowledge			0.205
Low Knowledge	88(33.2)	177(66.8)	
Moderate Knowledge	25(80.0)	80(76.2)	
High Knowledge	11(32.4)	23(67.6)	
Level of Attitude			0.003*
Positive Attitude	36(43.4)	47(56.6)	
Neutral Attitude	76(178.0)	178(70.1)	
Negative Attitude	12(17.9)	55(82.1)	
Availability of maternal health information			0.001*
No	17 (70.8)	7 (29.2)	
Yes	107 (28.2)	273 (71.8)	
Access to transportation			0.019*
No	36 (40.9)	52 (59.1)	

Cont... **Table 4 Pearson Chi-Square test for the association of socio-demographic, knowledge, attitude, enabling and need factors and institutional delivery (n=404)**

yes	88 (27.8)	228 (72.2)	
Female skilled personel			0.016*
No	17 (48.6)	18 (51.4)	
yes	107 (29.0)	262 (71.0)	
Attending the Ante Natal Care visit			0.001*
No	13 (68.4)	6 (31.6)	
Yes	111 (28.8)	274 (71.2)	
Access to 24 hours service care			0.001*
No	99 (87.6)	14 (12.4)	
Yes	25 (8.6)	266 (91.4)	

Pearson chi-Squer, *P-value<0.05

Discussion

The current study shows that the institutional delivery was 69.3%, home delivery was 26.7%, on the way to health facility, on the road delivery was 3% which is institutional delivery seems to be higher than home delivery which could be due to better accessibility to health service. The study also shows high percentage of ANC service utilization (95.3%) which contradict with other studies reported that participants who had attended ANC vist were very low [11-14]. The previous findings showed that institutional delivery service utilization was 12.1% in the district and the majority of mothers (87.9%) gave birth at home and also revealed that overall delivery assisted by skilled birth attendants was 12.7%.[11]. Our study finding was higher than National and Amhara region EDHS result of 2005 which was 6% and 3.5% respectively, this might be due to the time gap, i.e., since 2005 there could be improvement in accessing and utilizing the service. This study showed that institutional delivery service utilization in the study area was high 69.3%, however when compared to other findings this finding is not constant with the other finding in Ethiopia; EDHS 2011[12] in the urban Arsi Zone and in Metkel and in Metekel [15-16].

Additionally , current study shows the women who attended institutional delivery, who had attainded 24 hours' service care were 72% and those that attened the post natal care was 28% which consistent with studies done in northwest Ethiopia, delivering at health facility led women to seek for PNC services [13]. The previous study showed that individual attitude towards health care providers and perceptions on the quality services provided in health facilities were mentioned as influencing factors for maternal health service seeking behaviors of women consistent with previous studies [13]. This was also consistent with study done in Dembecha district, Northwest Ethiopia. This could be explained in three reasons; (i) low institutional delivery in the study setting, (ii) low antenatal health coverage, and (iii) lack of knowledge on the importance of the service [13,17,18].

This study found that the womens educational status to their antenatal health care service seeking behavior in maternal health care service. Women who were able to read and write were more likely to seek antenatal health care, and institutional delivery. It is understood that education is likely to enhance women autonomy and it make them near to information and obtain good knowledge [13,19,20]. Women autonomy of this study the respondents who responded to decision made by both respondent and her husband were 45.3% and the respondents who responded to the decision only made by the husband for seeking health seeking were 29.2%, whereas, espondents to the decision made by mother in law were 17.1% repondents who responded to the autonomous 8. 4% which means that it is less likely for the respondent to seek for health service behavior. This finding is inconsistent with systematic review conducted in sub Saharan Africa (SSA), which stated that women with highest levels of autonomy most likely seek facility-based delivery. This might be due to the fact that the

SSA review assesses power of the women in relation to other activities such as household purchase and freedom of movement in addition to decision on place of delivery [15].

The magnitude of risk of home delivery, pregnancy complications, and benefit of institutional delivery, free service care for delivery and child are should be displayed to the public as it is necessary to help people in the society consider about these issues. The campaigns for women empowerment regarding knowledge and awareness of institutional delivery, settlement, and trainings for mother of under two years' children should be created. Furthermore, the health sectors should have a plan to give training about the risk of home delivery, and pregnancy complications to guarantee the safety for mothers of under two-year-old children. Legal regulation and punishment should be strictly enforced to the family who doesn't allow mothers to seek for a health care in order to reduce maternal mortality, child death occurrence and protect to women's right.

Acknowledgement: Authors would like to acknowledge the college of public health sciences, Chulalongkorn University, Thailand International Cooperation Agency (TICA) and the participants in this study.

Ethical Clearance: Ethical permission for this study was obtained from the Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University, Thailand

Source of Funding: International Cooperation Agency (TICA).

Conflict of Interest: The authors declare that they have no conflict of interest.

References

1. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et al. Maternal mortality for 181 countries, 1980–2008: a systematic analysis of progress towards Millennium Development Goal 5. The lancet. 2010; 375(9726):1609-1623.

2. Wetzel LM. Maternal mortality statistics. Modern Medicine; 2018.

3. Langer DA, Meleis MA, Knaul PM, Atun PR, Aran MM. Women and Health: the key for sustainable development. The Lancet. 2015: 386(9999):1165-1210.

4. Carter A, Abroad SS. Factors That Contribute to the Low Uptake of Skilled Care During Delivery in Malindi, Kenya. 2010.

5. Mekonnen Y, Mekonnen A. Factors Influencing the Use of MaternalHealthcare Services in Ethiopia. Journal of health, population and nutrition. 2003:374-382.

6. Tessema GA, Laurence CO, Melaku YA, Misganaw A, Woldie SA, Amare AHAT, et al. Trends and causes of maternal mortality in Ethiopia during 1990–2013: findings from the Global Burden of Diseases study. BMC public health. 2017: 17(1): 160

7. World Health Organization. Global strategy on human resources for health: workforce 2030. 2016.

8. Mamba KC, Muula AS, Stones W. Facility-imposed barriers to early utilizationof focused antenatal care services in Mangochi District, Malawi – a mixedmethods assessment. BMC pregnancy and childbirth. 2017:17(1): 444.

9. Bhutta ZA, Black RE. Global maternal, newborn, and child health—so near and yet so far. New England Journal of Medicine. 2013:369(23): 2226-2235.

10. Hounton S, Chapman G, Menten J, Brouwere VD, Ensor T, Sombié I, et al. Accessibility and utilisation of delivery care within a Skilled Care Initiative in rural Burkina Faso. Tropical medicine & international health. 2008:13: 44-52.

11. Tefera AS, Alemu FM, Yohannes SM. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 month in sekelela district, North west of Ethiopia: A community-based cross sectional study. BMC pregnancy and childbirth. 2012: 12(1): 74.

12. Demographic, CSA Ethiopian. Health Survey-2011. Central Statistical Agency Addis Ababa. Ethiopia ICF International Calverton, Maryland, USA. 2012; 2016.

13. Kifle D, Azale T, Assefa Y, Melsew YA. Maternal health care service seeking behaviors and associated factors among women in rural Haramaya District, Eastern Ethiopia: a triangulated community-based cross-sectional study. Reproductive health. 2017:14(1):6.

14. Wilunda C, Scanagatta C, Putoto G, Montalbetti F, Segafredo G , Takahashi R, et al. Barriers to

utilisation of antenatal care services in South Sudan: a qualitative study in Rumbek North County. Reproductive health. 2017: 14(1): 65.

15. Tura G. Safe delivery service utilization in Metekel zone, northwest Ethiopia. Ethiopian Journal of Health Sciences. 2008:18(1).
16. Abera M, Belachew T. Predictors of safe delivery service utilization in Arsi Zone, South-East Ethiopia. Ethiopian journal of health sciences. 2011: 21(3).
17. Mesfin M, Farrow J. Determinants of antenatal care utilization in Arsi Zone, Central Ethiopia. Ethiopian Journal Of Health Development. 1996:10: 171-178.
18. Johnson FA, Padmadas SS, Matthew Z. Are Women Deciding against Home Births in Low and Middle Income Countries? PLoS One. 2013:8(6): e65527.
19. Alemi KH, Teklehaymanot AN. Factors associated with institutional delivery service utilization in Ethiopia. International Journal of Women's Health. 2016: 8:463.
20. Awoke W, Muhammed J, Abeje G. Institutional delivery service utilization in Woldia, Ethiopia Science. Journal of Public Health. 2013:1:18-23.

Effects of Self-efficacy, Health Perception, Social Support and Perceived Disability on Health Promoting Behavior of Nursing Students

Mi Sun Lee, Hee Kyung Kim

[1]Doctoral student, [2]Professor, Department of Nursing, Kongju National University, Gongju, South Korea

Abstract

Purpose: This study is a descriptive survey to investigate the relationship between health promoting behaviors and self-efficacy, health perception, social support and perceived disability and to identify factors affecting health promoting behaviors among nursing students.

Methods: With the permission of the Education Committee of the Department of a University, 249 nursing college students explained the purpose and method of research and collected data with written consent. The data were analyzed by the t-test, ANOVA and Pearson's correlation and Stepwise Multiple Regression using the SPSS 24.0 program.

Results: The health promoting behaviors of the subjects were a positive correlation at the statically significant level at the self-efficacy (r=.73, p<.001), health perception (r=.50, p<.001), Social support (r=.62, p<.001) and a negative correlation at the perceived disability (r=-.29 p<.001). Regression analysis showed that health condition (β =-.144, p <.001), health concern (β=-.147 p<.001), self-efficacy (β=.523, p<.001) and social support (β=.199, p<.001) explained 62.0% of health promoting behaviors, and health conditions, health concern, self-efficacy, and social support were the main factors influencing health promoting behaviors of nursing student.

Conclusion: Through the result of this study, it is necessary to develop programs that allow nursing students to observe their health conditions and raise their interest in health, and promote self-efficacy and social support.

***Keywords**: Nursing students, Health promoting behaviors, Self-efficacy, Social support, Perceived disability*

Introduction

With the growing interest in health, health care methods are emerging to improve health levels through changes in personal lifestyles and living environments, rather than health care which is practiced after getting a disease. The WHO[1], which calls the health care method as a health promoting behaviors, defines it as a health promoting behaviors which improves the health level of individuals and society that needs to be improved and maintained, and maximizes health potential. Health promoting behaviors are affected by various sub-components, such as personal physiological, psychological, sociocultural factors, cognitive factors, previous related behaviors, and behavior intentions. Specific health promoting behaviors include anti-smoking, anti-alcoholism, exercise, diet, and stress management, and such actions require a community-oriented and systematic approach, along with the legal and institutional support of the state, rather than a personal approach to effectively operate health promotion.

The results of the study using the health promoting behavior model of Pender[2] shows that the variables of self-efficacy, health perception, perceived disability, and

Corresponding Author:
Hee Kyung Kim
Professor, Department of Nursing,
Kongju National University, Gongju, South Korea
E-mail: hkkim@kongju.ac.kr

social support were highly relevant with health promoting behaviors and influencing factors. Self-efficacy has been shown to be a main predictor and the most important factor for motivating health promotion. Health perception is said to have a significant impact on physical activity as it forms the basis for health promoting behaviors.[3] The study also found that perceived disability is a variable that affects health promoting behaviors[4]and the lower perceived disability of behavior, the higher level of health promoting behaviors.[5] The higher level of social support and relationship satisfaction was reported to have a positive effect on the practice of health promoting behaviors. [6]

Since nursing college students are prospective nurses, it is important to establish proper health promoting behaviors for nursing students because they will be responsible for education and role models for improving health promotion activities. However, health promoting behaviors are fundamentally not bounded and multidimensional, so it is necessary to study whether the health of college students has a significant effect on college life or how it is effective to help them improve their health. Although there are many papers that investigate health-related variables for nursing college students, comprehensive studies on factors such as self-efficacy, health perception, perceived disability, and social support, which have been shown to significantly affect health promoting behavior, are not sufficient, therefore these important factors are used to help nursing college students establish health promoting behaviors and to provide basic data for developing health promotion programs.

Method

Subjects: The subjects of this study were 250 nursing college students in 2nd, 3rd and 4th grades who majored in nursing at H University located in H province, Cheongnam in Korea. The number of participants was calculated by setting the level of 0.05 for significance, power of 0.95, effect size of 0.15 and 14 predictors using the G*Power 3.1.9.2 program, and the number of samples calculated was 194 among 250 subjects which were randomly selected considering the dropout rate of 20%. A total of 249 parts (99%) of 250 questionnaires were used as final analysis data, except for one of the unfaithful responses. A total of 249 copies were used as the final analysis data.

Instruments

Health promoting behavior: Measured by the health-promoting lifestyle measuring tool of Korean (adults) developed by Park[7]. It is a 5point Likert scale with total of 60 questions and indicates that the higher the score, the higher the level of health promoting behavior. The reliability at the time of development was Cronbach's α=92 and the reliability of this study is .94.

Self-efficacy: Measured by a tool which was developed by Sherer and Maddux[8] and supplemented by Lee[9]. It is a 5point Likert scale with total of 17 questions and indicates that the higher the score, the higher the level of self-efficacy. The reliability at the time of development was Cronbach's α=85 and the reliability of this study is .95.

Health perception: Measured by a tool which was developed by Ware, and supplemented by Lee[10.] It is 4point Likert scale with total of 20 questions and indicates that the higher the score, the higher the level of health perception. The reliability at the time of development was Cronbach's α=72 and the reliability of this study is .74.

Perceived disability: Measured by a tool which was developed by Moon[11] as a health belief measurement tool and modified by Seo.[12] It is a 4point Likert scale with total of 10 questions, and indicates that the higher the score, the higher the level of perceive disability. The reliability at the time of development was Cronbach's α=73 and the reliability of this study is .86.

Social support: Measured by a tool which was developed by Park[13] It is a 5point Likert scale with total of 18 questions, and 1 point of 'never', 5 point of 'always' indicates that the higher the score, the higher the level of social support. The reliability at the time of development was Cronbach's α=95 and the reliability of this study is .96.

Data collection: This study was approved by the Board of Education of H College, and published the research contents on the bulletin board of the nursing department between September and November 2019 and distributed questionnaires in groups at certain times and places. The research was collected after a fully trained assistant obtained written consent from the candidate and completed the questionnaire in a written manner.

Ethical consideration: Approved by the K University Institutional Bioethics Committee (KNU_IRB _2019-58) for this study. The survey was prepared with voluntary participation, there were no disadvantages of discontinuing the questionnaire and that the data would be processed anonymously. The information collected was used for three years for the study and promised to be stored in lockers.

Date analysis: Using the SPSS/WIN 24.0 program, the general characteristics of the subjects were analyzed as frequency and percentages, the difference in health promoting behavior according to the general characteristics was t-test, ANOVA and Scheffe test, variables was mean and standard deviation, and the correlation between variables was analyzed as Pearson's correlation coefficient, and the influence factor analysis was stepwise multiple regression.

Results

General Characteristics of Subjects

The sex of the subjects was 214 (85.9%) of females, most of them were 222 (89.2%) under 29 years of age, and 138 (55.4%) of third graders were more than half. 171 people (68.7%) did not have a religion, 166 people (66.7%) were drinking alcohol, and 230 people (92.4%) did not smoke, and the academic grades of 161 people (64.7%) was in middle. The health condition answered their condition was moderate was 153 (61.4%), 142 (57.0%) ware interested in their health, and 184 (73.9%) responded that the economic status was moderate.

Difference in Health Promoting Behavior across General Characteristics

Gender (t=-1.97, p=.049), age (t=-2.58, p=.010), grade (t= 3.16, p=.044), and religious status (t=2.45, p=.015), drinking (t=.75 p=.454), smoking (t=-. 921, p =.358), grades (t=5.05, p=.007), Health condition (t=25.35, p<.001), health concern (t=18.80, p<.001) and economic level (t=9.04, p<.001) showed differences in health promoting behavior. Male students, those in their 30s and over, and those in a religious group, those who reported middle grades had higher levels of health promoting behavior. It is showed that the higher or moderate health condition, health concern, and economic status tend to do health promoting behaviors (Table 1).

Table 1: Difference in Health Promoting Behavior across General Characteristics

Characteristics	Categories	Number	Frequency (%)	Mean±SD	Health promoting behavior t or F(p) Scheffe test
Sex	Female	214	85.9	3.19±.52	-1.97(.049)
	Male	35	14.1	3.38±.48	
Age	29 years old or younger	222	89.2	3.19±.52	-2.58(.010)
	30 years old or older	27	10.8	3.46±.41	
Grade	Second grader a	79	31.7	3.29±.49	3.16(.044)
	Third grader b	138	55.4	3.22±.53	a > c
	Fourth grader c	32	12.9	3.02±.48	
Religion	Yes	78	31.3	3.34±.50	2.45(.015)
	No	171	68.7	3.16±.52	
Academic grade	High a	29	11.6	3.27±.48	5.1(.007)
	Middle b	161	64.7	3.28±.51	-
	Low c	59	23.7	3.03±.53	

Cont... **Table 1: Difference in Health Promoting Behavior across General Characteristics**

Health condition	Good a	56	22.5	3.56±.46	25.35(<.001)
	Moderate b	153	61.4	3.18±.45	a > b > c
	Bad c	40	16.1	2.88±.56	
Health concern	High a	90	36.1	3.42±.47	18.80(<.001)
	Middle b	142	57.0	3.15±.48	a , b > c
	Low c	17	6.8	2.69±.54	
Economic status	High a	18	7.2	3.38±.44	9.04(<.001)
	Middle b	184	73.9	3.27±.48	a , b > c
	Low c	47	18.9	2.94±.59	

Health Promoting Behavior, Social Support, Self-efficacy, Health Perception and Perceived Disability

The average score of health promoting behavior was 3.22 ±.52 out of 5 points, self-efficacy was 3.55 ± 0.73 out of 5 points, health perception was 2.73 ± 0.33 out of 4 points, and social support 3.82 ± 0.66 out of 5 points. The perceived disability score was 2.08 ± 0.55 out of 4 points.

Correlation between Social Support, Self-efficacy, Health Perception, Perceived Disability and Health Promoting Behavior

Health promoting behaviors were positive correlation in statistically significant with self-efficacy (r=.73, p<.001), health perception (r=.50, p<.001), social support (r=.62, p<.001). There was negative correlation with perceived disability (r=-.29, p<.001) (Table 2).

Table 2: Correlation between Related variables and Health Promoting Behavior

Variables	**Self-efficacy r (p)**	**Health perception r (p)**	**Social support r (p)**	**Perceived disability r (p)**
Health promoting behavior	.73(< .001)	.50(<.001)	.62(< .001)	-.29(< .001)

Factors affecting Health Promoting Behavior

In order to identify factors affecting the health promoting behavior of the subject, significant variables among the general characteristics were piled up as covariates, and multiple regression analyses were performed in a step-by-step manner, including independent variables. In the regression analysis, there was no autocorrelation (Dubin-Watson=1.94), and the problem of multicollinearity was the tolerance limit -.915 was more than 0.1, and the VIF was not more 1.09 to 1.78 under 10, so there was no problem.

The regression model for health promoting behavior was significant and explanator power was 62.0%. the health status (β=-.144 p.001), health concern (β=-.147, p<.001), self-efficacy (β=.523, p<.001) and social support (β=.199, p<.001) was a significant factor in health promoting behavior (Table 3).

Table 3: Factors affecting Health Promoting Behavior of Subjects

Variables	B	SE	β	t	p
a constant	1.75	.202	8.690	.000	
Health condition	-.121	.036	-.144	-3.346	.001
Health concern	-.131	.037	-.147	-3.562	<.001
Self-efficacy	.372	.037	.523	10.120	<.001
Social support	.158	.042	.199	3.789	<.001
R=.788 R^2=.620 Adj. R^2=.614 F=99.63 p<.001					

Discussion

The health promoting behavior of the subjects was 3.22 out of 5 points, which was higher than 2.71 of Park & Kim[14] and lower than 3.28 of Kim & Yoon[15]. The health promoting behaviors of nursing college students need to be guided to live up to the point with health promoting behaviors continue to be moderate.

Health promoting behavior according to general characteristics showed significant differences in gender, age, grade, religion, academic grade, health status, health interest, and economic status. Since men have higher health promoting behavior than women, it is necessary to encourage them to increase their interest in women. Age is under 29 years old and higher grades have lower health promoting behavior, so it is necessary to give more attention to them. The health condition and health-related group showed better health promoting behavior than the lower group A study in Baek et al.[16] found that groups with higher health conditions and higher health concerns performed better than those with lower health conditions, consistent with the results of a study in Kim, Kim and & Park[17] that showed that the better health conditions, the more health importance is perceived, it tends to do actions such as health promoting behaviors. Therefore, it would be desirable to increase interest in health for nursing college students to maintain good health.

There was a significant correlation between the health promoting behavior, self-efficacy, health perception, social support, and perceived disability of nursing college students, and the most descriptive factors affecting health promoting behavior were self-efficacy, accounting for 52% of the total. These results are higher than 23.5% for them[17], and 23.9% for Park & Kim.[15] Since self-efficacy is believed to be able to successfully perform the necessary actions to achieve the desired results, it is necessary to develop programs that enhance the ability to communicate with health-related beliefs to improve the self-efficacy of nursing college students. Health perception was recognized at a normal level and was a correlated with influenced by health promoting behavior. These results were similar to those of Hong[3] with an average of 3.42±.66 points. Nursing college students who are interested in health and maintain a steady state of health need to be encouraged to take good care of their health so that they can recognize their health as well as their patients in the future. Social support was also a main factor in health promoting behavior. The study by them[17] also showed high correlation with health promoting behavior, which is consistent with the results of this study. It is also advisable to establish a support group of family, peers and experts in relation to health in order to enhance the practice of health promoting behavior for nursing college students.

On the other hand, perceived disability has a negative relationship with health promoting behavior, so we should try to eliminate the uncomfortable environment that makes us avoid health promoting behaviors and create conditions for active health promotion.

Conclusions

The purpose of this study was to identify factors affecting health promoting behavior for nursing college students. Since the health promoting behavior of the subjects shows moderate values, the self-efficacy, health perception and social support should be considered and ongoing efforts and should be made to reduce health-related obstacles to better conduct health promoting behaviors. The higher the self-efficacy, health perception, and social support of nursing students, the lower the perception of disability show the higher health promoting behavior so it is necessary to be included in the study. Factors affecting the health promoting behavior of nursing students are health conditions, health concerns, self-efficacy, and social support, so that the health conditions are recognized well during everyday life, and programs should be prepared to increase self-efficiency for students. It is also necessary to develop a well-developed support system to recognize that it has social support.

Since the subjects who were participated in this study are the future nurses, it is desirable to prepare policies and systems so that students can increase their health-promoting behaviors and implement them in the middle of their daily lives. In addition, research is also needed on the remaining factors that affect the health promoting behavior of nursing students.

Ethical Clearance-Not required

Source of Funding-Self

Conflict of Interest-Nil

References

1. WHO. Global Health Observatory: Risk Factor, 2006.
2. Pender. NJ. Health promotion in nursing practice (3rd eds.). Norwalk, Conn: Appleton & Lange. Pender. N.J.1996.
3. Hong SH. A Convergence Study on Health Promotion Behavior of Nursing and Normal University Students The Korea Convergence Society, 2018,9(6), 339-346.
4. Kim HK. Health Promotion Behavior and Influence Factors of University Students Using Pender Models Journal of Women's Health Nursing. 2006, 12(2), 132-141.
5. Choi ES. Factors affecting emergency medical students' health-enhancing behavior using Pender models. Journal of the Korean Emergency Medicine, 2007, 11(2) ,5-17.
6. Oh HC. The deciding factor for national health 1: Health life habits.The Journal of Prevention. 1993,26(4),54-479.
7. Park IS. A study on the health-promoting lifestyle a doctoral dissertation from the graduate school of Pusan National University, 1995.
8. Sherer, M., Maddux, J.E., Mercadante, B., Prentice-Dunn, S., Jacobs, B., & Rogers,R.W. The self efficacy sacle: Construntion and vadidation. Psychol rep, 1982.51, 336-671.
9. Lee JH. A Study on the Prediction Factors of Health Promotion Behavior of Nurses Working at the Daily Medical Center, and a Master's Degree thesis from Korea University.1998.
10. Lee TH. Analyses of Variations Affecting Health Promotion Behavior, and a thesis on the Master's Degree from Yonsei University's Graduate School. 1989.
11. Moon, JS. A Study of instrument development for health belief of Korean adults. Unpublished doctoral dissertation. Yonsei University, Seoul.. 1990.
12. Seo HM., Ha YS. Factors affecting the health lifestyle of the elderly. Journal of the Korean Nursing Society, 2004, 34(7), 1288-1297.
13. Park JW. A work study for the development of social support scale a doctoral dissertation from Yonsei University, 1985.
14. Park DY., Kim MJ. The effect of a nursing college student's family function, health awareness, and self-efficiency on health promotion behavior. the Korean Society of Contents Association. 2017, 17(6),561-570.
15. Kim MS., Yoon SY. The Effect of Eating and Self-Efficiency on Health Promotion Behavior of Nursing University Students in the Unified Age a convergent journal. 2017, 7(2), 111-117.
16. Baek HJ et al. Factors affecting the health-promoting lifestyle of nursing college students. The Korea Institute of Health Care, 2011, 25(1), 73-83.
17. Kim JH, Kim SJ and Park YH. Factors affecting the health-promoting behavior of female college students. Adult Nursing Society, 2001,13(3), 433-440.

Factors Related to The Obstetric Complications in The Working Area of Halong Public Health Center Balangan District 2017

Mina Elfa[1], Triawanti[2], Syamsul Arifin[2], Roselina Panghiyangani[2], Lenie Marlinae[3]

[1]Master of Public Health Science Study Program, [2]Medical Education Study Program, [3]Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Banjarmasin, Indonesia

Abstract

Around 80% of maternal mortality are due to increased complications of obstetrics. High obstetric complications in Balangan District 18.1% where in Halong Public Health Center is 41.89%. The research aim to analyze the factors related to obstetric complications in the working area of the Halong Public Health Center 2017. Research method using analytic observational with case control study design. The population of this study was 327 postpartum mothers in the Halong Public Health Center Working Area. Proportional random sampling that has been determined based on inclusion criteria with a total sample of cases 74 and 74 controls. Calorie energy deficiency (CED) (p=0.80), anemia (p=0.038), weight gain (p=0.032), age (p=0.517), parity (p=1,000), pregnancy spacing (p=0.069), antenatal care (ANC) (p=0.014), height (p=0.743) for obstetric complications. Multivariate analysis using multiple logistic regression showed anemia variables (p=0.031; Exp.B=2.704), weight gain (p=0.033; Exp.B=2.112), and ANC (p=0.028; Exp. B=3.132) to obstetric complications. There was no relationship of CED, age, parity, space of pregnancy, and height with obstetric complications and there was an relationship of anemia, weight gain, and ANC with obstetric complications in the working area of Halong Public Health Center in Balangan 2017.

***Keywords**: anemia, weight gain, ANC, obstetric complications*

Introduction

The direct cause of MMR is related to complications during childbirth such as bleeding, hypertension, eclampsia, infection and prolonged parturition. Around 80% of maternal deaths are due to increased complications during pregnancy, childbirth and after childbirth.[1] The obstetric complications is present in about 20% of all pregnant women, but the cases of obstetric complications handled are still less than 10% of all pregnant women. As for the types of complications as a direct cause of maternal death are bleeding 42%, eclampsia 25%, infections 3%, old parturition 3% and other pregnancy complications 27%. Based on data from the South Kalimantan Health Office profile in 2017, it was found that MMR in South Kalimantan was 103 per 100,000 live births (75 people). The second highest MMR in Balangan District was 175.97 per 100,000 live births (5 people). The number of obstetric complications in South Kalimantan Province in 2017 was 20.45%. One of the high obstetric complications is Balangan District in 2017 as many as 537 people (18.1%).[2] Based on the monitoring report of the local area (PWS) maternal and child health program in Balangan District in 2017, the highest obstetric complications at the Halong Public Health Center were 137 people (41.89%). Most of these obstetric complications occur during pregnancy (40.41%) and childbirth (55.48). While obstetric complications that occur in childbirth as much as 4.1%.[3] One strategy to reduce maternal mortality is to prevent/reduce the possibility of pregnant women experiencing complications in pregnancy, childbirth and the puerperium. The complications of pregnancy and childbirth are direct factors causing maternal death. The

Corresponding Author:
Lenie Marlinae
Public Health Study Program, Faculty of Medicine, Lambung Mangkurat University, Jalan A. Yani, Km.36, Banjarbaru, Kalimantan Selatan, Indonesia,
email: bintangara@ulm.ac.id

indirect factors that cause maternal death and also affect the incidence of complications of pregnancy and childbirth are health status, namely nutritional status, infectious diseases, chronic diseases, heart disease, kidney disease, history of complications. Reproduction status, namely gestational age, number of births, marital status. Access to services is affordability of location, type and quality of service, affordability of information. Healthy behaviors are contraception, pregnancy check-up, childbirth assistance, uterine abortion behavior.

Materials and Method

This research is a quantitative study, with an analytical observational research design through a case control study. The case control study was carried out by identifying the case group (obstetric complications) and the control group (postpartum mothers with no complications), then retrospectively (backward tracking) investigated risk factors that might explain whether the case and control were exposed or not. Population was postpartum mother in Halong Public Health Center amounting to 327. The sampling technique is proportional al random sampling, the minimum number of samples was 74 cases and 74 controls.

Findings and Discussion

Table 1. Frequency Distribution and Risk Factors of Obstetric Complications at the Working Area of Halong Public Health Center 2017

Variable	Category	Frequency (person)	Percentage (N = 148)
CED	CED	18	12.20%
	No CED	130	87.80%
Anemia	Anemia	29	19.60%
	No anemia	119	80.40%
Weight gain	Risky < 9 kg	70	47.30%
	No risk ≥ 9 kg	78	52.70%
Mother's age	Risky	26	17.60%
	No risk	122	82.40%
Parity	Risky	46	31.10%
	No risk	102	68.90%
Pregnancy spacing	Risky	33	22.30%
	No risk	115	77.70%
Antenatal Care (ANC)	Incomplete	24	16.20%
	Complete	124	83.80%
Mother's Height	Risky	10	6.80%
	No risk	138	93.20%

Table 2. Bivariate Analysis Results

Variable	Case		Control		OR	95% CI	P
	n	%	n	%			
CED							
CED	10	13.5	8	10.8			
No CED	64	86.5	66	89.2	-	-	0.801
Anemia							
Anemia	20	27	9	12.2			
No anemia	54	73	65	87.8	2,675	1,126-6,356	0.038
Weight Gain							
Risky < 9 kg	42	56.8	28	37.8			
No risk ≥ 9 kg	32	43.2	46	62.2	2,156	1,117-4,161	0.032
Mother's age							
Risky	15	20.3	11	14.9			
No risk	59	79.7	63	85.1	-	-	0.517
Parity							
Risky	23	31.1	23	31.1			
No risk	51	68.9	51	68.9	-	-	1
Pregnancy spacing							
Risky	18	24.3	15	20.3			
No risk	56	75.7	59	79.7	-	-	0.693
Antenatal Care							
Incomplete	18	24.3	6	8.1			
Complete	56	75.7	68	91.9	3,643	1,355-9,797	0.014
Mother's height							
Risky	6	8.1	4	5.4			
No risk	68	91.9	70	94.6	-	-	0743

Relationship of CED and Obstetric Complications

The results of the Chi-Square test, obtained p=0.80 (p≥0.05), which means there was no relationship between CED and obstetric complications. It could be due to the fact that based on the data available the most respondents were not CED (87.8 %) which was not a risk factor for pregnant women. In addition, the Halong Public Health Center has carried out nutrition interventions on CED pregnant women by providing supplementary food to pregnant women. Actions given to pregnant women with CED in general are adding more food portions than before pregnancy, resting more, as well as more adequate antenatal checks to monitor adequate weight gain. The results of this study are in line with Aeni (2013) that there was no relationship of CED (LILA <23cm) with obstetric complications.[4]

Relationship between Anemia and Obstetric Complications

The results of the Chi-Square test, obtained p=0.038 (p<0.05), which means there was a relationship between anemia with obstetric complications. Results OR=2.6; 95% CI=1.126-6.356 which means that mothers who have anemia have a risk of developing obstetric complications 2.6 times greater than mothers who do not have anemia.

A standardized and regular pregnancy check-up will be able to monitor maternal weight gain during pregnancy and anemic mothers will receive treatment and counseling regarding anemia management. The results of this study are strengthened by Edyanti and Indawati (2014) which shows that there was an anemic relationship (p=0.0001) to obstetric complications.[5]

Relationship between Weight Gain and Obstetric Complications

The results of the Chi-Square test, obtained p=0.032 (p<0.05), which means that there was a relationship between risky weight gain and obstetric complications. Results OR=2.1; 95% CI= 1.11-4.16 which means that women who experience risky weight gain have a risk of experiencing obstetric complications 2.1 times greater than those of mothers who gain weight.

During pregnancy, mothers will gain weight around 10-12 kg, where in the first trimester it is less than 1 kg, trimester II around 3 kg, and trimester III around 6 kg. A habit that is commonly practiced in Indonesia but is not beneficial one of which is limiting eating and drinking to prevent large babies. The habit that occurs is also the head of the family who is prioritized first to fulfill the new nutrition of his wife and children. The results of this study are in line with research conducted by Khoiriah et al (2015) which states there is a significant relationship between maternal weight gain with obstetric complications and Shiddiq's research (2014).

Relationship between Age and Obstetric Complications

The results of the Chi-Square test, obtained p=0.517 (p≥ 0.05), which means that there was no relationship between the age of mothers with obstetric complications. Age <20 years or >35 years is actually a risk factor for obstetric complications. However, many respondents (age <20 years or> 35 years) in this study were located near the sub-district (Halong village, Tabuan village) making it easier for health workers to detect pregnant women at risk and monitor their pregnancies. Access to health services is largely determined by the distance of the house from the health facility. The availability of health workers, especially midwives in the villages, is also available in every village who is ready at any time to help pregnant, childbirth and postpartum mothers. The results of this study are in line with the results of the study of Diana, et al (2012) which showed no relationship between the age of pregnant women with the obstetric complications (p =0.290). In accordance with the results of the study Simarmata et al (2015) age was not associated with obstetric complications.[6]

Relationship between Parity and Obstetric Complications

The results of the Chi-Square test, obtained p=1.0 (p≥0.05), which means that there was no relationship between parity and obstetric complications. The proportion of the risky parity in the case and control groups was equal to 31.1%. It is in line with the study of Simarmata et al (2015), there was no relationship between maternal parity and obstetric complications (p=1.0). Likewise with the study of Astuti,et al (2017), there was no relationship between maternal parity and obstetric complications (p=0.427).[7]

Relationship between Antenatal Care and Obstetric Complications

The results of the Chi-Square test, obtained p=0.014 (p<0.05), which means that there was a relationship between incomplete antenatal care with obstetric complications. Results OR=3.6; 95% CI=1.355-9.797 which means that a mother who is pregnant with an incomplete antenatal care has a risk of obstetric complications 3.6 times greater than a mother who has a complete pregnancy check-up.

Antenatal care should start as early as possible, namely immediately after no longer menstruating. The goal is to keep pregnant women through pregnancy, childbirth and childbirth well and safely. The standard time for antenatal care is recommended to guarantee protection to pregnant women, in the form of early detection of risk factors, prevention and management of complications. The existence of antenatal checkups that is in accordance with the standards and is continually accompanied by good records can reduce the risk factors causing obstetric complications.

Research Sulistiyowati et al (2017) found that the causes of obstetric complications in the mother, in the form of poor antenatal care pose a risk of obstetric complications. Research Nurrizka et al (2018) found that the main problem of obstetric complications was the problem of poor maternal health access in most districts/cities in Eastern Indonesia. One of them is antenatal coverage, especially the fourth pregnancy visit (K4) which is low, the OR value of the variable coverage

of the fourth pregnancy visit (K4) is 1.682.[8,9]

Relationship between Height and Obstetric Complications

The results of the Chi-Square test, obtained p=0.743 (p≥0.05), which means that there was no relationship between the height and obstetric complications. This study is in accordance with the research of Huda (2006) which showed no relationship between maternal height <145 cm with obstetric complications.[10]

Multivariate Analysis

Table 3. Final Models of Multivariate Logistic Regression

Risk Factors	B	Exp (B)	95% CI	Sig.
Antenatal Care	1.142	3.312	1.128-8.692	0.028
Anemia	0.995	2.704	1.094-6.685	0.031
Weight gain	0.748	2.112	1.062-4.200	0.033

The results showed that the risk factors for antenatal care were the most related variables for obstetric complications (p=0.028) compared to anemia and weight gain. Respondents with incomplete antenatal care, 3,312 times will have a risk of obstetric complications compared with respondents who have complete antenatal examinations. This is because the antenatal care greatly affect the maternal pregnancy, fetal development and emergencies that may occur. Pregnant women who have their pregnancies checked according to standards to ensure that they can get through the period of pregnancy, childbirth and childbirth properly so that the mother and baby are safe. Routine antenatal check-up according to the schedule that has been determined at least 4 times during pregnancy in accordance with the standards set by the Republic of Indonesia Ministry of Health, mothers can know the progress of their pregnancy conditions and can detect early complications that can occur during pregnancy.[11] Mothers who check their pregnancy routinely will have the opportunity to carry out examinations including laboratory services (Hb examination). Anemia of pregnant women can also be known and treated if it occurs. Every time a pregnant woman checks her pregnancy, weight will be weighed. Weight gain will be monitored so that the mother will know the increase in body weight during pregnancy and know the benefits of weight gain during pregnancy and the risks that occur if an unsafe weight gain occurs.

Conclusion

There was no relationship of CED, age, parity, space of pregnancy, and height with obstetric complications. There was an relationship of anemia, weight gain, and ANC with obstetric complications. The antenatal care is the most related factor in the obstetric complications in the working area of Halong Public Health Center in Balangan 2017.

Ethical Clearance: Before conducting the data retrieval, the researchers conducted a decent test of ethics conducted at the Faculty of Medicine, Lambung Mangkurat University to determine that this study has met the feasibility. Information on an ethical test that the study is eligible to continue. The feasibility of the research was conducted to protect the human rights and security of research subjects.

Source Funding: This study was done by self-funding from the authors.

Conflict of Interest: The authors declare that they have no conflict interests.

References

[1] World Health Organization. (2014). Make Every Mother and Child Count. The World Health Report, World Health Organization, Geneva.

[2] South Kalimantan Provincial Health Office. South Kalimantan Province Mother and Child Health Report 2017. Banjarmasin. 2017.

[3] Balangan District Health Office. Balangan District Mother and Child Health Report 2017. Balangan. 2017.

[4] Aeni N. (2013). Risk Factors for Maternal Mortality. Office of Starch Research and Development. National Journal of Public Health. 2013. 7(10).

[5] Edyanti DB, Indawati R. Factors in Mothers Related to Obstetric Complications. Journal of the Department of Biostatistics and Population. 2014. 3(1): 1-7.

[6] Diana, Sukandar H, Handono B. Analysis of Factors

Related to Mother and Infant Complications in Parongpong District, West Bandung Regency. Padjadjaran University. 2012.

[7] Astuti KS, Aziz AM, Insy FDA. Maternal Mortality Risk Factors in dr. Hasan Sadikin General Hospital, Bandung in 2009-2013. International Journal of Integrated Health Sciences. 2017. 5(2).

[8] Sulistiyowati N, Puti SH, Dwi HT. Continuity in Utilization of Maternal Health Services in Indonesia. Health Research Bulletin. 2017. 45 (3): 177-186.

[9] Nurrizka RH, Wahyono TYM. Disparity in Maternal Death in Indonesia: Ecological Studies with Spatial Analysis. MKMI. 2018. 14(2).

[10] Huda N. Lasmita. Relationship of Reproductive Status, Behavior of Utilization of Health Services, Health Status with Obstetric Complications in Lhokseumawe City. [Thesis]. Faculty of Public Health, University of Indonesia. 2006.

[11] Maternity D. et al. Community Midwifery Care. 2018.

Cognitive Evaluation of Non-Verbal Intelligence among Adolescents in the Middle Atlas of Morocco

Mounir Bouzaboul[1], Abdeslam Amri[1], Zakaria Abidli[2], Hassan Saidi[2], Nourredin Faiz[1], Rabea Ziri[1], Ahmed Omar Touhami Ahami [1]

[1]Cognitive Behavioral Neuroscience and Applied Nutrition Team, Laboratory Nutrition-Health and Environment, Department of Biology, BP 133 Faculty of Sciences, University IBN TOFAIL, Kenitra, Morocco, [2]Laboratory of Genetics and Biometry, Department of Biology, BP 133 Faculty of Sciences, IBN TOFAIL University, Kenitra, Morocco.

Abstract

Bacground and purpose : Non-verbal intelligence is one of the cognitive skills that plays a key role in academic performance in children and adolescents. Hence, this study intends to evaluate non-verbal intelligence in a sample of Moroccan adolescents to situate them in relation to their counterparts in other countries.

Materials and Method : To assess non verbal intelligence, we used Raven's Progressive Matrix Test, which consists of 60 items, categorized into five series of 12 items.

Results : There were 286 adolescents, 46.8 % of whom were women, with an average age of 15.2±1.7 years. Cronbach's alpha value is 0.94, the correlations between the different series of the test are highly significant, reflecting the high internal reliability of the test. The scores of the adolescents are low compared to the international standard and more than 4% of the participants are in an intellectually impaired state.

Conclusion : We consider it important to have a national standardization of the test and to establish a precise diagnosis in order to identify adolescents with an intellectual disability.

Key words : *Cognitive assessment, non-verbal intelligence, Raven's Standard Progressive, Matrices, adolescents, Morocco.*

Introduction

The diversity of models and theoretical approaches developed illustrates the difficulty encountered in defining the notion of intelligence. However, the Cattell-Horn-Carroll model remains the most validated psychometric model of cognitive skills [1]. This model includes several cognitive capacities at its base, at its summit we find the general intelligence factor or g factor[2]. Factor (g) refers to general intellectual ability, based on Spearman's theory [3]. Raven's Progressive Matrices (SPM) are generally considered to be good non-verbal indicators of general intelligence or factor (g) [4]. This makes it one of the best psychometric tests measuring the (g) factor [5].The paradigm of the (SPM) test is intended to measure the ability to extract and process information from a new situation [6]. The (SPM) test is the most widely used test for screening in many countries around the world [7]. It has been widely used in clinical, professional, educational, and research settings [8]. Court and Raven (2004) note that learners' ability to solve Raven's matrices may act as a predictor of academic success[9]. This test has become widely used and is used in many countries on five continents. Furthermore, to our knowledge in Morocco, studies that have been conducted on (SPM) are rare and have been limited to middle school learners [3,10, 8]. The objective of our study is to evaluate non-verbal intelligence in a sample of Moroccan adolescents to situate them in relation to their counterparts in other countries.

Materials and Method

Participants

There are 286 adolescent learners, 53.2% of whom are boys (n=152) and 46.8% girls (n=134). The average

age is 15.2±1.7 years, with a maximum of 18 and a minimum of 13 years. Learners are distributed over two cycles of education, with 51.20% in middle school and 48.8% in high school. People with obvious disabilities or a diagnosis established by doctors or who are undergoing treatment with psychostimulant drugs were all excluded from this study.

Measuring instrument

Raven's progressive matrices appear to be one of the best measures of the g-factor. The g-factor refers to general intellectual ability, according to Spearman's theory [3]. It is highly recommended because it minimizes cultural and linguistic barriers in the evaluation of intellectual functioning. This test measures non-verbal reasoning ability, by analogy. The version used consists of 60 items, divided into five series or sub-tests of 12 items. In order to succeed, the subject must find the rule of progression. Each item constitutes a pattern with a missing part, 6 to 8 images are proposed below which the subject must choose the missing part adequately (figure 1).

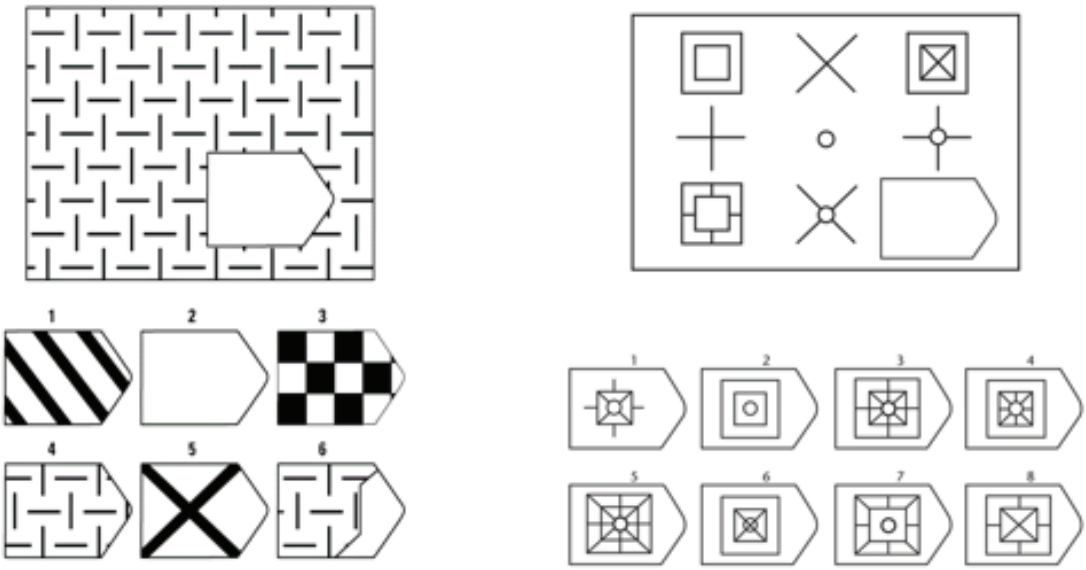


Figure 1 : Examples of items used in Raven's progressive matrices (PM 38)

Procedure

We proceeded to fill out an information sheet for each learner. The test was done in groups after having carried out two pre-tests, it was done in two phases :

- The first phase concerned series A, B, C.

- The second phase concerned series D, E.

Statistical methodology

The collected data are first entered on an Excel sheet, after filtering the matrix is transferred to an SPSS statistical processing software. The statistical analyses used are descriptive and analytical, a significance level of 5% was used for this study. To determine the internal reliability of the measuring instrument we have calculated the Cronbach index, this value is considered "acceptable" from 0.7[11].

Results

A. Psychometric properties

• The determination of the internal reliability of the test (SPM) and the five test series is performed by calculating the Cronbach alpha value (Table 1)

Table 1 : Cronbach's Alpha Coefficient for Subtests and for the Total Score

Sub-test	Number of items	Cronbach's Alpha
Serie A	12	0.75
Serie B	12	0.80
Serie C	12	0.82
Serie D	12	0.85
Serie E	12	0.83
Total Score	60	0.943

The determination of the value of the Cronbach's alpha coefficient shows that the different subtests or series have values respectively of 0.75 for series A, 0.80 for series B, 0.82 for series C, 0.85 for series D, 0.83 for series E and a value of 0.94 for the total test score.

- The Pearson test is used to examine the correlation between the scores of the five series A, B, C, D and E of (SPM) (Table 2).

Table 2 : Pearson correlation between the scores of the five series A, B, C, D and E of (SPM) (N= 286)

		Serie A Score	Serie B Score	Serie C Score	Serie D Score	Serie E Score	Total Score
Serie A Score	Correlation r	1					
	P-value						
Serie B Score	Correlation r	.58**	1				
	P-value	.000					
Serie C Score	Correlation r	.58**	.72**	1			
	P-value	.000	.000				
Serie D Score	Correlation r	.59**	.70**	.80**	1		
	P-value	.000	.000	.000			
Serie E Score	Correlation r	.45**	.52**	.68**	.67**	1	
	P-value	.000	.000	.000	.000		
Total Score	Correlation r	.71**	.82**	.90**	.90**	.80**	1
	P-value	.000	.000	.000	.000	.000	

****. The correlation is highly significant at the 0.01 level.**

According to Perason's correlation, a highly significant positive correlation between the scores of the different subtests and with the total score is noted, with respectively: [(r=.58; p<0,000 between the scores of series A and B), (r=.58. ; p<0,000 between the scores of series A and C), (r=.59. ; p<0,000 between the scores of series A and D), (r=.71 ; p<0,000 between the scores of series A and E) , (r=.71 ; p<0,000 between the scores of series A and the total score)]. [(r=.72; p<0,000 between Series B and Series C scores), (r=.70; p<0,000 between Series B and Series D scores), (r=.52; p<0,000 between Series B and Series E scores), (r=.82; p<0,000 between Series B scores and total SPM score)]. [(r=.80; p<0,000 between Series C and Series D scores), (r=.68; p<0,000 between Series C and Series E scores), (r=.90; p<0,000 between Series C scores and total score)]. [(r=.67; p<0,000 between Series D and Series E scores), (r=.90; p<0,000 between Series D scores and total score)]. [(r=.80; p<0,000 between Series E scores and total score)].

B. Learner Performance in the SPM Test

Learners' performance in SPM is assessed by determining the average scores totalled by the learners and the average of the errors made in the test series (table 3).

Table 3 : Average scores totalled by learners and average errors in the test series with correlations between scores and errors (n=286)

		Minimum	Maximum	Mean	Standard Deviation	Pearson Correlation	P-value
Serie A	Score	2.0	12.0	10.45	1.85	-0.99**	,000
	Erreurs	.0	10.0	1.55	1.85		
Serie B	Score	.0	12.0	9.55	2.83	-0.98**	,000
	Errors	.0	12.0	2.41	2.79		
Serie C	Score	.0	12.0	7.96	2.88	-1**	,000
	Errors	.0	12.0	4.03	2.87		
Serie D	Score	.0	12.0	7.77	2.98	-1**	,000
	Errors	.0	12.0	4.22	2.98		
Serie E	Score	.0	12.0	4.20	3.15	-0.96**	,000
	Errors	.0	12.0	7.74	3.17		
Total	Score	7.0	59.0	39.82	11.59	-0.98**	,000
	Errors	1	53	19.97	11.52		

****. The correlation is highly significant at the 0.01 level.**

The analysis of the results of the mean scores and the means of the errors committed in the test series shows that for series A, the learners totalled a mean of 10.45 items and a mean of the errors of 1.55. For Series B, adolescents in our population recorded an average score of 9.55 and an average of 2.41 for errors made. In series C, the average score is 7.96 and an average error of 4.03. For Series D, learners had a mean score of 7.77 and a mean error score of 4.22. In Series E, the mean score for correct items was 4.20 and the mean error score was 7.74. For the average total score, learners recorded an average score of 39.82 and an average error of 19.97. According to the bi-variate analyses, we found a highly significant negative correlation between scores and

errors committed by adolescents in SPM.

C. The profile of non-verbal intelligence of adolescents in the population

- Distribution of learners' scores in SPM by age in percentiles (Table 4).

Table 4 : Percentile distribution of test scores (PMS) by age.

	Age (years)					
Percentiles	13	14	15	16	17	18
5	12,200	11,300	10,650	15,600	19,500	32,750
10	19,600	13,000	13,300	26,200	34,200	36,500
25	34,000	27,000	27,250	32,500	42,000	45,000
50	40,000	36,000	36,500	46,000	49,000	48,000
75	44,000	43,000	42,500	50,000	52,000	51,750
90	49,000	49,800	50,400	53,000	54,800	55,000
95	51,000	55,100	51,700	54,000	55,900	57,750
Mean	37.701	34.778	34.615	41.514	45.976	47,250
Standard Deviation	10.0830	12.3966	12.1964	11.0821	8.9763	7,8685

Calibration of Raven's progressive matrices by age showed that the 50th percentile had a score of 40 points at age 13 ; 36 points at age 14 ; 36.5 points at age 15 ; 46 points at age 16 ; 49 points at age 17 and 48 points at age 18.

- The authors propose a categorization of subjects into five classes, from group I "higher intellectual abilities" to group V "intellectual disability". The status of the results obtained allowed us to classify the subjects into 5 intellectual classes (Figure 2).

According to the categorization of adolescents in our population according to intellectual abilities, we find that : 4% of adolescents in our population correspond to an intellectually defective state.

Discussion

The present study, which aimed to assess non-verbal intelligence among adolescents in the Moroccan Middle Atlas, was able to highlight the following points:

The calculation of Cronbach's alpha coefficient for the total test score is 0.94. The correlations between the scores of the different series of the test l are positive and highly significant. Therefore (SPM) has a very high degree of reliability, which supports the results obtained at the national and international level [8].

Analysis of the results shows that the participants recorded an average score of 39.82±11.59 and an average error of 19±11.52, and a negative correlation is noted between the scores of the totaled items and the errors made. The same result is observed among Argentine an adolescents[12].

The average score of our population is higher than the score totalled by learners from Moroccan populations in other studies [3- 8-10].

Calibration of Raven's progressive matrices in our age-dependent study showed that adolescent performance increases with age from 14 to 17 years of age with the exception of 13 and 18 years of age. These results are consistent with several studies conducted in

Morocco [3-10- 8] and international studies from Icelandic, Slovenian [8] and Kuwaiti [13]. The increase in non-verbal intelligence with age is explained by the fact that intellectual maturation continues in parallel with physical maturation [8]. In other studies, a steady increase in the overall volume of white matter until the age of 21 has been observed [14]. The functional consequences of this increase are rapid and effective communication within the fronto-cortical circuit and other cortical and sub-cortical regions [15]. Other studies have shown continued growth of the corpus callosum during childhood and adolescence [14-15-16].

In order to situate the results of adolescents in our population at the international level, we're going to rank them against international standards. Compared to several international studies, the scores obtained by respondents are considerably lower than those of the British [13], American [10], Chilean [10], Indian - Pune and Mumbai population[8], Icelandic [8], Slovenian [10] and Kuwaiti [13] international standardization standards. As we can add that 4% of the adolescents of our population corresponds to an intellectually defective state. These revealed differences in mean test scores may be related to several factors, including the Flynn effect[17]. The low performance recorded in the test could also be explained by the high level of illiteracy among parents [18] and also by malnutrition [19]. Other work links cognitive functions to non-verbal intelligence to explain intra-individual variability, such as updating skills [20], processing speed [21] and working memory [1]. Recent studies have demonstrated links between cognitive strategies and performance on fluid intelligence tasks [22].

Conclusion

The study realized has reconfirmed the very high degree of test reliability (SPM). The scores totaled by the adolescents in (SPM) show that they present a superior non-verbal intelligence compared by studies carried in Morocco, however in comparison with the international standardization norms these scores are considerably lower, all the more so as 4% of the adolescents of our population corresponds to an intellectually defective state. These low performances in non-verbal intelligence could be explained by several factors including the Flynn effect, the socio-economic environment of learners, the development of cognitive functions and the reasoning strategies used by adolescents. In addition, we must underline the importance of having national standardization of (SPM) and the importance of to realize an accurate diagnosis to identify adolescents who may show signs of intellectual deficits.

Significance Statement:

This study assessed nonverbal intelligence in a population of adolescent adolescents, as well as, this study will help researchers discover areas of neuroscience that many researchers have not been able to explore.

Conflict of Interest: The Authors declare that there are no conflicts of interest.

Ethical approval: The procedures were carried out in accordance with the recommendations of the internal ethics committee of the Ibn Tofail University of Kenitra. This procedure has been reviewed and approved by the Committee.

Source of Funding: This work is not financial

References

1 Golay, Ph. Inter and intra-individual variability in complex cognition: Relationships between working memory, executive functions and fluid intelligence. Ph.D. Thesis: University of Geneva.2014.Cited 22/12/2019. Available on https://archive-ouverte.unige.ch/unige:37146.

2 Taub, G et McGrew, K. The Woodcock-Johnson Tests of Cognitive Abilities III's Cognitive Performance Model : Empirical Support for Intermediate Factors Within CHC Theory. In Journal of Psychoéducation Assessment. 2013, 32(3):187-201.

3 Latifi, M., Soulaymani, A., Ahami, A.O.T., Mokhtari, A., Aboussaleh, Y., et Rusinek, S. Comparaison des performances cognitives chez les adolescents consanguins et les non consanguins de la région nord-ouest marocain. Antropo. 2009, 19 : 57-65.

4 Wicherts, J.M. et al. Raven's test performance of sub-Saharan Africans: Average performance, psychometric properties, and the Flynn Effect. Learning and Individual Differences. 2010, 20 :135–151.

5 Maithilee, K., & al, Error patterns on the Raven's Standard Progressive Matrices Test. Intelligence. 2016, 59:181–198.

6 Raven, J., Raven, J. C., and Court, J. H.

Manual for Raven's Progressive Matrices and Vocabulary Scales. San Antonio,TX: Harcourt Assessment.2003.

7 Al-Shahomee, A., Lynn, R.,. Norms and Sex Differences for the Standard Progressive Matrices in Libya. The mankind quarterly.2010, 51(1):97-107.

8 Sbaibi, R., Aboussaleh, Y., et Ahami, A.O.T. (2014). The Standard Progressive Matrices Norms in an international context among the middle school children of the rural commune Sidi el Kamel (North-Western Morocco). WebPsychEmpiricist. Retrieved from.

9 Rajotte,T., & al. Étude de l'effet de la résolution de matrices de Raven sur la motivation scolaire, l'anxiété à l'égard des mathématiques et le rendement en résolution de problèmes des élèves de quatrième année du primaire. Canadian Journal for New Scholars in Education. 2017, 8(1):40-50.

10 El Azmy, J., Azzaoui, F-Z., et Youssef Aboussaleh, Y., Ahami, A.O.T. Evaluation des performances neurocognitives des collégiens à M'rirt (Moyen Atlas, Maroc) Antropo.2013, 30 :33-43.

11 George, D., & Mallery, P. SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.2003.

12 Rossi-Casé & al,. Raven's progressive matrices, Argentinean norms for ages 13 to 18 and Flynn effect. In Orientación y Sociedad, 2015, 15: 1-21.

13 Abdel-Khalek, A. M., & Raven, J. Normative data from the standardization of Raven's Standard Progressive Matrices in Kuwait in an international context. Social Behaviour and Personality: International Journal.2006, 34(4), 169-179.

14 Giedd, J. N. Structural magnetic resonance imaging of the adolescent brain. Ann N Y Acad Sci.2004.1021, 77-85.

15 Giedd, J. N., & al,. (1996). A quantitative MRI study of the corpus callosum in children and adolescents. Brain Res Dev Brain Res. 1996, 91:274-280.

16 Rajapakse, J. C., & al,. Cerebral magnetic resonance image segmentation using data fusion. J Comput Assist Tomogr, 1996:20, 206-218.

17 Nicollet, J., Guillen, C. J., Jouhar, A-C., et Rossier, J. Performance aux tests d'intelligence : vers une inversion de l'effet Flynn ?. L'orientation scolaire et professionnelle.2009 , 38(3):353-368.

18 Aboussaleh, Y., Ahami, A. O. T., Bonthoux, F., Marendaz, C., Valdois, S. et Rusinek, S. Performances cognitives des enfants anémiques ages de 6 a 11 ans en milieu urbain du Nord-ouest Marocain. Journal de Thérapie Comportementale et Cognitive.2006, 16(2) :49-54.

19 Djapo, Nermin, Lynn, Richard, Gender Differences in Means and Variability on the Progressive Matrices in Bosnia-Herzegovina. Mankind quarterly.2010:51(2), 158-161.

20 Friedman, N., Miyake, A., Robinson, J., & Hewitt, J. Developmental trajectories in toddlers' self-restraint predict individual differences in executive functions 14 years later: A behavioral genetic analysis. Developmental psychology, 2011:47(5), 1410-1430.

21 Redick, T. S., Unsworth, N., Kelly, A. J., & Engle, R. W. Faster, smarter? Working memory capacity and perceptual speed in relation to fluid intelligence. Journal of Cognitive Psychology.2012, 24(7) :844-854.

22 Gonthier, C., & Thomassin, N.. Strategy use fully mediates the relationship between working memory capacity and performance on Raven's matrices. Journal of Experimental Psychology General. 2015,144(5) : 916–924.

The Influence of Parents and Other Factors on Adolescents' Fish Consumption in Selected Senior High School Students, Jakarta

Nabilah Shofa Fauziyah[1], Triyanti[1]

[1]Department of Nutrition, Faculty of Public Health, Universitas Indonesia

Abstract

Fish is an important source of animal food for adolescents because it contains various nutrients. Indonesia has high fish availability, but the level of domestic fish consumption in adolescents is still low. Lower fish consumption during adolescence will affect health status in the future. It is thus important to understand the various factors that influence fish consumption in adolescents. This study aimed to obtain information on fish consumption frequency; to investigate the associations between individual, socio-physical and environmental factors of adolescents and their fish consumption; and to examine the influence of parental eating behavior and support on adolescents' fish consumption. Samples were chosen from adolescents aged 15-17 years. This study used a cross-sectional design. Data collection was obtained through filling out questionnaires, anthropometric data, and completing a semi-quantitative food frequency questionnaire (SFFQ). Bivariate analysis was conducted using the chi-square test and multivariate analysis was conducted using multiple logistic regression. The average fish consumption was found to be 34.1 grams/day. Fish consumption was significantly associated with attitude, preference, parental influence, and availability of fish at home ($p<0.05$). Further analysis showed that parental influence was the dominant factor related to fish consumption in students. This means that various parties, especially parents, can take a role in increasing fish consumption in students.

Keywords: *fish consumption; senior high school student; parent influence.*

Introduction

Fish is one of the most important animal food sources in a healthy diet because it is rich in protein, unsaturated fatty acids, various vitamins, selenium, and iodine[(1)]. Fish is also a major food source of long-chain omega-3 polyunsaturated fatty acids, including docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), which are well-known for their anti-inflammatory effects and protective role against non-communicable diseases, such as heart disease coronary, hypertension, stroke and Alzheimer's disease[(1,2)]. Bonaccio et al. showed that fish consumption 4 times per week was associated with a 40% reduction in the risk of coronary heart disease and stroke[(3)]. Fish consumption also has a good impact on cognitive development in adolescents. Handeland et al. in Norway stated that consumption of fish, especially fatty fish, can improve cognitive performance in adolescents, increasing their vocabulary skills and concentration on learning[(4)]. Morris et al. also showed that fish consumption ≥4 times per week was associated with lower memory loss rates[(5)].

Although the benefits of fish consumption are numerous, there are still many adolescents who do not consume enough fish. The results of the National Diet and Nutrition Survey Rolling Program (NDNS) in Europe in 2008-2012 showed that only 5.3% of adolescents aged 12-18 years consumed fish in accordance with the recommendations[(6)]. St-Jules, Watters, and Novotny also showed that the average fish consumption in adolescent girls in Asia was only 24 g/day[(7)]. Fish consumption in Indonesia, especially in adolescents, is also still far below the national consumption target. The results of the Indonesian Individual Food Consumption Survey in 2014

Corresponding author:
Nabilah Shofa Fauziyah
nabilahsf2894@gmail.com, *triyantigizi@gmail.com*

showed that adolescents (13-18 years) who consumed fish in Indonesia had an average consumption of 58.3 g/day[8]. Adolescents (13-18 years) who consumed fish in Jakarta had an average consumption of 26.9 g/day[9].

Low fish consumption in adolescents can be caused by several factors, such as individual factors (nutritional status, knowledge, attitude, and preference), social environmental factors (parents' education, parents' influence, peer influence, and mass media influence), and physical environmental factors (availability of fish at home)[1,10,11] . Individuals also may be averse to consuming fish because of a perceived difficulty in buying, preparing and cooking fish, the belief that it is expensive, or the unpleasant physical properties of some varieties of fish, such as bones, taste, smell, and texture[10,12].

This research was conducted with adolescents, especially high school students, because in this period the consumption of nutrients is one of the critical things that must be achieved well to be able to improve the quality of individual health in the future. The researcher chose East Jakarta as the research location because the prevalence of non-communicable diseases in Jakarta is still high, while the average fish consumption in adolescents in Jakarta is still very low and the research on fish consumption on adolescents in East Jakarta remains limited.

Method

Design

This research was conducted using a cross-sectional design. Independent variables in this study were individual factors (gender, nutritional status, pocket money, knowledge, attitude, and preference), social environmental factors (parents' education, parental influence, peer influence, and mass media influence), and a physical environmental factor (availability of fish at home), while the dependent variable used was fish consumption.

Sample

The study was conducted in April 2019 at SMAN 39 Jakarta. The sample used in this study comprised students of classes X and XI. Inclusion criteria in this study were all students from five classes with active status in 2019. Exclusion criteria from this study were unwell students or those who had certain physical disabilities. Then, 150 students from five classes were selected by the school and all of them were taken as research samples.

Data Collection

Primary data collection was carried out through asking students to fill out questionnaires, SFFQ and measuring nutritional status based on anthropometric data. The time needed to complete the questionnaire and anthropometric data was 30 minutes. Data collection was carried out by the researchers and four enumerators who were students at the Nutrition Department in the Faculty of Public Health, Universitas Indonesia. Parental influence, peer influence and availability of fish at home were assessed using a four-point Likert scale, with responses ranging from 'strongly disagree' (1) to 'strongly agree' (4). Knowledge was obtained from the answers students scored by adding up all the questions that were answered correctly. Preferences were categorized as positive and negative. Anthropometric data was measured using weight scales and a microtoise and was calculated with BMI according to age based on classification by the Indonesian Ministry of Health (2010) to determine the classification of nutritional status.

A semi-quantitative FFQ was developed to assess dietary intake among senior high school students in Jakarta. The SFFQ included three sections: the food list, the portion size and the frequency response. The final SFFQ list included a total of 21 types of fish. The reference portion for each fish item was represented by how many pieces of fish and what parts were eaten (tail/body/head), or how many pieces of whole fish were eaten, and fish size (large/medium/small). The results were converted into grams. In order to assist in quantifying the reference portion size, the standard two-dimensional fish portion visual chart by the Indonesian Ministry of Health was also used. The frequency of adolescents' fish intake was indicated by how many times per day/week/month the adolescents consumed fish. For all fish items in the SFFQ, the frequency per day was multiplied by the portion size of the fish item in order to calculate the total amount of fish consumed in grams per day.

Data Analysis

Univariate analysis was conducted to provide an overview of the data. Bivariate analysis used chi-square to determine whether there is a relationship between the dependent variable and the independent variable. Results are reported in terms of odds ratios (ORs), 95%

confidence intervals (CIs) with the respective p-values with a significance level set to $p < 0.05$. Multivariate analysis used multiple logistic regression to determine the independent variables that have a dominant relationship to the dependent variable.

Findings

The average fish consumption among students is 34.1 grams/day. The results show that 57.3% of students are still low in fish consumption. All main results are displayed in Table 1.

Table 1. Associations between Individual, Socio-physical Environmental Factors and Adolescents' Fish Consumption

Variable	Fish Consumption				Total		OR	*p-value*
	Low		Good					
	n	%	n	%	n	%	(95% CI)	
Gender								
Man	34	63	20	37	54	100	1,438	0,382
Women	52	54,2	44	45,8	96	100	0,73 – 2,85	
Total	86	57,3	64	42,7	150	100		
Nutritional status								
Not normal	22	48,9	23	51,1	45	100	0,603	0,235
Normal	64	61	41	39	105	100	0,3 – 1,24	
Total	86	57,3	64	42,7	150	100		
Pocket money								
Low	58	57,4	43	42,6	101	100	1,012	1
High	28	57,1	21	42,9	49	100	0,51 – 2,02	
Total	86	57,3	64	42,7	150	100		
Knowledge								
Less	69	57,5	51	42,5	120	100	1,035	1
Well	17	56,7	13	43,3	30	100	0,46 – 2,32	
Total	86	57,3	64	42,7	150	100		
Attitude								
Less	48	69,6	21	30,4	69	100	2,586	**0,009**
Well	38	46,9	43	53,1	81	100	1,32 – 5,07	
Total	86	57,3	64	42,7	150	100		
Preference								
Negative	24	77,4	7	22,6	31	100	3,152	**0,02**
Positive	62	52,1	57	47,9	119	100	1,26 – 7,87	
Total	86	57,3	64	42,7	150	100		
Mother's Education Level								
Low	39	61,9	24	38,1	63	100	1,383	0,426
High	47	54	40	46	87	100	0,71 – 2,68	
Total	86	57,3	64	42,7	150	100		
Father's Education Level								
Low	38	59,4	26	40,6	64	100	1,157	0,788
High	48	55,8	38	44,2	86	100	0,6 – 2,23	
Total	86	57,3	64	42,7	150	100		

***Cont.*. Table 1. Associations between Individual, Socio-physical Environmental Factors and Adolescents' Fish Consumption**

Variable	Fish Consumption				Total		OR	*p-value*
	Low		Good					
	n	%	n	%	n	%	(95% CI)	
Parental Influence								
Less	52	76,5	16	23,5	68	100	4,588	**0**
Well	34	41,5	48	58,5	82	100	2,25 – 9,35	
Total	86	57,3	64	42,7	150	100		
Peer Influence								
Less	60	63,8	34	36,2	94	100	2,306	0,056
Well	26	46,4	30	53,6	56	100	1,04 – 3,99	
Total	86	57,3	64	42,7	150	100		
Mass Media Influence								
Never	15	65,2	8	34,8	23	100	1,479	0,547
Ever	71	55,9	56	44,1	127	100	0,59 – 3,74	
Total	86	57,3	64	42,7	150	100		
Availability of Fish at Home								
Less	58	67,4	28	32,6	86	100	2,663	**0,006**
Well	28	43,8	36	56,3	64	100	1,36 – 5,2	
Total	86	57,3	64	42,7	150	100		

The results of this study show that fish consumption is significantly related to attitude, preference, parent influence, and availability of fish at home. Thorsdottir et al.[13] and Tomić et al.[1] state that attitude has a significant relationship with fish consumption. Can et al.[10], Thong & Olsen[14] and Jimoh et al.[15] also state that preference has a significant relationship with fish consumption. Lai et al.[16] demonstrate that fish consumption in adolescents has a significant relationship with parental influence at home. Tamale et al. also show that the availability of fish at home is significantly associated with fish consumption in children[17].

It was also found that most students did not like consuming fish because of bones (50%), unpleasant taste (18%) and unpleasant smell (18%). It was also found that catfish, carp, tuna fish and salmon are the most liked fish among students. The most preferred processing of fish by most students (57,3%) is frying, followed by roasting (30%).

Next, a multivariate analysis was carried out to obtain the dominant factor in adolescents' fish consumption. Following the final model of the multivariate stage, the independent variables that are most strongly related to the dependent variable are seen from the magnitude of the OR value. The greater the OR, the greater the effect.

Table 2. The Dominant Factors in Adolescents' Fish Consumption

Variable	p-value	OR (95% CI)
Nutritional status	0,280	0,647
Attitude	0,339	1,505
Preference	0,198	2,107
Parent Influence	0,001	3,407
Availability of Fish at Home	0,045	2,130

Table 2 is the result of the analysis of the final multivariate model, which shows that the most dominant variable is parental influence, with an OR value of 3.407. This means that students who have less parental influence will have 3.407 times the risk of having less fish consumption compared to students who have good parental influence.

Discussion

The results of this study showed that parents have the most important role in adolescents' fish consumption. Parents have an important role as role models in helping adolescents to adopt and learn to maintain a healthy lifestyle. This means that parental influence is an important factor in regulating nutrient intake in adolescents. Selection of the consumption of unhealthy foods in adolescents has been shown to be related to lack of supervision from parents[18].

Parents tend to pay attention to their children's health and nutritional status, which influences a stronger desire for parents to provide fish at home as family food[19]. Parents who want to maintain the health and nutritional status of their children also tend to follow the recommended food consumption patterns, including those recommended for weekly fish consumption[20]. The influence of parental consumption on children's consumption can occur directly through the transmission of attitudes towards food. Parents' attitudes towards food consumption can influence certain behaviors, such as cooking seafood as a family dinner if parents have a good attitude towards fish consumption. This will certainly affect fish consumption in adolescents[1,14] .

Other factors that are also related to fish consumption in adolescents are attitudes, preferences, and the availability of fish at home. Adolescents who have a positive attitude towards healthy eating tend to consume fish more than other meat because it is high in protein and unsaturated fatty acids, as they believe that it brings many health benefits[21,22]. Preference is also an important factor related to fish consumption. Can et al.[10] and Thong and Olsen[14] stated that preferences are influenced by sensory factors (bones, taste, color, smell and texture) and non-sensory factors (habits, beliefs, individual characteristics and perceptions of risk). The availability of fresh fish that has been cooked for the family table is also important because family members will usually tend to eat food according to what is available at the dining table[1]. Tamale et al. also showed that children usually tend to consume food that is available at home[17].

Conclusion

This study shows that the average fish consumption among students is 34.1 grams/day with the majority of students still categorized as low in fish consumption. Attitude, preference, parental influence and availability of fish at home are significantly related to fish consumption. These factors can be influenced through cooperation between the ministries of maritime and fisheries, government health agencies and schools through the Gerakan Memasyarakatkan Makan Ikan (GEMARIKAN) program. Parents are also important, as they can serve as role models and support their children regarding fish consumption. Parents are also expected to be able to provide fish as an animal dish at home at least twice per week with enough portions to be consumed by all family members.

Conflict of Interest: There is no conflict of interest.

Source of Funding: This research was self-funded by the authors.

Ethical Clearance: This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Universitas Indonesia (number 126/UN2.F10/PPM.00.02/2019).

References

1. Tomić, M., Matulić, D., & Jelić, M. What determines fresh fish consumption in Croatia? J Appetite. 2016;106: 13 – 22.
2. Oken, E., Choi, A. L., Karagas, M. R., Marien, K., Rheinberger, C. M., Schoeny, R., et al. Which Fish Should I Eat? Perspectives Influencing Fish Consumption Choices. Environmental Health Perspectives. 2012;120(6): 790 – 798.
3. Bonaccio, M., et al. Fish Intake is Associated with Lower Cardiovascular Risk in A Mediterranean Population: Prospective Results from The Moli-Sani Study. Nutrition, Metabolism and Cardiovascular Diseases. 2017;27(10): 865–873.
4. Handeland, K., et al. Fatty Fish Intake and Attention Performance in 14-15 Year Old Adolescents: FINS-TEENS - A Randomized Controlled Trial. Nutrition Journal. 2017;16(1): 1–10.
5. Morris, M.C., et al. Fish Intake, Genetic Predisposition to Alzheimer Disease, and Decline in Global Cognition and Memory in 5 Cohorts of Older Persons. *American Journal of Epidemiology*. 2017;187(5): 933–940.
6. Newton, W., & McManus, A. Consumption of Fish and Alzheimer's Disease. *The Journal of Nutrition, Health & Aging*. 2011;15(7): 551–553.
7. St-Jules, D. E., Watters, C. A., & Novotny, R.

Estimation of Fish Intake in Asian and White Female Adolescents, and Association with 2-Year Changes in Body Fatness and Body Fat Distribution: The Female Adolescent Maturation Study. *Journal of the Academy of Nutrition and Dietetics*. 2014;114(4), 543–551.

8. Kemenkes RI. Buku Studi Diet Total: Survei Konsumsi Makanan Individu dalam Survei Diet Total Provinsi DKI Jakarta 2014. Jakarta: Kementerian Kesehatan RI; 2014.
9. Kemenkes RI. Buku Studi Diet Total: Survei Konsumsi Makanan Individu Indonesia 2014. Jakarta: Kementerian Kesehatan RI; 2014.
10. Can, M. F., Günlü, A., & Can, H. Y. Fish Consumption Preferences and Factors Influencing It. Food Science and Technology (Campinas). 2017; 35(2): 339–346.
11. Matlabi, M., Rad, G. S., Mostavafi, F., Mohebi, S., Sani, A., Azadbakht, L., & Tabaraie, Y. A Study on the Fish Consumption According to Health Education Models Constructs in 2012. Bulletin of Environment, Pharmacology and Life Sciences. 2013;3(1): 57-67.
12. Verbeke, W., & Vackier, I. Individual Determinants of Fish Consumption: Application of the Theory of Planned Behaviour. J Appetite. 2005; 44(1), 67–82.
13. Thorsdottir, F., et al. A Model of Fish Consumption among Young Consumers. Journal of Consumer Marketing. 2012;29(1): 4 – 12.
14. Thong, N. T., & Olsen, S. O. Attitude toward and Consumption of Fish in Vietnam. Journal of Food Products Marketing. 2012;18(2): 79–95.
15. Jimoh, et al. Evaluation of Consumers' Preference for Fresh and Frozen Fish Products in Ibadan Metropolis, Nigeria. Production Agriculture and Technology Journal. 2017;9(1): 13-20.
16. Lai, M., et al. Fish Intake by Adolescents Is Related to Nutrient Intake but Not Lifestyle Factors. Asia Pacific Journal of Public Health. 2013;27(2): 1627 – 1638.
17. Tamale, A., Ejobi, F., Muyanja, C., Naigaga, I., & Nakavuma, J. Sociocultural Factors Associated with Fish Consumption in Lake Albert Fishing Community : Guidelines for Lead and Mercury. Cogent Environmental Science. 2017;134: 1 – 17.
18. Morales, L. E., & Higuchi, A. Is Fish Worth More than Meat? – How Consumers' Beliefs about Health and Nutrition Affect Their Willingness to Pay More for Fish than Meat. Food Quality and Preference. 2018;65: 101–109.
19. Verstraeten, R., et al. A Conceptual Framework for Healthy Eating Behavior in Ecuadorian Adolescents: A Qualitative Study. Plos One. 2014;9(1): 1 – 7.
20. Håvås, S., Coombes, L., & Holte, T. Associations Between Parenting and Substance Use, Meal Pattern and Food Choices : A Cross-Sectional Survey of 13,269 Norwegian Adolescents. *Preventive Medicine Reports*. 2019;14: 1 – 8.
21. Mitterer-Dalto_e, M. L., Carrillo, E., Queiroz, M. I., Fiszman, S., & Varela, P. Structural Equation Modeling and Word Association as Tools for A Better Understanding of Low Fish Consumption. Food Research International. 2013;52(1): 56 – 63.
22. Trondsen, T., Braaten, T., Lund, E., & Eggen, A. E. Consumption of Seafood – The Influence of Overweight and Health Beliefs. Food Quality and Preference. 2004;15(4): 361 – 374.

Under Five Child Mortality & Its Risk Factors in Bangladesh and other South Asian Countries: A Literature Review

Nahian Rahman[1], Md. Ruhul Kabir[1], Oumma Halima[1], Mohammad Rahanur Alam[1], Md. Abdullah Al Mamun[1], Homayra Islam[2]

[1]Department of Food Technology & Nutrition Science, Noakhali Science & Technology University, Bangladesh, [2]Deputy Commissioner Office, Noakhali, People's Republic of Bangladesh

Abstract

Under five child mortality is one of the serious public health issues in all over the world especially in South Asian region. Significant achievements have been made in last ten decades to reduce child mortality globally, but South Asian region still has one of the highest child mortalities in the world (51 deaths per 1000 live births). Out of ten child deaths, three occur in South Asian region. Various risk factors influence this high mortality rate, however, some of the risk factors show similarities and other varies time to time across countries in the South Asian region. Parents literacy, occupation, household wealth, health care accessibility and utilization, poverty and inadequate food intake, poor access to information, mother's age and several socio-cultural factors contributes mostly to the high number of mortalities in young children. However, it is imperative to study the country specific reasons and useful comparison of contexts might be useful to address the immediate, underlying and basic causes of child malnutrition. There, this paper aimed to study the difference in under five child mortality in different South Asian countries and determine whether the associated risk factors are similar or different across those eight countries. For increasing the under-five child survival and achieving the Sustainable Development Goals, South Asian regional countries needs to give serious efforts on maternal and child health sector as it affects national development. Country specific strategies and interventions should be based on most prevalent risk factors.

Key words: *Under-5 mortality, Infant mortality, Determinants of mortality, South Asian countries, Risk factors.*

Introduction

Under five child mortality is a very important public health indicator for estimating a country's progress and overall wellbeing of a nation [(1)]. United Nations International Children's Emergency Fund (UNICEF) describes under-5 mortality as "the probability of dying between birth and exactly five years of age". Early childhood is an important period for determining their future health status. Infant mortality is one of the contributing indicators that can be used to assess the physical quality of life index (PQLI) and wellbeing of a nation [(2)]. According to World Health Organization (WHO), notable global improvement has been done in decreasing child deaths, from 12.7 million in 1990 to 5.9 million in 2015.Since 1990, worldwide under five mortality rates decreased 53%, from 91 deaths per 1000 live births in 1990 to 43 in 2015. Globally, approximate 4.6 million deaths appear annually and 99% of which is occur in developing countries at infancy [(3)].

South Asia contributes a major portion in neonatal mortality in the world. Time period between 1990-2009, countries having more than 50% of neonatal deaths were: India 27.8% (19.6% of global live births), Pakistan 6.9% (4.0%), Nigeria 7.2% (4.5%), China 6.4% (13.4%), and Democratic Republic of the Congo 4.6% (2.1%) [(4)].

The main aim of this paper is to assess the trends, socioeconomic and demographic risk factors associated with under-5 mortality in South Asian region (Bangladesh, India, Maldives, Nepal and Pakistan).

Child Mortality, Infant Mortality, Neonatal Mortality and risk group

Child mortality or under-5 mortality refers to "death of children under the age of 5 years" (UNICEF). During the last two decades, remarkable improvement has been

done in declining under five child mortality. Globally, under five child mortality rate "dropped 53% (from 91 deaths per 1000 live births in 1990 to 43 deaths in 2015)" [5]. In South Asia 1 child from 19 children dies before their reaching 5th birthday. In 2015, 6 million child deaths occurred from which 30% take place in South Asian nations. Three deaths occur out of every 10 children globally happen in South Asia. According to Centre for disease and control (CDC), infant mortality is defined as "child dies before reaching his/her first birthday". The Infant Mortality Rate (IMR) is referred to the rate of children death before one year of age per 1000 live births. In 2015, infant mortality accounted about 4.5 million. therefore, the infant mortality rate reduced globally from "63 deaths per 1000 live births in 1990 to 32 deaths per 1000 live births in 2015" [6].

Methodology

The study accesses the determinants and consequences of under-five mortality after a live birth, using the definition of child mortality: death occurring death of children before five year of age. For the purpose of the study, 1990-2016 was chosen as comparative time periods.

Data Source

For reviewing, searches are done for getting journal articles into Pub Med/Medline, Google scholar, Data base of open Access journal, Research gate and Science direct. The name of eight South Asian countries was added to these terms for getting information of respective countries. Estimates for under five child mortality rates were collected from the UNICEF Report of levels and trends in child mortality 2015. For certain countries within South Asian region, BHDS data for Bangladesh, NDHS for Nepal and PDHS for Pakistan.

Search strategy and identification of studies

The search for under five child mortality in South Asian region and combining used key words were: under five child mortality, child morbidity, neonatal mortality, infant mortality, risk factors of child mortality and cause specific child mortality. For countries with very few studies reporting under five mortality rate such as Maldives, Bhutan consider little source. In this paper, try to estimate the difference in under five child mortality in Bangladesh & South Asian countries and determine whether the associated risk factors are similar or different across the South Asian countries.

Child mortality trends in Bangladesh

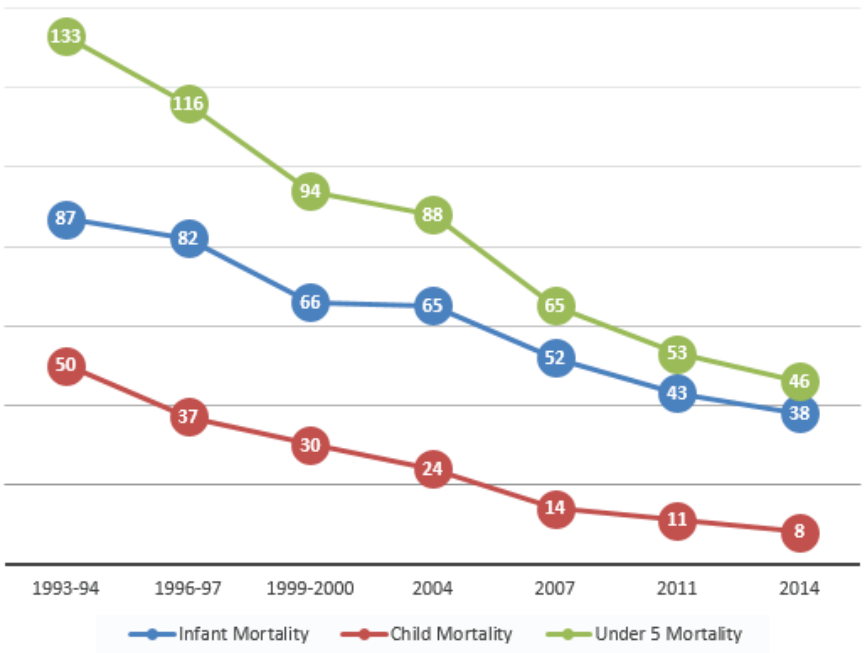


Figure 1: child mortality trends in Bangladesh

Time period of 1993-2014 where the infant mortality rate was 87 deaths per 1000 live births in 1993-94 and reducing by 66 in 1999-2000, 52 in 2007, 43 in 2011 and 38 in 2014. Child mortality rates also reducing trends from 1993-2014; 50 deaths were in 1993-94, 30 in 1999-2000, 14 in 2007, 11 in 2011 and 8 in 2014 per 1000 live births. In contrast to, Under-5 mortality rates, were 133deaths per 1000 live births in 1993-94 and reached at 94 in 1999-2000, 65 in 2007, 53 in 2011 and even 46 in 2014 [6].

Risk factors of under-five mortality in Bangladesh

Maternal age, Poor gestational weight gain, Maternal malnutrition, Marriage age, Poor education level, Wealth index, Insufficient food intake, lack of health facility are key contributors for child mortality in Bangladesh [6, 7].

Age of mother

Mother age is one of the vital factors for gestational risk and child mortality. Adolescent and older age (>45) pregnancy are dangerous for both the child and mother. Giving of births in adolescent period have reduced globally since 1990 but remain young age (11-19) fertility contributes 11% of the births and 95% of these births occur in low and middle-income countries [8].

Women's employment

Most important issue for mother is providing the quality of care by mother to her child. For employed mother has tough responsibility especially for take care of the health outcomes of under-five age children. In India, mortality rate for children under age of five is higher for the working mother. Mothers working for long hours influence the children's nutritional status and management of adequate care [9].

Parental Education

Parental education plays vital role to develop the health status of children. Maternal education contributes to fertility and economic wellbeing. Beside the formal education level, improving reading skills are also very much useful for mother and child survival [10].

Sex of child

Child mortality differing by sex is a vital concerning issue to consider. Under five mortality differing with sex vary from country to country. In developing countries, such as India and China, boys have lower under five mortality rates in comparison to girls [11].

Unintended Pregnancy

Unintended pregnancy influences the mother health status. Mother with unintended pregnancies has less intake of folic acid from the dose of recommended, prenatal/post-partum smoking and depression. Children born by unintended pregnancies are at greater risk of receiving poor antenatal care in developing nations [12].

Contraceptive use

Unintended pregnancy is prevented by using contraceptives which contribute to reduce maternal and child mortality. According to demographic and Health Survey in Bangladesh, use of contraceptives contribute to reduce infant mortality of birth order 2 and higher by 7.9%. In Bangladesh, complete use of contraceptive methods contributes to decrease the child mortality with a birth order of two or higher. Similarly, in Afghanistan higher contraceptive methods are used which is one of the key factors for reduction in child mortality [13].

Smoking

Smoking tobacco cigarette is very familiar sight though non-smoking tobacco products are highly used in developing countries. Passive smoking also caused affects to non-smokers indirectly and about 28% of child death occur globally [14].

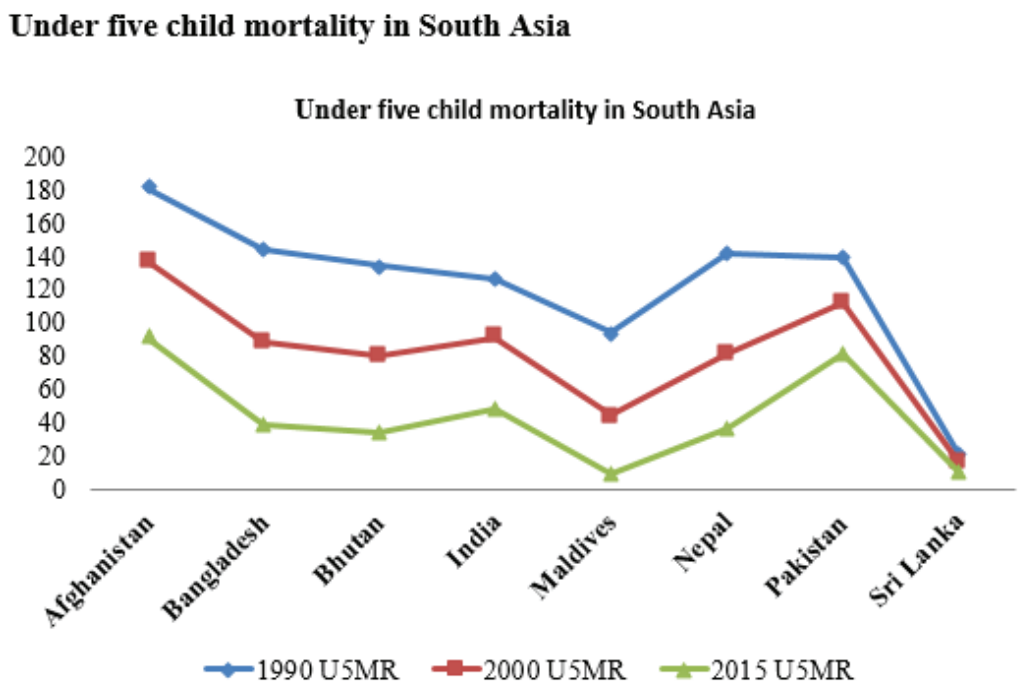


Figure 2: Levels and trends in under five child mortality among South Asian countries, 1990-2015. (Data source: The United Nations Children's Fund, September 2015).

Plotting under five mortality rates against time period of 1990, 2000, 2015 for South Asian countries. Figure 2 presents the under-five mortality distribution per 1000 live births from 1990-2015 where the observation pointed that highest mortality rate was 180 deaths per 1000 live births in Afghanistan at 1990 and decreased to 86 deaths in 2015. Similarly, lowest deaths of 21 per 1000 live births in Sri Lanka at 1990 and reduced to 16 deaths per 1000 at 2015.

Cause specific under-5 mortality

Mortality rate with a considerable cause for a population is referred as cause-specific mortality and Globally out of every 10 deaths, non-communicable conditions contribute for six, three for communicable, nutritional or reproductive and one for injuries. Potential causes are leading to under five mortality were preterm birth issues, maternal complications and pneumonia. The vital causes of child death in South Asian regions with highest under-5 mortality were preterm birth issues. Six conditions are caused for more than 70% of the under-5 child mortality globally, pneumonia (19%), diarrhea (18%), malaria (8%), measles, (4%), HIV/ AIDS (3%), and neonatal issues like as birth pre-term birth, and infections (37%). Malnutrition also consider as key contributor for the neonatal deaths [7].

Discussion

The focus of this study was to access the comparison and determinants associated with under-5 mortality in five South Asian countries (Bangladesh, India, Maldives, Nepal and Pakistan).According to the *State of the world's children*, Under-five mortality rate in Afghanistan is 257 deaths per 1000 live births which are the third highest in the world [15].India is the most populated country in the South Asian region which have the highest number of under-five children deaths in the region (2.1 million deaths in 2006) and one-fifth of under-five deaths globally. Nepal, which has developed in public health and declining under five mortality from 158 (per 1000 live births) in 1990 to 54.4 in 2011 [16].

In Sri Lanka, under five mortality rates was determined at 11 deaths per 1,000 live births before reaching age of five, which estimating a reduction of about 30 per cent during the last 15 years. About 70% of deaths are caused by diarrheal, preterm delivery pneumonia, neonatal infection, and lack of oxygen at birth. Poor sanitation, inadequate of safe water and malnutrition are contributing risk factors to half of under-five child deaths. Maternal malnutrition and

poor gestational weight gain are vital causes of low birth weight and high rates of newborn mortality in Bangladesh. Other factors such as immunization status of children and delivery practice may also accelerate under five child mortality rates. Low economic status of household, lower female literacy, inadequate mother nutritional status, early marriage age of mother, larger family and insufficient access to health care facility lead to high risk for under five mortality in India [17].

Comparison of Country specific risk factors

Risk factors causing under-5 mortality in different South Asian countries vary from each other. Old age of mothers (45-49) had constantly highest risk of under-five mortality in Bangladesh compared with Nepal, India, Maldives and Pakistan. Bangladesh has significant association of mother's age with under five mortality [18]. In India, highest risk of under-5 mortality in children is caused by poor wealth quintile and there are strong relationship between household wealth and under-5 mortality [19].

The association between education level of mother and under-5 mortality also vary between South Asian nations. Lowest level of education or no education of mother had significantly highest risk for under-5 mortality in Nepal comparison with other South Asian countries. In Nepal, there is a significant relationship between mother's level of education and breastfeeding practices [20]. The intention of using contraceptive methods or not also has major role to the risk of under-5 mortality in all countries of South Asia especially India having the highest risk of under five deaths for mother who does not use contraceptive.

Conclusion and Recommendation

This study focused on comparing the prevalence and risk factors of under-five mortality in South Asian countries. Findings from different studies in these countries reveals that the levels of under-5 mortality still unacceptably high among all South Asian countries with marginal differences. Risk factors like old age of mother, poor education, lack of using contraceptive, poor wealth quintile, and maternal smoking are key contributors of under-5 mortalities in each country and overall region.

Women's education is a key factor for improving the child survival among all other socioeconomic factors. The practice of early marriages should be controlled for decaling adolescent pregnancy which could increase child survival. Any specific strategy for reducing under five mortality in any South Asian country should be based on risk factors that are specific to that country. For achieving the Sustainable Development target of reducing child mortality by 2030, countries in South Asian region crying need to take serious attempts on child and mother health.

Acknowledgment: The authors acknowledge the support of Department of Food Technology & Nutrition Science, NSTU for the opportunity to conduct this research work.

Funding

The authors received no specific funding for this work.

Author information

Affiliations

1. **Department of Food Technology & Nutrition Science, Faculty of Science,**

Noakhali Science & Technology University, Noakhali-3814, Bangladesh.

- Nahian Rahman, Research Assistant
- Md. Ruhul Kabir, Assistant Professor,
- Md. Abdullah Al Mamun, Assistant Professor,
- Oumma Halima, Lecturer,
- Mohammad Rahanur Alam, Lecturer

2. **Deputy Commissioner Office, Noakhali, People's Republic of Bangladesh**

- Homayra Islam, Assistant Commissioner & Research Assistant

Contributions

Nahian Rahman and Md Ruhul Kabir conceptualize the idea, analyzed updated evidence, compared it, and prepared the manuscript and drafting. All other authors chipped in with drafting process and helped in comparison and analysis. All authors read and approved the final manuscript.

Ethics declarations: Ethics approval: Not applicable.

Competing Interests: The authors declare that they have no competing interests.

References

1. McGuire JW. Basic health care provision and under-5 mortality: a cross-national study of developing countries. World Development. 2006;34(3):405-25.
2. Reidpath DD, Allotey P. Infant mortality rate as an indicator of population health. Journal of Epidemiology & Community Health. 2003;57(5):344-6.
3. Lublóy Á, Keresztúri JL, Benedek G. Formal professional relationships between general practitioners and specialists in shared care: possible associations with patient health and pharmacy costs. Applied health economics and health policy. 2016;14(2):217-27.
4. Oestergaard MZ, Inoue M, Yoshida S, Mahanani WR, Gore FM, Cousens S, et al. Neonatal mortality levels for 193 countries in 2009 with trends since 1990: a systematic analysis of progress, projections, and priorities. PLoS medicine. 2011;8(8):e1001080.
5. Nath B, Niu Z, Singh R. Land Use and Land Cover Changes, and Environment and Risk Evaluation of Dujiangyan City (SW China) Using Remote Sensing and GIS Techniques. Sustainability. 2018;10(12):4631.
6. Das AC. Childhood mortality and Child nutritional status of Bangladesh: A review on Demographic and Health Survey. Journal of Current and Advance Medical Research. 2015;2(2):42-6.
7. Khan JR, Awan N. A comprehensive analysis on child mortality and its determinants in Bangladesh using frailty models. Archives of Public Health. 2017;75(1):58.
8. Ribeiro FD, Ferrari RAP, Sant'Anna FL, Dalmas JC, Girotto E. Extremes of maternal age and child mortality: analysis between 2000 and 2009. Revista Paulista de Pediatria. 2014;32(4):381-8.
9. Nair M, Ariana P, Webster P. Impact of mothers' employment on infant feeding and care: a qualitative study of the experiences of mothers employed through the Mahatma Gandhi National Rural Employment Guarantee Act. BMJ open. 2014;4(4):e004434.
10. Semba RD, de Pee S, Sun K, Sari M, Akhter N, Bloem MW. Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study. The Lancet. 2008;371(9609):322-8.
11. Pandey A. Infant and child mortality in India. 1998.
12. Silverman JG, Gupta J, Decker MR, Kapur N, Raj A. Intimate partner violence and unwanted pregnancy, miscarriage, induced abortion, and stillbirth among a national sample of Bangladeshi women. BJOG: An International Journal of Obstetrics & Gynaecology. 2007;114(10):1246-52.
13. Saha UR, van Soest A. Contraceptive use, birth spacing, and child survival in Matlab, Bangladesh. Studies in family planning. 2013;44(1):45-66.
14. Organization WH. http://www. who. int/ mediacentre/factsheets/fs340/en. Accessed; 2014.
15. Burton A, Monasch R, Lautenbach B, Gacic-Dobo M, Neill M, Karimov R, et al. WHO and UNICEF estimates of national infant immunization coverage: methods and processes. Bulletin of the World Health Organization. 2009;87:535-41.
16. UNICEF. The state of the world's children 2008: Child survival: Unicef; 2007.
17. Ezeh OK, Agho KE, Dibley MJ, Hall JJ, Page AN. Risk factors for postneonatal, infant, child and under-5 mortality in Nigeria: a pooled cross-sectional analysis. BMJ open. 2015;5(3):e006779.
18. Debebe B, Dejene T. Levels, trens and determinants of under-five mortality in Amhara Region, Ethiopia using EDHS (2000-2011). Journal of Health, Medicine and Nursing. 2016;28:11.
19. Chalasani S, Rutstein S. Household wealth and child health in India. Population studies. 2014;68(1):15-41.
20. Acharya P, Khanal V. The effect of mother's educational status on early initiation of breastfeeding: further analysis of three consecutive Nepal Demographic and Health Surveys. BMC Public Health. 2015;15(1):1069.

The Influence of Oral Cryotherapy on Prevention from Mucositis in Cancer Patients under Chemotherapy in RSUP H. Adam Malik, Medan

Nataria Yanti Silaban[1], Siti Saidah Nasution[2], Cholina Trisa Siregar[3]

[1]Master Program, Faculty of Nursing, Universitas Sumatera Utara, Medan, Indonesia, [2]Lecturer, Faculty of Nursing, Universitas Sumatera Utara, Medan, Indonesia

Abstract

Objects: to identify effectiveness of oral cryotherapy on prevention from mucositis in cancer patients under chemotherapy.

Methods: the study used quasi experimental method with pre-post test with control group. The samples were 32 patients for intervention group and control group, taken by using consecutive sampling technique. Mucositis was measured by using questionnaires on Oral Assessment Guide (OAG) while the data analyzed by Wilcoxon test and Mann Whitney test.

Results: The result showed, in the post intervention in the intervention group, 24 respondents were not affected by mucositis at p-value=0.008 ($p<0.05$); in the post-intervention in both groups, there were difference in the value of mucositis measured by OAG at p-value=0.003 ($p<0.05$).

Conclusion: Oral Cryotherapy could prevent mucositis in cancer patients who were under chemotherapy.

Keywords: *Oral cryotherapy; Mucocities; Cancer; Chemotherapy*

Introduction

Cancer is the second leading cause of death after cardiovascular disease worldwide. According to a report by the International Agency for Research on Cancer (IARC) in 2012, the estimated incidence of cancer worldwide is 14.1 million in new cases and 8.2 million in cases of death. Lung cancer still leads the list of the highest incidence rates, 1.82 million followed by breast cancer (1.67 million) and colorectal (1.36 million). The highest ranking causes of death are lung cancer (1.6 million) and followed by liver cancer (745,000), and stoma cancer (723,000)[(1)]. Data from RISKESDAS in 2013, stated that cancer prevalence in Indonesia is 14% or estimated to be around 347,792 people. Province D.I. Yogyakarta has the highest prevalence for cancer, which is 41% [(2)].

Based on the KPKN, there are various types of cancer treatment therapies including surgery, radiation therapy, chemotherapy, hormonal therapy, and immune therapy. The treatment can be given in one type or in combination depending on the stage of the cancer, tumor characteristics, age, health, and preferences of the patient [(3)]. More than half of cancer patients treated with chemotherapy, where chemotherapy is a type of therapy done to kill cancer cells and the most effective therapy for cancer patients. Treatment given to cancer patients aims to cure the disease and prolong life, and improve the quality of life[(3)(4)].

Chemotherapy can cause side effects such as fatigue, nausea, vomiting, anorexia, myelosuppression (suppress blood production), hair loss, mucositis, and even death in severe cases [(4),] but the side effects that often occur in patients undergoing chemotherapy are mucositis [(5)].

Corresponding:
Nataria Yanti Silaban
e-mail: nataria1612@gmail.com
Jl. Bilal Ujung No.24,52, Pulo Brayan Darat I, Kec. Medan Tim., Kota Medan, Sumatera Utara 20239, Indonesia

Early intervention for oral mucositis is very important. In this case the role of nurses is needed because more nurses time in providing services in hospitals, nurses can provide immediate care according to the patient's condition. In addition, nurses are responsible for managing chemotherapy schedules. If mucositis prevention interventions are given according to the chemotherapy schedule, nurses are the most appropriate personnel to carry out these treatments. Oral mucositis occurs about 7 to 14 days after chemotherapy[6]. The majority of patients require chemotherapy treatment every two weeks. Patients who have undergone mucositis during the previous chemotherapy cycle that are not treated immediately will experience an increase in the degree of mucositis in the next chemotherapy cycle.

Martin and Perez said that oral mucositis treatment is also carried out with oral hygiene protocol, chlorhexidene digluconate, cytoprotective agents (amifostin, Sucralfate, Glutamine, Allopurinol, Cryotherapy, Growth factors, and Low Level Laser Therapy / LLLT) [7].

Method

This research was a quasi-experimental research with pre-post test control group design. This research was carried out in the RSUPH. Adam Malik Medan from January 2018 till April 2019. Sixty four respondent were involved in this study using consecutive sampling. Inclusion criteria: 1) patients aged 18-65 years old, 2) patients who first took chemotherapy treatment, 3) mucositis has not occurred, 4) no sensitivity to ice, 5) respondents want to participate in research, 6) respondents are fully aware and able to answer questions, 7) has good communication

The measuring instrument used in this study was the Oral Assessment Guide (OAG) to assess mucositis and observation sheets of documentation on the implementation of oral cryotherapy. Oral Assessment Guide (OAG) is a tool used to measure the assessment of mucositis due to chemotherapy. Oral examination using OAG is carried out through clinical assessments including sound, swallowing, lip, tongue, saliva, mucous membranes, gums, and teeth. Each aspect is assessed with a score of 1 to 3, a score of 1 if normal, a score of 2 if there is a change in function but not all, or minor damage, and a score of 3 if there is damage and loss of function of that aspect. The score is then added to produce a mucositis score between 8-24. The Royal Children's Hospital Australia categorizes OAG ratings into three categories, namely category 1 with an OAG score of 8 being categorized as normal, mild-moderate mucositis when the OAG score of 9-16 falls into category 2, and category 3 (severe mucositis) with an OAG score in the range 17-24. The number is categorized into two categories, namely no mucositis at an OAG score <10, and mucositis at an OAG score of ≥10[8]. The reason for using the Oral Assessment Guide (OAG) in this study is because this instrument is a measurement scale of the degree of mucositis commonly used to measure the degree of mucositis and is easy to do or assess.

Observation sheet implementation of oral cryotherapy measures is a tool used to observe the implementation of oral cryotherapy in accordance with the protocol that has been made. If you take action according to the protocol, check the checklist (√) on the observation sheet, but if you do not perform according to the protocol, put a dash (-) on the observation sheet.

The bivariate analysis used in this study was the Wilcoxon signed ranks test. This test was to see differences in mucositis score before and after oral cryotherapy in each intervention group, while the Mann-Withney U test is used to see differences in mucositis score between intervention and control group.

Results

Table 1. Characteristics of research respondents

No.	Variables	Intervention group (n = 32)		Control group (n = 32)	
		f	%	f	%
1	Age				
		Mean: 44.00	**SD : 5.607**	**Mean: 44.13**	**SD: 4.784**
	18-34 years	4	12.5	1	3.1
	35-54 years	23	71.9	31	96.9

Cont... **Table 1. Characteristics of research respondents**

	55-64 years	5	15.6	0	0
2	Sex				
	Male	22	68.8	24	75.0
	Female	10	31.3	8	25.0
3	Education				
	Junior High School	1	3.1	5	15.6
	Senior High School	23	71.9	24	75.0
	College	1	25.0	3	9.4
4	Employment				
	Civil officer	1	3.1	0	0
	Entrepreneur	26	81.3	26	81.5
	Housewife	2	6.3	5	15.6
	No working	3	9.4	1	3.1
5	Marital status				
	Married	29	90.6	28	87.5
	Widow	3	9.4	4	12.5
6	Ethnic				
	Batak	24	75.0	23	71.9
	Java	4	12.5	6	18.8
	Aceh	1	3.1	0	0
	Malay	3	9.4	3	9.4
7	Income				
	<1 million/monthly	29	90.6	29	90.6
	>1-2 million/monthly	1	3.1	` 1	3.1
	>2 million/monthly	2	6.3	2	6.3
8	Cancer diagnosis				
	Recti	7	21.9	4	12.5
	Tonsil	1	3.1	1	3.1
	Cervical	5	15.6	5	15.6
	NPC	12	37.5	15	46.9
	Laring	2	6.3	1	3.1
	Penis	2	6.3	1	3.1
	Colon	2	6.3	1	3.1
	Lung	1	3.1	4	12.5
9	Chemotherapy cycle				
	cycle 1	23	78.1	18	56.3
	cycle 2	4	6.3	7	21.9
	cycle 3	5	15.6	7	21.9

Table 1 shows that the average age of respondents in this study was 44.00 ± 5,067 in the intervention group and 44.13 ± 4,784 in the control group. Based on age grouping, respondents were in the age range of 35-54 years namely 71.9% in the intervention group and 96.9% control group. Based on gender, the respondents of this study were dominated by men, as many as 68.8% in the intervention group and 68.2% in the control group. Based on educational background, respondents graduated from high school were 71.9% in the intervention group and 7%% in the control group. There were 81.3% of respondents working as entrepreneurs in the intervention group and 81.5% in the control group. Based on marital status, as many as 90.6% were married in the intervention group and 87.5% in the control group. Most ethnics in this study came from the Batak, namely 75.0% in the intervention group and 71.9% in the control group. For the chemotherapy cycle the majority of the first cycle was 71.9% in the intervention group and 58.3% in the control group.

Table 2. Mucositis Value Before and After the Intervention and Control Groups in Cancer Patients with Chemotherapy

Variabels	Pre				Post			
	No mucositis		Mucositis		No mucisitis		Mucositis	
	f	%	f	%	f	%	f	%
Intervention group	32	100	0	0	29	88.6	3	9.3
Control group	32	100	0	0	12	37.3	18	63,9

Table 2. shows that the mucositis value in the intervention group before treatment has an OAG value <10 32 respondents and after the intervention 29 respondents with an OAG value <10 and 3 respondents with an OAG value ≥10. OAG values of all respondents in the control group before treatment <10 and after treatment 12 respondents with OAG values <12 and 18 respondents with OAG values ≥10.

Table 3. Difference in Mukositis Value after Action in the Intervention and Control Groups

Variabel	Intervention group (N=32)			Control group (N=32)		
(OAG) value	Mean Rank	Z	p-value	Mean Rank	Z	p-value
	4.50	-2.640	0.008	12.06	-4.238	0.000

Table 3. shows that there were differences in the value of mucositis between before and after the oral Cryotherapy measures measured by OAG after being statistically tested using the Wilcoxon Signed Rank Test with a mean rank of 4.50 and p=0.008 (p<0.05) and in the control group the mean rank 12.06 with p=0.003 (p<0.05).

Table 4. Difference in Mukositis Value after Action in Intervention and Control Groups Based on the Mann-Whitney U Test

Variabel OAG value	Median (Minimal-Maximal)	Nilai Z	p value
	9.00 (8-14)	-3,007	0.003

Table 4. shows that there were differences in the values of mucositis between the intervention group and the control group with p=0.003 (p <0.05).

Discussions

The measurement results show that the number of respondents who did not experience mucositis was more in the intervention group than in the control group. This is because respondents in the intervention group carried out the oral cryotortion treatment that researchers had designed in their lives during chemotherapy. From the results of the study it can be seen that the action of oral cryotherapy in the intervention group is more effective in preventing mucositis. It can be concluded that the oral cryotherapy action can prevent mucositis in cancer patients with chemotherapy.

These results are consistent with Katrancı, Ovayolu, Ovayolu and Sevinc research that oral cryotherapy affects the protection of oral health by reducing mucositis scores according to the WHO mucositis scale, especially on days 7 and 14. Oral mucocytes are a common side effect caused by cancer treatment and can cause mucosal toxicity. Patients with oral mucositis experience severe pain and are unable to eat, drink and talk and, consequently, their quality of life is impaired[9]. Thirty to eighty-five percent of patients undergoing chemotherapy will experience oral mucositis. Preventing or reducing the incidence of oral mucositis and its severity can help reduce the pain experienced by patients. oral cryotherapy, is a prophylactic intervention. to reduce the incidence and severity of oral mucositis induced by chemotherapy[10].

Research conducted by Svanberg et al. by dividing respondents into 2 groups randomly namely interventions and controls which stated the assessment of mucositis was measured on day 22 after chemotherapy and the result was that oral cryotherapy could significantly reduce the incidence and severity of mucositis and confirmed that oral cryotherapy could prevent induced mucositis chemotherapy with the aim of the mucosal blood vessels undergoing vasocontraction so that chemotherapy drugs do not reach the mucosa[11].

Wilcoxon test results showed there were differences in the pre-post mucositis assessment of gargling with normal saline with a value of p=0.000. The results of the study were the same as the research conducted by Nursalam, Ertawati, and Kristyaningsih, stating that in the normal saline group the p value was 0.012, these results show that normal saline is effective in preventing oral mucositis. Normal saline is a physiological fluid (according to body fluids) that can clean debris, does not irritate, nor does it change the pH of saliva. Because it does not change the pH of saliva, the natural buffer of the mouth will not be disturbed. Physiological mouth will be maintained because there is no irritation [12]. Reducing the number of debris will result in a reduction in bacteria in the mouth. If the patient rinses with normal saline, it is expected that the endurance (oral) of the patient will increase[13].

The value of mucositis before and after the oral cryotherapy action in this study was identified by comparing the post-test values of the degree of mucositis between the intervention group and the control group by using a statistical analysis of the mann whitney test. Based on the results of the analysis it can be interpreted that there are differences in the intervention and control groups with an OAG value, p = 0.003, given p <0.05.

The results of this study are in accordance with Askarifar, Lakdizaji, Ramzi, Rahmani and Jabbarzadeh, which divided the two groups: the intervention group with oral cryotherapy and the control group using

mouthwash with normal saline. The results showed that on the seventh day the severity of mucositis was less in the intervention group (p=0.031) than in the control group. On the fourteenth day mucositis severity was less in the intervention group (p=0.004) than in the control group. The conclusion of the study is that cryotherapy is more effective than mouthwash using normal saline in preventing mucositis [4].

Karagozoglu and Ulusoy showed that the incidence of mucositis in the intervention group was 10% and in the control group 50% using instruments measuring the degree of mukositis Physician-Judged Mucositis Grading. The results of the study confirmed that oral cryotherapy was effective for the prevention of mucositis and reduced severity [13].

Conclussion

The results of this study are described in several sections about: (1) There is a difference in the value of mucositis after being given treatment (post) Oral cryotherapy using ice cubes in the intervention group, where 29 respondents did not experience mucositis and 3 respondents experienced mucositis. Whereas in the control group that experienced mucositis 18 respondents and did not experience mucositis 12. respondents (2) There were mucositis values before and after treatment in the intervention group with oral cryotherapy measures, the results of this study showed there were significant differences in mucositis values. While in the control group there were also significant differences between the values of mucositis.

Conflict of Interest: Nil

Source of Funding: Self

Ethical Consideration: The Research Ethics Committee from the Commission of Health Research Ethics Faculty of Nursing Universitas Sumatera Utara No. 1577/X/SP/2018.

References

1. International Agency for Research on Cancer (IARC). 2012. Available from: http://globocan.iarc.fr/Default.aspx.
2. Riset Kesehatan Dasar (RISKESDAS) 2013. Available from: http://terbitan.litbang.depkes.go.id/penerbitan/index.php/lpb/catalog/book/158.
3. American Cancer Society. 2017. Available from: https://www.cancer.org/research/cancer-facts-statistics/all-cancer-facts-figures/cancer-facts-figures-2017.html. diunduh 10 Oktober 2017.
4. Askarifar et al. The Effects of Oral Cryotherapy on Chemotherapy-Induced Oral Mucositis in Patients Undergoing Autologous Transplantation of Blood Stem Cells: A Clinical Trial. 2016. *Iran Red Crescent Med J, 18*(4):e24775. doi: 10.5812/ircmj.24775
5. Sadasivan R. Chemotherapy-induced oral mucositis. 2010. *Oncological Review,* 6: 13–6. doi: 10.17925/OHR.2010.06.0
6. Gori et al. Cryotherapy in the prevention of oral mucositis in patients receiving low-dose methotrexate following myeloablative allogeneic stem celltransplantation: a prospective randomized study of the Gruppo Italiano Trapianto di Midollo Osseo nurses group. 2007. *Bone Marrow Transplantation* 39, 347–352. doi:10.1038/sj.bmt.1705590.
7. Martin CA, Perez MG. Prevention and treatment of oral mucositis in patients receiving chemotherapy. 2014. *Journal section: Oral Medicine and Pathology.* doi:10.4317/jced.51313. http://dx.doi.org/10.4317/jced.51313
8. Dodd MJ., Miaskowski C., Dibble AL., Paul SM., MacPhail L. Greespan D. Faktor influencing oral mucositis in patient receiving chemotherapy. 2000. Cancer Practise Journal.
9. Katranci N, Ovayolu N, Ovayolu O, and Sevinc A. Evaluation of the effect ofcryotherapy in preventing oral mucositis associated with chemotherapy - a randomizedcontrolled trial. 2012. *European Journal of Oncology Nursing, 16*(4):339–44. doi: 10.1016/j.ejon.2011.07.008. [PubMed: 21911313]
10. Peterson DE, Ohrn K, Bowen J, Fliedner M, Lees J, Loprinzi C, et al. Systematic review of oral cryotherapy for management of oral mucositis caused by cancer therapy. *Support Care Cancer.* 2013;21(1):327–32. doi: 10.1007/s00520-012-1562-0. [PubMed: 22993025]
11. Svanberg A, Birgegard G, Ohrn K. Oral cryotherapy reduces mucositis and opioid use after myeloablative therapy--a randomized controlled trial. *Support Care Cancer.* 2007;15(10):1155–61. doi: 10.1007/s00520-007-0245-8. [PubMed: 17393189]

12. Royse M, Martens, J. Implementation of an oral care protocol to promote early detection and management of stomatitis. 2010. *Clinical Journal of Oncology Nursing, 14*, 799–802.

13. Karagözo SL, Ulusoy MF. Chemotherapy : The Effect of Oral Cryotherapy on the devolopment of mucositis. 2005. *Journal of Clinical Nursing*, 14(6),754-765.

The Correlation of Neck Circumference with the Metabolic Age of Obesity

Ni Nyoman Sri Yuliani [1], Elsa Trinovita[2]

[1]Department of Nutrition, [2]Department of Pharmacology, Faculty of Medicine, Palangka Raya University, Central Kalimantan, Indonesia

Abstract

Fat accumulation in obesity stimulates an increase in the production of pro-inflammatory mediators in the body chronically, causing the cell's metabolic age to be older than the chronological age. This situation can cause a decrease in metabolic rate; therefore, the body is at risk of cardiometabolic disease. Neck circumference (NC) is known as an anthropometry which is closely related to obesity, visceral fat, and metabolic syndrome. The purpose of this study was to determine the correlation of NC with increasing cell's metabolic age so that it can serve as a simple anthropometry in predicting cell's metabolic age. The study was conducted with a cross-sectional design. The sample of the study was adult male and female with age 30-59 years and following the inclusion and exclusion criteria. The anthropometric examination was carried out in the form of body mass index, neck circumference, and cell's metabolic age using Bioelectrical Impedance Analyzer. Total samples obtained were 94 obese subjects with a mean BMI, NC and metabolic age was 26.9 kg /m^2, NC 34.1 cm, and 50 years. There was a significant positive correlation between NC and cell's metabolic age ($p = 0.001$; $r = 0.42$). In conclusion, NC is useful as simple and practical anthropometry used to predict the increase in metabolic age of cells.

Keywords*: neck circumference; the age of metabolic cells; obesity*

Introduction

Obesity is a serious health problem, and its prevalence continues to increase in many developing countries. World Health Organization (WHO) data shows that the problem of obesity is increasing in developing countries with more than 115 million people suffering. In Indonesia, secondary data analysis from the National Health Survey (Riskesdas) in 2018 depicted an increase in the prevalence of obesity in adults aged > 18 years to 21.8% in 2018, while in 2007 it was only 10.8%.[1] An increase in the prevalence of obesity was also seen in Central Kalimantan Province, which was 15.2% in 2007 to 18.67% in 2018.[1] Obesity is one of the leading causes of metabolic diseases such as insulin resistance which then develops into fatty liver diabetes mellitus, cancer, and cardiovascular disease.[2] Fat accumulation in obesity will increase the basal metabolic rate (BMR) and the deposits of subcutaneous and visceral fat. This situation will stimulate an increase in the production of pro-inflammatory mediators in the body in a chronic manner, causing a cell's metabolic age to be older than chronological age.[3] The more aging cellular metabolic age, compared to the actual age of the patient, indicates a decrease in metabolic rate in the body and implies a risk of experiencing several significant health problems namely cardiometabolic disease.[4]

The gold standard for examining fat accumulation in obesity is computed tomography scans, in addition to indirect methods that are often used, which are anthropometric measurements such as body mass index, waist-hip circumference ratio, skinfold thickness, and upper arm circumference. These anthropometric measurements have advantages and disadvantages of each in predicting fat accumulation in obesity. Neck circumference serves as a relatively new anthropometric measurement.[5–7] Several studies mention that neck circumference is closely related to obesity, visceral fat and metabolic syndrome.[7–10] Examination of metabolic

Corresponding Author:
Ni Nyoman Sri Yuliani
Jl. Kampus Tunjung Nyaho Jalan Yos Sudarso, Palangka Raya,, Indonesia email: nyomigiziklinik@gmail.com

age of body cells is measured based on the basal metabolic rate which requires sophisticated tools such as indirect calorimetry, dual-energy X-ray absorptiometry (DXA) and bioelectrical impedance analyzer. [11,12]

Based on the previous researches, no research has elicited the relationship of neck circumference with an increasing metabolic age of cells in obesity with the aim of producing an alternative measurement of cell's metabolic age that is practical, simple and minimizes radiation exposure so that it can solidify the prediction of cell's metabolic age which is related to cardiometabolic disease by the primary health workers.

Materials and Method

This research was conducted at the University of Palangka Raya and the working area of the Pahandut Public Health Center in Palangka Raya City, starting from May - July 2019. The sample in this study was male and female adults aged 30-59 years and was following the inclusion criteria ie, not undergoing diet program and not consuming steroids. The exclusion criteria included neck tumors, kyphosis, incomplete extremities, edema, and Cushing's syndrome. The research used a purposive sampling method, and 94 samples were obtained.

The stages in this study were carried out by measuring anthropometrics, namely by using body mass index (BMI) measurements with the formula below. We used WHO Asia pacific adult's cutoff point, BMI ≥ 25 kg/m2 for obesity.[13]

$$\text{BMI} = \frac{Body\ weight\ (kg)}{Body\ height\ (m) x\ Body\ height\ (m)}$$

The neck circumference measurements were then performed on the cricoid cartilage, mid-neck length, between mid-cervical bone and mid-anterior neck using a non-elastic plastic measuring tape with a scale of 1 mm. The circumference of a man's neck was drawn just below the protrusion of Adam's apple. Measurement of cell's metabolic age and BMR were carried out using Bioelectrical Impedance Analyzer (BIA) (Omron Karada Scan professional spec HBF 701, Kyoto Japan).

Analysis of the data used in this study was the Pearson correlation bivariate test using SPSS (Statistical Package for the Social Sciences) version 23 (IBM Corporation, Armonk, NY, USA). Data interpretation based on the value of *r* arithmetic (Pearson correlations) > r table means that this analysis is positive and has a relationship between the two variables.

Findings and Discussion

In this study, 94 subjects with obesity criteria were dominated by the female (72.3%) compared to men (27.7%). In addition, an average body mass index of obese subjects was 29.6 kg / m2 with an age range of 30-57 years. Characteristics of the research subjects can be seen in Table 1 below.

Table 1. Subject characteristics (N = 94)

Variables	Total (%)	Mean ± SD	Min-max
Age (year)		41,6 ± 9,95	30-57
30-40	39 (41,4)	31,8 ± 2,5	30-37
41-50	14 (14,8)	47 ± 2,9	42-50
51-59	41 (43,8)	53,8 ± 1,7	51-57
Sex			
Male	26 (27,7)		
Female	68 (72,3)		
Body mass index (kg/m2)		29,6 ± 3,7	25-41,3
25 – 30	59 (62,8)	26,9 ± 1,2	25-29,1
>30	35 (37,2)	33,2 ± 3,1	30,1-41,3
Neck circumference (cm)	94	34,1 ± 2,6	27,5-39,8
Cell's metabolic age (year)	94	50 ± 13	18-80
BMR (kkal/day)	94	1427,9±241,2	1021-2013

As per Table 2. Data NC and cells's metabolic age was achieved by using Pearson correlation test showed a significant relationship and positive linear correlation on neck circumference variables with cell's metabolic age (p = 0.001).

Table 2. Correlation between neck circumference and cell's metabolic age

Variable	Neck circumference	
	r	p
Cell's metabolic age	0,42	0,001

The results of this study indicate that neck circumference has a positive linear correlation with the cell's metabolic age with moderate correlation strength (r = 0.42, p = 0.001). This correlation indicates that the larger the size of the neck circumference, the metabolic age of cells increases or older than the chronological age in the obese individual bodies. The mechanism that is thought to cause this is the start of a positive energy balance in obesity, which causes an abnormal and excessive accumulation of fat in the body. The fat accumulation is stored mainly in the upper body adipose tissue.[14,15]

The limitations of subcutaneous fat capacity in storing excess fat in obese individuals are causing fat to be stored in visceral tissue and ectopic tissue including the neck in the posterior and subcutaneous compartments, thereby increasing the size of the neck circumference in obese people.[16] Adipose tissue in obesity is known to produce and release pro-inflammatory mediators such as tumor necrosis factor-α (TNF-α), interleukin 6 and reduce adiponectin production which then causes pro-inflammatory conditions and oxidative stress.[17] Extra nutrient stimulation in adipose tissue is responded by performing hyperplasia and hypertrophy of adipocyte cells. Adipocyte cells that continue to grow cause the blood supply to these cells to decrease and trigger hypoxia.[17] This hypoxia is the cause of cell necrosis and infiltration of macrophages into adipose tissue, which then stimulates overproduction of pro-inflammatory mediators. This situation causes local inflammation in adipose tissue which then becomes a systemic inflammation in obesity.[17,18] This ongoing inflammatory condition in obesity is referred to as chronic low-grade inflammation and can change metabolic function.[19,20] However, tissue function restoration does not occur in obese individuals, and it is different from healthy individuals that can occur due to inflammation of tissue restoration. This situation is associated with the elaboration of cytokines and inflammatory mediators that trigger metabolic organ tissue dysfunction.[19]

The increased of adipose tissue in obesity will increase the BMR compared to individuals of normal weight.[21] Increased BMR will increase the metabolic age of cells, rather than chronological age, and it is reflecting the physical health of obese individuals which leads to cell metabolic dysfunction.[4]

Conclusion

A large increase in neck circumference can be a predictor of the cell's metabolic age in obesity, which in line with an increase of fat accumulation in adipose tissue with obesity.

Ethical Clearance: Approval for the study was taken from the Ethics Committee of Faculty of Medicine, Palangka Raya University. Informed consent was taken from adults aged 30-59 years.

Source Funding: This research was supported by the The Ministry of research and technology Dikti, Indonesia through the 2019 as Beginner Lecturer Research Grant.

Conflict of Interest: There are no conflicts of interest.

References

[1] Riskesdas. Basic of Health Research 2018. Ministry of Health Republic of Indonesia. 2018;1–100.

[2] Ellulu M, Abed Y, Rahmat A, Ranneh Y, Ali F. Epidemiology of obesity in developing countries : challenges and prevention. Glob epidemic Obes. 2014;2(2):1–6.

[3] Garcia-rubira JC, Cano-garcia FJ, Bullon B, Seoane T, Villar P V, Cordero MD, et al. Body fat and metabolic age as indicators of inflammation and cardiovascular risk. Eur J Prev Cardiol. 2017;0(00):1–2.

[4] Kaziuk, Magdalena Barbara Kosiba W, Kuzniewski M. High metabolic age and excessive adipose tissue as a storage location for toxins, and their influence on the excretory

function of a liver and bile duct in patients with a transplated allogenic kidney. Transpl J. 2016;S53.

[5] Hingorjo MR, Qureshi M a, Mehdi A. Neck circumference as a useful marker of obesity: a comparison with body mass index and waist circumference. JPMA. 2012;62(1):36–40.

[6] Ferretti RDL, Cintra IDP, Aparecida M, Passos Z, Luis G, Ferrari DM, et al. Elevated Neck Circumference and Associated Factors in Adolescents. BMC Public Health. 2015;15(208):1–10.

[7] Huang B, Zhu M, Wu T, Zhou J, Liu Y, Chen X. Neck Circumference , along with Other Anthropometric Indices , Has an Independent and Additional Contribution in Predicting Fatty Liver Disease. PLoS One. 2015;10(2):1–12.

[8] Ang NS, Raboca JC. Neck Circumference as a Screening Measure for Abdominal Obesity and its Association with Metabolic Syndrome among High Risk Filipino Patients in Makati Medical Center. PSEM. 2011;118(87):1–17.

[9] Li H-X, Zhang F, Zhao D, Xin Z, Guo S-Q, Wang S-M, et al. Neck circumference as a measure of neck fat and abdominal visceral fat in Chinese adults. BMC Public Health. 2014;14(1):311.

[10] Hassan NE, Atef A, El-masry SA, Ibrahim A, Shady MMA, Al-tohamy M. Neck Circumference as a Predictor of Adiposity among Healthy and Obese Children. Maced J Med Sci. 2015;3(4):558–62.

[11] Schrack JA, Knuth ND, Simonsick EM, Ferrucci L. "IDEAL" Aging is Associated with Lower Resting Metabolic Rate: The Baltimore Longitudinal Study of Aging. J Am Geriartr Soc. 2014;62(4):667–72.

[12] Jylhävä J, Pedersen NL, Hägg S. Biological Age Predictors. EBioMedicine. 2017;21:29–36.

[13] World Health Organization Western Pasific Region. The Asia-Pasific perspective: Redefining obesity and its treatment. Health communications Australia Pty; 2000.

[14] Karpe F, Pinnick KE. Biology of upper-body and lower-body adipose tissue—link to whole-body phenotypes. Nat Publ Gr. 2014;11(2):90–100. Available from: http://dx.doi.org/10.1038/nrendo.2014.185

[15] Yuliani NNS, Subagio HW, Murbawani E. Korelasi Lingkar Leher Dengan Persentase Lemak Tubuh Pada Obesitas. J Nutr Heal. 2017;5(3):138–45.

[16] Torriani M, Gill CM, Daley S, Oliveira AL, Azevedo DC, Bredella MA. Compartmental neck fat accumulation and its relation to cardiovascular risk and metabolic syndrome. Am J Clin Nutr. 2014;100:1244–51.

[17] Ellulu MS, Patimah I, Khaza'ai H, Rahmat A, Abed Y. Obesity & inflammation: The linking mechanism & the complications. Arch Med Sci. 2017;13(4):851–63.

[18] Tchernof A, Després J-P. Pathophysiology of human visceral obesity: an update. Physiol Rev. 2013;93(1):359–404.

[19] Kotas ME, Gorecki MC, Gillum MP. Sirtuin-1 is a nutrient-dependent modular of inflammation. Adipocyte. 2013;2(2):113–8.

[20] Lee H, Lee IS, Choue R. Obesity, Inflammation and Diet. Pediatr Gastroenterol Hepatol Nutr. 2013;16(3):143.

[21] Jr BJG, Connolly-schoonen J. Addressing Weight Loss Recidivism : A Clinical Focus on Metabolic Rate and the Psychological Aspects of Obesity. ISRN Obes. 2012;2012:1–6.

Analysis of Calcium and Phsophate in Patiens with Heart Failure

Nunung Meisari Indah Umar[1], Tenri Esa[1], Darmawaty ER[1]

[1]Department of Clinical Pathology, Faculty of Medicine, Hasanuddin University-Dr.Wahidin Sudirohusodo Hospital Makassar, Indonesia. Jl. Perintis Kemerdekaan Tamalanrea, Makassar, Telp.(0411) 581226

Abstract

Heart failure is a clinical syndrome caused by abnormalities in the structure or function of the heart in the myocardium, causing ventricular filling or cardiac output. Calcium and phosphate are metabolic markers that have been linked to the development of the cardiovascular disease. Increased levels of phosphate in patients cause increased production of FGF-23 which induces activation of calcineurin signaling in cardiomyocytes and triggers cardiac hypertrophy. Calcium plays an important role in connecting membrane stimulation with contractions in the myocardium. This study uses a cross-sectional method. Examination of calcium and phosphate levels using serum samples was taken on 57 heart failure patients treated at the Integrated Heart Center Dr. Wahidin Sudirohusodo during the period May to August 2019. Data were analyzed statistically by the Kolmogorov Smirnov test and the Independent T-test.This study showed a significant difference between the calcium levels of the ejection fraction group <50% with a median of 4.67 mg / dL and the ejection fraction group> 50% with a median of 6.06 mg / dL (p <0.01). There was a significant difference between the phosphate levels of the ejection fraction group <50% with a median of 3.62 mg / dL and the ejection fraction group> 50% with a median of 3.04 mg / dL (p = 0.04). It was concluded that calcium levels arehigher in heart failure patients with ejection fraction> 50% & phosphate levels lower in heart failure patients with ejection fraction> 50%.

***Keywords**: Calcium, phosphate, ejection fraction, heart failure*

Introduction

Heart failure is a clinical syndrome caused by structural and functional defects in the myocardium that causes impaired ventricular filling or cardiac output.[1] According to the American College of Cardiology (ACC) and the American Heart Association (AHA), heart failure with a decreased ejection fraction is defined as an ejection fraction ≤40%, whereas heart failure with maintained ejection fraction is defined as an ejection fraction ≥50%.[2]Data from the Atherosclerosis Risk in Communities Study has shown that around 915,000 new cases of heart failure occur annually in the United States. The incidence rate increases with the age of patients of both sexes. Data from the Framingham Heart Study has shown that the annual rate of new heart failure per 1000 people/year is 9.2 for white men aged 65 to 74 years, 22.3 for white men aged 75 to 84 years, and 43.0 for white men ≥85 years.[3]Higher thresholds for case definition, greater severity of the disease, and limited availability of evidence-based therapy can explain this higher death rate in developing countries.[4]

Heart failure is a multisystem disorder in which there is interference with the heart, skeletal muscle and kidney function, stimulation of the sympathetic nervous system and complex neurohormonal changes. In systolic dysfunction, there is a disruption in the left ventricle which causes a decrease in cardiac output. This results in activation of the neurohormonal compensation mechanism, the Renin-Angiotensin-Aldosterone system (RAA system) as well as vasopressin and natriuretic peptide levels that aim to improve the cardiac environment so that cardiac activity can be maintained.[5,6]

Calcium plays an important role in connecting membrane stimulation with contractions in the myocardium. Damaged calcium homeostasis in heart failure can occur due to pathological changes in the expression, and activity of calcium homeostatic binding proteins, ion channels and enzymes. Calcium also plays

an important role in the excitation and contraction of cell membranes, called Excitation-Contraction Coupling (ECC). Cardiac contraction depends on increasing transient concentrations of cytosolic calcium to activate the formation of cross-bridges between the myofilament proteins which ultimately leads to the development of pressure in the heart chambers and provides energy for blood pumps. Cardiomyocytes wrapped in myofibrils are enveloped in tissue storing calcium sarcoplasmic reticulum and mitochondria. The research of Adeniran et al concluded that with calcium disruption and ion channel remodeling in the ejection fraction, the duration of the potential action of ventricular cells becomes prolonged, along with an increase in diastolic calcium concentration.[7]

Increased phosphate levels in patients with heart failure result in increased production of FGF-23, which induces activation of calcineurin signaling in cardiomyocytes, promoting cardiac hypertrophy.[8] Increased phosphate load has been associated with valvular heart disease, with hypertrophic left ventricles, and especially with vascular calcification.[9] Research conducted by Lutsey et al high phosphate concentrations to be associated with an increased risk of heart failure, atrial fibrillation, and a worse prognosis among patients. Framingham's research and post hoc analysis from Cholesterol and Recurrent Events clinical trials have found a positive relationship between serum phosphorus risk and heart failure.[8]

Research on the analysis of calcium and phosphate levels in heart failure patients is still ongoing and continues to be developed. Based in there backgrounds, we were interested in conducting research on the analysis of calcium and phosphate levels in heart failure patients.

Method

This study is a cross-sectional analytic study, analyzing calcium and phosphate levels in patients with heart failure based on ejection fraction. The study was conducted from May to August 2019 at the Clinical Pathology Laboratory of Dr. Wahidin Sudirohusodo Hospital Makassar. The study sample was all patients diagnosed with heart failure by the cardiologist. All subjects were tested for serum calcium and phosphatelevels in. In conducting this research, every action was carried out with the permission and knowledge of patients who were used as research samples through an informed consent sheet and was declared to have met the ethical requirements to be carried out by the Health Research Ethics Commission (KEPK) Faculty of Medicine, Hasanuddin University-UNHAS State University Hospital (RSPTN UH) -RSUP Dr. Wahidin Sudirohusodo Makassar.

Data were analyzed statistically by the Independent T-test is used to assess the difference between calcium levels of heart failure with ejection fraction <50% and ejection fraction> 50% and phosphate levels of heart failure with ejection fraction <50% and ejection fraction> 50%. Hypothesis test results are significant if $p \leq 0.05$.

Results

The study samples obtained were 57 heart failure patients who met the inclusion criteria. The characteristics of study samples can be seen in Table 1 that shows male subjects were more than female. Most study subjects were found in the 40-64 year group.

Table 1. Sample characteristics

Characteristics	n (%)	Mean ± SD	Median (Min-Max)
Gender Male Female	39 (68.4) 18 (31.6)		
Age (year)		52.87±12.06	
Calcium		5.47 ± 1.61	5.66 (2.54-9.23)
Phosphate		4.05 ± 1.90	2.65(1.99–7.60)

Table 2 showed ejection fraction group <50% with mean calcium level 4.72 mg / dL ± 1.06 and ejection fraction group> 50% with mean calcium level 6.41 mg / dL ± 1.62. The results of the statistical analysis in table 2 show that there are significant differences between these two groups with a value of p = 0.00 (p <0.01).

Table 2.The difference between calcium in heart failure based on ejection fraction

Ejection Faction	calcium levels (mg/dL)		P
	Mean ± SD	Median (min-max)	
< 50 %	4.72 ± 1,06	4.67 (2.54 – 6.44)	*0.000
> 50 %	6.41 ± 1.62	6.06 (3.10 – 9.23)	

*Independent T test

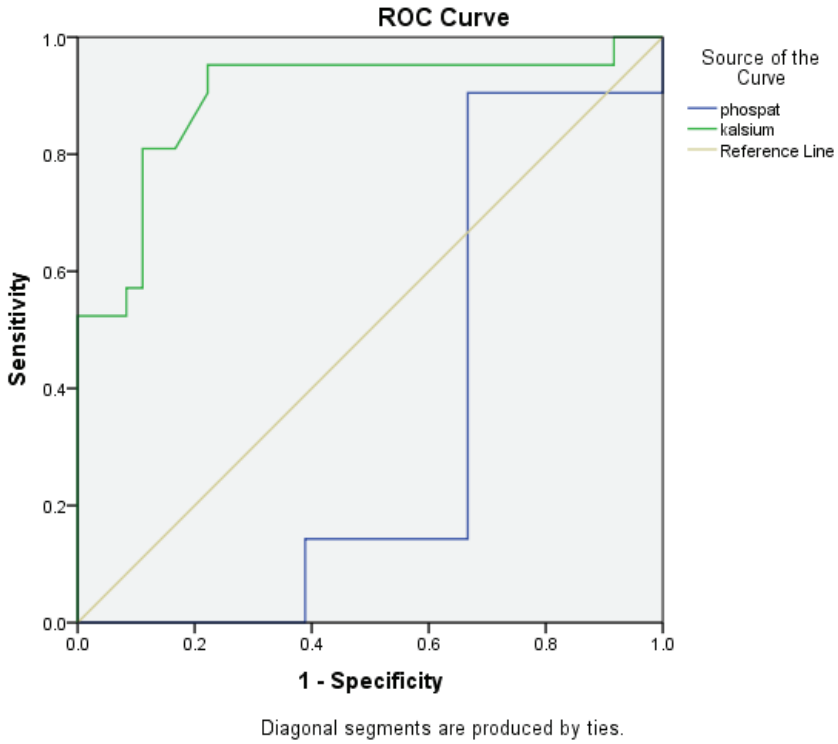
Table 3 shows the ejection fraction group <50% with mean phosphate level of 3.80 ± 1.79 and the ejection fraction group> 50% with a mean phosphate level of 3.44 ± 1.07. Statistical analysis showed that there were significant differences between the two groups with p <0.05.

Table 3. The difference between phosphate in heart failure is based on the ejection fraction

Ejection Faction	Phosphate levels (mg/dL)		P
	Mean ± SD	Median (min-max)	
< 50 %	3.80 ± 1.79	3.62 (1.49-7.60)	*0.047
> 50 %	3.44 ± 1.07	3.04 (1.99-6.30)	

*Independent T test

Pictures 1 shows statistical analysis based on ROC curves shows there is a cutoff in calcium levels in heart failure patients based on ejection fractionis 5.7 mg / dL with ROC = 0.046 (0.011-0.197) with a sensitivity of 87% and a specificity of 76.5%. Pictures 1 shows statistical analysis based on ROC curves shows there is a cutoff in phospate levels in heart failure patients based on ejection fractionis 2.5 mg / dL with ROC = 0.314 (0.077-1.285) with a sensitivity of 87% and a specificity of 32.4%.



Pictures 1. Receiver operating characteristic (ROC) calcium dan phospat levels in heart failure patients based on ejection fraction

Discussion

In this study, subjects were mainly male (68.4%) with a mean age of the subjects 52.8 years. Epidemiological data show that the incidence of heart failure is higher in men than women and the risk increases with age.[10] This study is in line with research conducted by The Netherlands' Rotterdam which found that the majority of heart failure that was obtained was male (33%) compared to women (29%) and the average age of 55 years.[11] In old age and male sex are risk factors associated with atherosclerosis and the occurrence of SCS that cannot be modified.[12]

The results of this study indicate calcium levels in heart failure patients (5.47 ± 1.61 mg / dL). One study reported a patient with hypocalcemia (23%) in heart failure patients (Rozentryt et al., 2015). Other studies have shown calcium levels in heart failure patients to be around 32% with hypocalcemia.[13]

The dysregulation of calcium homeostatic mechanisms are common in heart failure. There have been many studies in patients treated in intensive care units (including those with acute heart failure) showing a high prevalence of hypocalcemia and its association with a poor prognosis. Calcium is an important element for ventricular systolic and diastolic function. During the active process of depolarizing the myocardial membrane, there is a rapid flow of calcium ions through the active membrane calcium channels and the subsequent release of calcium ions from the sarcoplasmic reticulum. Then calcium binds to the troponin-tropomyosin complex, supporting myocardial contraction and fusion of actin-myosin. Relaxation occurs when calcium ions are actively pumped back into the sarcoplasmic reticulum, tropomyosin continues in its shape and myosin returns and releases actin. [14,15]

This study also showed a significant association of calcium levels between the heart failure group and the ejection fraction <50% with> 50%. At the determination of the cut point in calcium in heart failure patients based on ejection fractionis 5.7 mg / dL with ROC = 0.046 (0.011-0.197) with a sensitivity of 87% and a specificity of 76.5%. This is in line with research by Wang et al, 2015 found that low calcium levels are one of the factors that influence the low left ventricular ejection fraction. In another study conducted by Grandi et al, stated that there was a significant correlation between calcium and phosphate levels with a value of p <0.0001.[16] This

is certainly related to calcium phosphate metabolism which is influenced by various factors including the role of parathyroid hormone and vitamin D levels.

The results of this study indicate phosphate levels in heart failure patients (4.05 ± 1.90 mg / dL). Another large-scale study with 977 heart failure patients showed an independent relationship between serum phosphate levels even in the normal range with the severity of disease and prognosis in patients with heart failure. [17]

Hypophosphatemia can cause heart failure. ATP synthesis in muscle cells is decreased in hypophosphatemic patients, indicating that intramyocellular phosphate regulates ATP synthesis. Myocardial and inorganic phosphate keratin phosphate concentrations are significantly reduced during periods of phosphate depletion along with mitochondrial and myofibrillar keratin phosphate kinase activities, which have an important role in contractility of the heart muscle. Stroke volume is increased by administration of phosphate independently of the Frank-Starling effect in patients with severe hypophosphatemia, indicating an increase in myocardial contractility.[18]

Phosphate levels in this study were found to be within normal limits in the heart failure group with ejection fractions <50% and> 50%. At the determination of the cut point in calciumin heart failure patients based on ejection fractionis 2.5 mg / dL with ROC = 0.314 (0.077-1.285) with a sensitivity of 87% and a specificity of 32.4%. A cross-sectional study found high serum phosphate levels were associated with an increase in left ventricular mass and enlarged left ventricular internal dimensions that affected the ejection fraction.

The group with normal phosphate levels was found as many as 26 people. From all research subjects, the mean phosphate value was 4.05. These results are in line with the research of Kamiyama et al, who reported a normal phosphate level of 3.3 mg / dL in heart failure patients. Recent research shows that high serum phosphate levels, even in the normal range, can contribute to an increased risk of cardiovascular diseases such as myocardial infarction and heart failure.[19] Several factors that can affect phosphate levels include diabetic status, albumin levels, smoking history, parathyroid hormone activity, vitamin D levels, history of using beta-blockers, in addition to genetic polymorphism variations that affect FGF-23 production.[20]

This study had some limitations. This study is a cross-sectional study with one-time sampling so it does not see changes in phosphate and calcium levels due to the therapeutic effect and other than that in this study other factors that could affect phosphate and calcium levels were not excluded.

Conclusion and Suggestion

This study concluded that there were differences in phosphate and calcium levels between heart failure patients with ejection fraction < 50% and > 50%. There are significant differences in calcium and phosphate levels in heart failure based on ejection fraction.We recommend further studywith the better distribution of samples in each group, considering therapy received by the patientsand control other risk factors that affect phosphate and calcium levels. We also recommend further study that measures phosphate and calcium levels serially at the beginning and at the end of treatment.

Ethical Clearance: The study was approved by the Health Research Ethics Commission (KEPK) Faculty of Medicine, Hasanuddin University-UNHAS State University Hospital (RSPTN UH) -RSUP Dr. Wahidin Sudirohusodo Makassar Indonesia.

Source of Funding: This study was funded by authors

Conflict of Interest: The authors declare that they have no conflict interest

References

1. Cooperstein, N. Coronary Artery Disease Diagnosis and Management Coronary artery Cardiovascular Risk reduction Prevention, Primary Care Clinics in Office Practice.Elsevier Inc.2018; 45(1) : 45–61.
2. Ziaeian B, Fonarow GC. Epidemiology and aetiology of heart failure. *Nat Rev Cardiol*. 2016;13(6):368–378. doi:10.1038/nrcardio.2016.25
3. Thomas S, Rich MW. Epidemiology, pathophysiology, and prognosis of heart failure in the elderly. *Heart Fail Clin*. 2007;3(4):381–387. doi:10.1016/j.hfc.2007.07.004
4. Diastutik D. Proporsi karakteristik penyakit jantung koroner pada perokok aktif berdasarkan karakteristik merokok (*Characteristic Proportion of CHD for Active Smoker by Smoking Characteristic*). Jurnal berkala Epidemiologi. 2016;4(3): 326–337

5. Jackson G, Gibbs CR, Davies MK, Lip GY. ABC of heart failure. Pathophysiology. *BMJ*. 2000;320(7228):167–170. doi:10.1136/bmj.320.7228.167
6. Hartupee J, Mann DL. Neurohormonal activation in heart failure with reduced ejection fraction. *Nat Rev Cardiol*. 2017;14(1):30–38. doi:10.1038/nrcardio.2016.163
7. Kendrick J, Kestenbaum B, Chonchol M. Phosphate and cardiovascular disease. *Adv Chronic Kidney Dis*. 2011;18(2):113–119. doi:10.1053/j.ackd.2010.12.003
8. Lutsey PL, Alonso A, Michos ED, et al. Serum magnesium, phosphorus, and calcium are associated with risk of incident heart failure: the Atherosclerosis Risk in Communities (ARIC) Study. *Am J Clin Nutr*. 2014;100(3):756–764. doi:10.3945/ajcn.114.085167
9. Heine, G. H., Nangaku, M. and Fliser, D. Calcium and phosphate impact cardiovascular risk. *European Heart Journal*. 2013;34(15):1112–1121.
10. Mbakwem A, Aina F, Amadi C. *Expert Opinion*-Depression in Patients with Heart Failure: Is Enough Being Done?. *Card Fail Rev*. 2016;2(2):110–112. doi:10.15420/cfr.2016:21:1
11. Dunlay SM, Pereira NL, Kushwaha SS. Contemporary strategies in the diagnosis and management of heart failure. *Mayo Clin Proc*. 2014;89(5):662–676. doi:10.1016/j.mayocp.2014.01.004
12. Mirza Aj, Taha AY, Khdir BR. Risk factors for acute coronary syndrome in patients below the age of 40 years. *The Egyptian Heart Journal*.2018;70(4):233-235.
13. Jensen ASC, Polcwiartek C, Sogard P., et al. The Assocoiation Between Serum Calcium Levels and Short-Term Mortality in Patients with Chronic Heart Failure. *The American Journal of Medicine*. 2019;132(2):200-208.e1.
14. Parepa I, Mazilu L, Suceveanu A, Voinea C, Tica I. HYPOCALCEMIC CARDIOMYOPATHY - A RARE HEART FAILURE ETIOLOGY IN ADULT. *Acta Endocrinol (Buchar)*. 2019;-5(1):107–112. doi:10.4183/aeb.2019.107.
15. Rozentryt P, Niedziela JT, Hudzik B, Doehner W, Jankowska EA, Nowak J, et al. Abnormal Serum Calcium Levels are Associated with clinical response to maximization of heart failure therapy. *Pol Arch med Wewn.* 2015;125(1-2):54-64.
16. Lucock MD, Martin C, Boyd L, et al. Response to "calcium, phosphate and the risk of cardiovascular events and all-cause mortality in a population with stable coronary heart disease." *Heart*. 2012;99(5):349-350. doi:10.1136/heartjnl-2012-302480
17. Ess M, Heitmar-Wietzorrek K, Frick M., et al. Serum phosphate and long-term outcome among patients with stable heart failure. *Journal of Cardiac Failure*. 2013; 19(1):25-30. doi: 10.1016/j.cardfail.2012.11.008.
18. Christopoulou, E.C., Filippatos, T.D., Megapanou, E. et al. Phospahte Imbalance in Patients with Heart Failure. *Heart Fail Rev*.2017;22: 349. https://doi.org/10.1007/s10741-017-9615-6.
19. Kamiyama Y, Suzuki H, Yamada S, Kaneshiro T, Takeishi Y. Serum phosphate levels reflect responses to cardiac resynchronization therapy in chronic heart failure patients. *J Arrhythm*. 2015;31(1):38–42. doi:10.1016/j.joa.2014.06.006.
20. Palmer SC, Teixeira-Pinto A, Saglimbene V, et al. Association of drug effects on serum parathyroid hormone, phosphorus, and calcium levels with mortality in CKD: A meta-analysis. *Am J Kidney Dis*. 2015;66(6):962-971. doi:10.1053/j.ajkd.2015.03.036

Survival Analysis of Ovarian Cancer Patients based on Age at The Dr. Wahidin Sudirohusodo Makassar Hospital in 2014-2018

Nurul Fitriani[1], Bambang Sutrisna[2], Nugraha Utama Pelupessy[3]

[1]Master of Epidemiology, Faculty of Public Health, University of Indonesia, Depok, [2]Department of Epidemiology, Faculty of Public Health, University of Indonesia, Depok, [3]Department of Obstetrics and Gynecology, Dr. Hospital Wahidin Sudirohusodo Makassar, South Sulawesi

Abstract

Background. Generally, a younger age at diagnosis indicates a better prognosis, with younger women having an average survival of at least 2 years longer than older women. It is estimated that in young women the disease is diagnosed more quickly in the early stages when compared to older women.

Method. A cohort retrospective study. This research was conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital by taking the medical records of ovarian cancer patients from January 2014 to December 2018. The study subjects were 263 patients. The Kaplan-Meier method was used to estimate survival rate and Cox Regression to investigate the effect of variable.

Results. The survival of ovarian cancer patients within 30 months is 78%. Ovarian cancer patients who survived to the 30th month based on age ≤ 60 years were 79% whereas > 60 years to 30th month none had survived with an HR score of 2.74 (95% CI: 1.09-6.88). Multivariate analysis HR values were obtained for age 2.65 (95% CI: 1,07-6,52) after being controlled by stage, and performance status.

Conclusion. Age affects the survival of ovarian cancer patients. Patients aged> 60 years are more at risk of dying compared to patients aged ≤ 60 years

Keywords: *ovarian cancer, survival, age*

Introduction

Globally, the incidence of ovarian cancer was 6.6 per 100,000 population, while the mortality rate was 3.9 per 100,000 population with 300,000 new cases. Based on the same source, the incidence and mortality of ovarian cancer in Asia ranks ninth for cancer diseases suffered by women of all ages. The same situation is also found in Indonesia. Ovarian cancer is still the top ten causes of cancer deaths in women of all ages, with a total of 7,842 or 4.34%.[1]

Ovarian cancer is known as "The Silent Killer". Although the incidence of ovarian cancer is not as high as the incidence of breast and cervical cancer, especially in developing countries, the lethality rate is very high.[2] Ovarian cancer contribute for 2.5% of all malignancies among women. Most cases of ovarian cancer (60-70%) are found at an advanced stage so the treatment results are not as expected. This is due to the absence of specific symptoms (symptomless) in the initial state and the discovery of an approved method of early detection so that the survival rate of patients is low.[3]

For all types of ovarian cancer and ovarian cancer stage under the SEER (Surveillance, Epidemiology and End Results Program) of 2018, the five-year relative survival rate was 47%.[4] If ovarian cancer was discovered and treated before the cancer had spread beyond the ovaries (Stage 1A and 1B), the five-year relative survival rate was 95%. However, only 15% of all ovarian cancers are found in the early stages.[5]

Corresponding Author:
Bambang Sutrisna:
bsbambangsutrisna@gmail.com

There are many factors that influence the survival rate of ovarian cancer patients. Various factors such as age, grade, FIGO stage, residual disease, CA125, performance status, the presence and absence of ascites, histology, albumin, alkaline phosphatase, race, and various molecular markers are considered to be important prognostic factors affecting the survival of ovarian cancer.[6] The prognosis factors according to Holschneider and Barek (2000) that consistently influence the survival of ovarian cancer patients are stage, tumor histology, grade, age, tumor residues, and ascites.[7]

The age of patient are important prognostic factors in influencing survival rates. It is estimated that in younger age women are more likely to be diagnosed early in the stage than in older women. Also therapy in young women is more aggressive than therapy for the elderly.[8]

The highest age of ovarian cancer is 55-64. The average age at which women are diagnosed is 63, which means that half of women are younger than 63 when diagnosed with ovarian cancer and half are older. The average age of ovarian cancer death is 70.[9] Compared to stages, young women with ovarian cancer are more likely to survive than older women because older women are likely to be in the end stage. Women with stage III-IV ovarian cancer aged 45 years compared to those aged 85 and above are only 8% resistant.[10] Research from Chan (2006) found that overall survival rates of patients with age groups <30, 30-60, and> 60 years, respectively, were 78.8%, 8.8%, and 35.5%.[11] Therefore, the purpose of this study was to determine survival of ovarian cancer patients based on age at the Dr. Wahidin Sudirohusodo Makassar Hospital in 2014-2018.

Method

The design of this study is a retrospective cohort study. This research was conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital obtained medical records of ovarian cancer patients from January 2014 to December 2018 in the hospital information system. The results of the total sample count were obtained in 86 cohort subjects, the minimum sample size in this study was 172. However, in this study we would exclude all ovarian cancer patients who met the inclusion and exclusion criteria. The inclusion criteria were patients with new cases of ovarian cancer and who were receiving treatment only at the Dr. Wahidin Sudirohusodo Makassar Hospital. Exclusion criteria are patients whose medical records are incomplete. The independent variable of study was age. The dependent variable was the survival of ovarian cancer patients. The variables of the covariate were marital status, stage, grade, ascites, albumin, treatment compliance, and performance status. Univariate analysis to see the frequency distribution, the proportion of each variable. To determine survival rate of ovarian cancer patients using the Kaplan Meier test and Log Rank Test. Cox regression analysis is used to investigate the effect of variable.

Results

During this study, a total of 263 patients were studied during the period January 2014 - December 2018. Of the 263 patients event (died) 26 (9.89%) and 237 censored patients (90.11). Patients aged ≤ 60 years were 226 (85.93%) and> 60 years 37 (14.07%). Ovarian cancer patients with marital status were 240 (91.25%) and unmarried 23 (8.75%).

It is known that most ovarian cancer patients who come for treatment in the end stage are 141 (53.61%), while patients with early stages are 122 (46.39%). Patients who had moderate and poor grade were 193 (73.38%), while patients with high grade were 70 (26.62%). Patients who had ascites were 179 (68.06%) and patients who did not have ascites 84 (31.94%). Patients with albumin levels <3.6 g / dl were 191 (72.62%) and patients whose albumin levels were ≥ 3.6 g/dl were 72 (27.38%). Patients with good performance status were 248 (94.30%) and patients with weak performance status were 15 (5.70%). Obedient patients were 257 (97.72%) and non-compliant patients were 6 (2.28%).

The survival rate of ovarian cancer patients within 30 months is 78% with an average survival rate of ovarian cancer patients for 8 months. Based on Figure 1, it was found that ovarian cancer patients who survived to the 30th month based on the age of ≤ 60 years by 79% while> 60 years to the 30th month none had survived with an HR value of 3.82 (95% CI: 95% 1.36-9.51).

Table 1. Frequency Distribution of Ovarian Cancer Patients in RSUP Dr. Wahidin Sudirohusodo Makassar in 2014-2018

Variables	Total		Aged ≤ 60 years		Aged > 60 years	
	n	%	n	%	n	%
Patient Status						
Sensor	237	90,11	207	87,34	30	12,66
Event	26	9,89	19	73,08	7	26,92
Stage						
Early Stage	122	46,39	107	87,70	15	12,30
End Stage	141	53,61	119	84,40	22	15,60
Marital Status						
Married	240	91,25	203	84,54	37	15,42
Unmarried	23	8,75	23	100	-	-
Treatment Compliance						
Obedient	257	97,72	220	85,60	37	14,40
Non-compliant	6	2,28	6	100	-	-
Grade						
High	70	26,62	65	92,86	5	7,14
Moderate and low	193	73,38	161	83,42	32	16,54
Ascites						
No	84	31,94	74	88,10	10	11,90
Yes	179	68,06	152	84,92	27	15,08
Albumin Level						
< 3,6 g/dl	191	72,62	64	88,89	8	11,11
≥ 3,6 g/dl	72	27,38	162	84,82	29	15,18
Performance Status						
Good	248	94,30	214	86,29	34	13,71
Weak	15	5,70	12	80	3	20

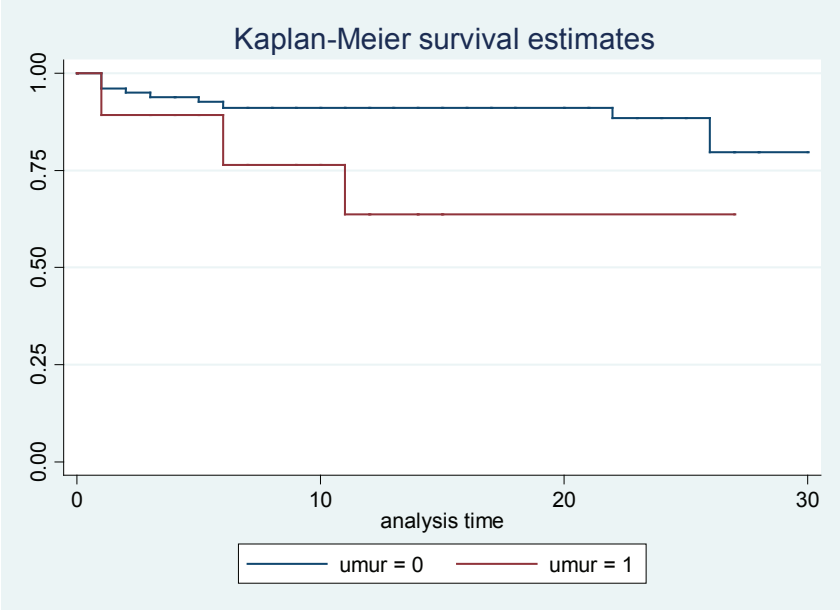


Figure 1. Kaplan Meier's Curve for the Survival of Ovarian Cancer Patients by Age

Table 2. Multivariate Final Models Effects of Age on the Survival of Ovarian Cancer Patients

variables	Coef B	HR	95% CI	p value
Age	0,973	2,65	1,07-6,52	0,032
Stage	0,726	2,07	0,82-5,22	0,132
Performance Status	2,539	12,68	5,67-28,32	0,000

In the bivariate results, the HR value for age was 3.82 (95% CI 1.36-9.51; p <0.0010). This study also conducted stratification analysis to see the variables that interacted, but the results were no interactions and there were confounding on stage, marital status, grade, and performance status. After conducting stratification analysis, all variables were entered then proceed to multivariate analysis and HR values were obtained for age 2.74 (95% CI: 1.09-6.88) after being controlled by marital status, stage, ascites, grade, albumin levels, treatment compliance and performance status. When entering multivariate analysis before entering final modeling, there is no interactions or counfounding were found. From table 2, we get the final model of patients aged> 60 years who have a risk of 2.65 times death compared to patients aged ≤ 60 years after being controlled by variables of stage and performance status.

Discussion

Based on the results of this study conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital with a total of 263 patients, the cumulative probability of survival of ovarian cancer patients was 79% for 30 months. Events (died) occur more frequently in ovarian cancer patients with end-stage (53.61%) compared to ovarian cancer patients with early-stage (46.39%). This survival rate is higher than the Junita Sari study (2008) at Dharmais Cancer Hospital for 36 months by 51%.[12] Research by Aneta et al. (2018) in Podkarpacie province 51.2% .[13] This difference in survival occurred because in this study the lost to follow-up was included in the risk population, as well as differences in sample size, data capture and other factors in each study.

From the results of the analysis found that ovarian cancer patients who survived to the 30th month based on

age ≤ 60 years by 79% while> 60 years to 30th month no one had survived. On average ovarian cancer patients aged ≤ 60 years can survive for 9 months while ovarian cancer patients aged> 60 years can only survive for 5 months. This result is not much different from the results of Chan et al's study where the survival rate of ovarian cancer patients aged <60 years by 84.8% while different for ages> 60 years which obtained by 77.1%.[14] But these results are different from Junita (2007) results in which the survival rate for patients aged ≤ 49 years by 64%, in the 50 to 59 years age group by 34% while those aged ≥ 60 years by only 23% for 3 years.[12] Research conducted by Aneta et al. (2018) also states that as a woman gets older at the time of diagnosis, her survival will decrease. Comparing patient survival in groups> 65 years with women 45-65 years for 3 years by 24.2% .[13] This result may differ due to age category. Although a cut-off age of 60 years has commonly been used, the age criteria have differed among previous studies.

Past research about age as a prognostic factor is very important. Generally, a younger age at diagnosis indicates a better prognosis, with women younger than 65 years having at least 2 years longer median survival compared to women older than 65 years; older women also have an increased risk of recurrence and death. Age remains an independent prognostic factor after controlling for common confounding factors, such as performance status and medical comorbidities. Younger-aged women tend to have less invasive and well differentiated cancers and fewer comorbidities compared to older counterparts, yielding a more favorable overall prognosis.[15] Some studies also find that young women with early-stage ovarian cancer and with good differentiated tumors have good survival higher than older women. However, another study found that age was not the only prognosis factor after adjusting for other variables such as the stage and grade of the disease.[14]

In multivariate analysis it is known that patients aged> 60 years have a risk of 2.65 times of death compared with patients aged ≤ 60 years after being controlled by variable stage and performance status. In contrast to research by Chan et al. where patients> 60 years old have a risk of 1.96 times death compared to patients aged <60 years after being controlled with stage, grade, and citology.[14]

In this study it is also known that staging and general condition affect the survival of ovarian cancer patients. The survival rate of ovarian cancer patients decreases with increasing stage of the disease.[15] Diagnosis of ovarian cancer is often delayed due to lack of early examination and specific symptoms. Only about 25% of women diagnosed with ovarian cancer occur in stage 1.[17] Late diagnosis affects cancer treatment, making it more difficult to effectively fight cancer.[16] Better performance status generally provide greater tolerance for various therapeutic modalities, from surgery to chemotherapy, and might motivate the adoption of more aggressive treatment plans by doctors. Several studies support this reason and confirm the significance of prognosis independent of performance status.[15]

Elderly patients with ovarian cancer may benefit from a multidisciplinary approach, including a comprehensive evaluation by a gynecologist, oncologist, nurse and pharmacist. Comprehensive geriatric assessments have been shown to be able to predict morbidity and mortality in elderly cancer patients.[18] However, the high heterogeneity of elderly patients means that it is not feasible to make treatment decisions based on age alone, and a more objective assessment is required.[19]

Weaknesses in this study are that researchers cannot control the state and quality of data that have been done by others in the past and the research can only rely on secondary data that is already in incomplete medical record records where the possibility of errors in recording or available data is not appropriate with what is needed in research. For this reason, better records are needed for ovarian cancer patients.

Conclusions and Recommendations

From this study it was concluded that age affects the survival of ovarian cancer patients. Patients aged> 60 years are more at risk of dying compared to patients aged ≤ 60 years. It is recommended to do research with more samples to be able to prove other factors that influence the survival of ovarian cancer patients. The research can be continued with different outcomes, categorizing different variables, and including several characteristic variables such as economics.

Ethical Considerations: This Study was approved by Faculty of Public Health University of Indonesia Ethics Committee (No. 370/UN2.F10/PPM.00.02/2019).

Competing Interest: The authors declared that no competing interest exist.

Acknowledgement: The authors would like to

thank the Dr. Wahidin Sudirohusodo Makassar Hospital for sharing the data.

Source of Funding: This study was supported by self.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2018 Nov;68(6):394-424.
2. Siegel R, DeSantis C, Virgo K, Stein K, Mariotto A, Smith T, Cooper D, Gansler T, Lerro C, Fedewa S, Lin C. Cancer treatment and survivorship statistics, 2012. CA: a cancer journal for clinicians. 2012 Jul;62(4):220-41.
3. Torre LA, Trabert B, DeSantis CE, Miller KD, Samimi G, Runowicz CD, Gaudet MM, Jemal A, Siegel RL. Ovarian cancer statistics, 2018. CA: a cancer journal for clinicians. 2018 Jul;68(4):284-96.
4. SEER. *Cancer Stat Facts: Ovarian Cancer*. National Cancer Institute: Surveillance, Epidemiology, and End Results Program. 2018. Available At: https://seer.cancer.gov/statfacts/html/ovary.html
5. Canadian Cancer Society. *Prognosis and Survival in Ovarian Cancer*. 2018. Available at: https://www.cancer.ca/en/cancer-information/cancer-type/ovarian/prognosis-and-survival/?region=on
6. Clark TG, Stewart ME, Altman DG, Gabra H, Smyth JF. A prognostic model for ovarian cancer. British journal of cancer. 2001 Oct;85(7):944.
7. Berek, JS. *Epithelial Ovarian Cancer*. Chapter 11. 1996. Williams & Wilkins. Baltimore.
8. Aziez, M.F, Andrijono, Saifuddin, AB. Buku Acuan Nasional: Onkologi Ginekologi. 2006. Jakarta: Yayasan Bina Pustaka Sarwono Prawirihardjo.
9. NCI. *Understanding Ovarian Cancer*. Society of Gynecology Oncology. 2015.
10. Ries LA. Ovarian cancer: survival and treatment differences by age. Cancer. 1993 Jan 15;71(S2):524-9.
11. Chan JK, Urban R, Cheung MK, Osann K, Husain A, Teng NN, Kapp DS, Berek JS, Leiserowitz GS. Ovarian cancer in younger vs older women: a population-based analysis. British journal of cancer. 2006 Nov;95(10):1314.
12. Junita SU. Kajian Epidemiologi Ketahanan Hidup 3 Dan 5 Tahun Penderita Kanker Ovarium Epithelial Pengaruh Stadium RSKD Jakarta Tahun 1993-2005. 2008. Depok: Universitas Indonesia
13. Radziszewska AU, Karczmarek-Borowska B, Wójcik S, Kluz T. Survival rates among women with ovarian cancers diagnosed in the area of Podkarpacie province in the years 1990–2015. Contemporary Oncology. 2018;22(3):151.
14. Chan JK, Tian C, Monk BJ, Herzog T, Kapp DS, Bell J, Young RC. Prognostic factors for high□risk early□stage epithelial ovarian cancer: A Gynecologic Oncology Group study. Cancer. 2008 May 15;112(10):2202-10.
15. Ezzati M, Abdullah A, Shariftabrizi A, Hou J, Kopf M, Stedman JK, Samuelson R, Shahabi S. Recent advancements in prognostic factors of epithelial ovarian carcinoma. International scholarly research notices. 2014;2014.
16. Sihombing M, Sirait AM. Angka ketahanan hidup penderita kanker ovarium di RS Dr. Cipto Mangunkusumo Jakarta. Maj Kedokt Indon. 2007;57(10):346-52.
17. Badgwell D, Bast Jr RC. Early detection of ovarian cancer. Disease markers. 2007;23(5-6):397-410.
18. Extermann M, Hurria A. Comprehensive geriatric assessment for older patients with cancer. Journal of Clinical Oncology. 2007 May 10;25(14):1824-31.
19. Yoshikawa K, Fukuda T, Uemura R, Matsubara H, Wada T, Kawanishi M, Tasaka R, Kasai M, Hashiguchi Y, Ichimura T, Yasui T. Agerelated differences in prognosis and prognostic factors among patients with epithelial ovarian cancer. Molecular and clinical oncology. 2018 Sep 1;9(3):329-34.

Survival Analysis of Ovarian Cancer Patients based on Age at The Dr. Wahidin Sudirohusodo Makassar Hospital in 2014-2018

Nurul Fitriani[1], Bambang Sutrisna[2], Nugraha Utama Pelupessy[3]

[1]Master of Epidemiology, [2]Department of Epidemiology, Faculty of Public Health, University of Indonesia, Depok, [3]Department of Obstetrics and Gynecology, Faculty of Medicine, Hasanuddin University, South Sulawesi

Abstract

Background. Generally, a younger age at diagnosis indicates a better prognosis, with younger women having an average survival of at least 2 years longer than older women. It is estimated that in young women the disease is diagnosed more quickly in the early stages when compared to older women.

Method. A cohort retrospective study. This research was conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital by taking the medical records of ovarian cancer patients from January 2014 to December 2018. The study subjects were 263 patients. The Kaplan-Meier method was used to estimate survival rate and Cox Regression to investigate the effect of variable.

Results. The survival of ovarian cancer patients within 30 months is 78%. Ovarian cancer patients who survived to the 30th month based on age ≤ 60 years were 79% whereas > 60 years to 30th month none had survived with an HR score of 2.74 (95% CI: 1.09-6.88). Multivariate analysis HR values were obtained for age 2.65 (95% CI: 1,07-6,52) after being controlled by stage, and performance status.

Conclusion. Age affects the survival of ovarian cancer patients. Patients aged> 60 years are more at risk of dying compared to patients aged ≤ 60 years

Keywords: *ovarian cancer, survival, age*

Introduction

Globally, the incidence of ovarian cancer was 6.6 per 100,000 population, while the mortality rate was 3.9 per 100,000 population with 300,000 new cases. Based on the same source, the incidence and mortality of ovarian cancer in Asia ranks ninth for cancer diseases suffered by women of all ages. The same situation is also found in Indonesia. Ovarian cancer is still the top ten causes of cancer deaths in women of all ages, with a total of 7,842 or 4.34%.[1]

Ovarian cancer is known as "The Silent Killer". Although the incidence of ovarian cancer is not as high as the incidence of breast and cervical cancer, especially in developing countries, the lethality rate is very high.[2] Ovarian cancer contribute for 2.5% of all malignancies among women. Most cases of ovarian cancer (60-70%) are found at an advanced stage so the treatment results are not as expected. This is due to the absence of specific symptoms (symptomless) in the initial state and the discovery of an approved method of early detection so that the survival rate of patients is low.[3]

For all types of ovarian cancer and ovarian cancer stage under the SEER (Surveillance, Epidemiology and End Results Program) of 2018, the five-year relative survival rate was 47%.[4] If ovarian cancer was discovered and treated before the cancer had spread beyond the ovaries (Stage 1A and 1B), the five-year relative survival rate was 95%. However, only 15% of all ovarian cancers are found in the early stages.[5]

Corresponding Author:
Bambang Sutrisna:
bsbambangsutrisna@gmail.com

There are many factors that influence the survival rate of ovarian cancer patients. Various factors such as age, grade, FIGO stage, residual disease, CA125, performance status, the presence and absence of ascites, histology, albumin, alkaline phosphatase, race, and various molecular markers are considered to be important prognostic factors affecting the survival of ovarian cancer.[6] The prognosis factors according to Holschneider and Barek (2000) that consistently influence the survival of ovarian cancer patients are stage, tumor histology, grade, age, tumor residues, and ascites.[7]

The age of patient are important prognostic factors in influencing survival rates. It is estimated that in younger age women are more likely to be diagnosed early in the stage than in older women. Also therapy in young women is more aggressive than therapy for the elderly.[8]

The highest age of ovarian cancer is 55-64. The average age at which women are diagnosed is 63, which means that half of women are younger than 63 when diagnosed with ovarian cancer and half are older. The average age of ovarian cancer death is 70.[9] Compared to stages, young women with ovarian cancer are more likely to survive than older women because older women are likely to be in the end stage. Women with stage III-IV ovarian cancer aged 45 years compared to those aged 85 and above are only 8% resistant.[10] Research from Chan (2006) found that overall survival rates of patients with age groups <30, 30-60, and> 60 years, respectively, were 78.8%, 8.8%, and 35.5%.[11] Therefore, the purpose of this study was to determine survival of ovarian cancer patients based on age at the Dr. Wahidin Sudirohusodo Makassar Hospital in 2014-2018.

Method

The design of this study is a retrospective cohort study. This research was conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital obtained medical records of ovarian cancer patients from January 2014 to December 2018 in the hospital information system. The results of the total sample count were obtained in 86 cohort subjects, the minimum sample size in this study was 172. However, in this study we would exclude all ovarian cancer patients who met the inclusion and exclusion criteria. The inclusion criteria were patients with new cases of ovarian cancer and who were receiving treatment only at the Dr. Wahidin Sudirohusodo Makassar Hospital. Exclusion criteria are patients whose medical records are incomplete. The independent variable of study was age. The dependent variable was the survival of ovarian cancer patients. The variables of the covariate were marital status, stage, grade, ascites, albumin, treatment compliance, and performance status. Univariate analysis to see the frequency distribution, the proportion of each variable. To determine survival rate of ovarian cancer patients using the Kaplan Meier test and Log Rank Test. Cox regression analysis is used to investigate the effect of variable.

Results

During this study, a total of 263 patients were studied during the period January 2014 - December 2018. Of the 263 patients event (died) 26 (9.89%) and 237 censored patients (90.11). Patients aged ≤ 60 years were 226 (85.93%) and> 60 years 37 (14.07%). Ovarian cancer patients with marital status were 240 (91.25%) and unmarried 23 (8.75%).

It is known that most ovarian cancer patients who come for treatment in the end stage are 141 (53.61%), while patients with early stages are 122 (46.39%). Patients who had moderate and poor grade were 193 (73.38%), while patients with high grade were 70 (26.62%). Patients who had ascites were 179 (68.06%) and patients who did not have ascites 84 (31.94%). Patients with albumin levels <3.6 g / dl were 191 (72.62%) and patients whose albumin levels were ≥ 3.6 g/dl were 72 (27.38%). Patients with good performance status were 248 (94.30%) and patients with weak performance status were 15 (5.70%). Obedient patients were 257 (97.72%) and non-compliant patients were 6 (2.28%).

The survival rate of ovarian cancer patients within 30 months is 78% with an average survival rate of ovarian cancer patients for 8 months. Based on Figure 1, it was found that ovarian cancer patients who survived to the 30th month based on the age of ≤ 60 years by 79% while> 60 years to the 30th month none had survived with an HR value of 3.82 (95% CI: 95% 1.36-9.51).

Table 1. Frequency Distribution of Ovarian Cancer Patients in RSUP Dr. Wahidin Sudirohusodo Makassar in 2014-2018

Variables	Total		Aged ≤ 60 years		Aged > 60 years	
	n	%	n	%	n	%
Patient Status						
Sensor	237	90,11	207	87,34	30	12,66
Event	26	9,89	19	73,08	7	26,92
Stage						
Early Stage	122	46,39	107	87,70	15	12,30
End Stage	141	53,61	119	84,40	22	15,60
Marital Status						
Married	240	91,25	203	84,54	37	15,42
Unmarried	23	8,75	23	100	-	-
Treatment Compliance						
Obedient	257	97,72	220	85,60	37	14,40
Non-compliant	6	2,28	6	100	-	-
Grade						
High	70	26,62	65	92,86	5	7,14
Moderate and low	193	73,38	161	83,42	32	16,54
Ascites						
No	84	31,94	74	88,10	10	11,90
Yes	179	68,06	152	84,92	27	15,08
Albumin Level						
< 3,6 g/dl	191	72,62	64	88,89	8	11,11
≥ 3,6 g/dl	72	27,38	162	84,82	29	15,18
Performance Status						
Good	248	94,30	214	86,29	34	13,71
Weak	15	5,70	12	80	3	20

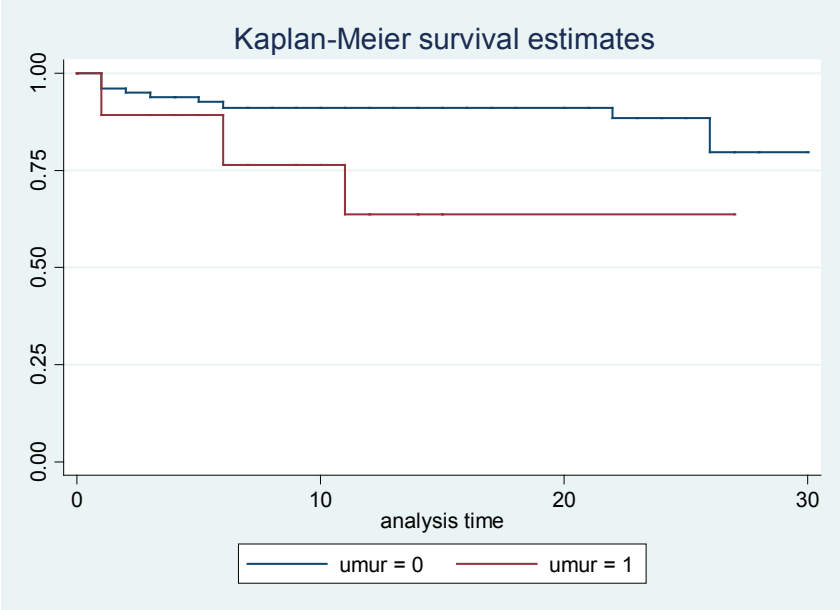


Figure 1. Kaplan Meier's Curve for the Survival of Ovarian Cancer Patients by Age

Table 2. Multivariate Final Models Effects of Age on the Survival of Ovarian Cancer Patients

variables	Coef B	HR	95% CI	p value
Age	0,973	2,65	1,07-6,52	0,032
Stage	0,726	2,07	0,82-5,22	0,132
Performance Status	2,539	12,68	5,67-28,32	0,000

In the bivariate results, the HR value for age was 3.82 (95% CI 1.36-9.51; p <0.0010). This study also conducted stratification analysis to see the variables that interacted, but the results were no interactions and there were confounding on stage, marital status, grade, and performance status. After conducting stratification analysis, all variables were entered then proceed to multivariate analysis and HR values were obtained for age 2.74 (95% CI: 1.09-6.88) after being controlled by marital status, stage, ascites, grade, albumin levels, treatment compliance and performance status. When entering multivariate analysis before entering final modeling, there is no interactions or counfounding were found. From table 2, we get the final model of patients aged> 60 years who have a risk of 2.65 times death compared to patients aged ≤ 60 years after being controlled by variables of stage and performance status.

Discussion

Based on the results of this study conducted at the Dr. Wahidin Sudirohusodo Makassar Hospital with a total of 263 patients, the cumulative probability of survival of ovarian cancer patients was 79% for 30 months. Events (died) occur more frequently in ovarian cancer patients with end-stage (53.61%) compared to ovarian cancer patients with early-stage (46.39%). This survival rate is higher than the Junita Sari study (2008) at Dharmais Cancer Hospital for 36 months by 51%.[12] Research by Aneta et al. (2018) in Podkarpacie province 51.2% .[13] This difference in survival occurred because in this study the lost to follow-up was included in the risk population, as well as differences in sample size, data capture and other factors in each study.

From the results of the analysis found that ovarian cancer patients who survived to the 30th month based on age ≤ 60 years by 79% while> 60 years to 30th month

no one had survived. On average ovarian cancer patients aged ≤ 60 years can survive for 9 months while ovarian cancer patients aged> 60 years can only survive for 5 months. This result is not much different from the results of Chan et al's study where the survival rate of ovarian cancer patients aged <60 years by 84.8% while different for ages> 60 years which obtained by 77.1%.[14] But these results are different from Junita (2007) results in which the survival rate for patients aged ≤ 49 years by 64%, in the 50 to 59 years age group by 34% while those aged ≥ 60 years by only 23% for 3 years.[12] Research conducted by Aneta et al. (2018) also states that as a woman gets older at the time of diagnosis, her survival will decrease. Comparing patient survival in groups> 65 years with women 45-65 years for 3 years by 24.2% .[13] This result may differ due to age category. Although a cut-off age of 60 years has commonly been used, the age criteria have differed among previous studies.

Past research about age as a prognostic factor is very important. Generally, a younger age at diagnosis indicates a better prognosis, with women younger than 65 years having at least 2 years longer median survival compared to women older than 65 years; older women also have an increased risk of recurrence and death. Age remains an independent prognostic factor after controlling for common confounding factors, such as performance status and medical comorbidities. Younger-aged women tend to have less invasive and well differentiated cancers and fewer comorbidities compared to older counterparts, yielding a more favorable overall prognosis.[15] Some studies also find that young women with early-stage ovarian cancer and with good differentiated tumors have good survival higher than older women. However, another study found that age was not the only prognosis factor after adjusting for other variables such as the stage and grade of the disease.[14]

In multivariate analysis it is known that patients aged> 60 years have a risk of 2.65 times of death compared with patients aged ≤ 60 years after being controlled by variable stage and performance status. In contrast to research by Chan et al. where patients> 60 years old have a risk of 1.96 times death compared to patients aged <60 years after being controlled with stage, grade, and citology.[14]

In this study it is also known that staging and performance status affect the survival of ovarian cancer patients. The survival rate of ovarian cancer patients decreases with increasing stage of the disease.[15] Diagnosis of ovarian cancer is often delayed due to lack of early examination and specific symptoms. Only about 25% of women diagnosed with ovarian cancer occur in stage 1.[17] Late diagnosis affects cancer treatment, making it more difficult to effectively fight cancer.[16] Better performance status generally provide greater tolerance for various therapeutic modalities, from surgery to chemotherapy, and might motivate the adoption of more aggressive treatment plans by doctors. Several studies support this reason and confirm the significance of prognosis independent of performance status.[15]

Elderly patients with ovarian cancer may benefit from a multidisciplinary approach, including a comprehensive evaluation by a gynecologist, oncologist, nurse and pharmacist. Comprehensive geriatric assessments have been shown to be able to predict morbidity and mortality in elderly cancer patients.[18] However, the high heterogeneity of elderly patients means that it is not feasible to make treatment decisions based on age alone, and a more objective assessment is required.[19]

Weaknesses in this study are that researchers cannot control the state and quality of data that have been done by others in the past and the research can only rely on secondary data that is already in incomplete medical record records where the possibility of errors in recording or available data is not appropriate with what is needed in research. For this reason, better records are needed for ovarian cancer patients.

Conclusions and Recommendations

From this study it was concluded that age affects the survival of ovarian cancer patients. Patients aged> 60 years are more at risk of dying compared to patients aged ≤ 60 years. It is recommended to do research with more samples to be able to prove other factors that influence the survival of ovarian cancer patients. The research can be continued with different outcomes, categorizing different variables, and including several characteristic variables such as economics.

Ethical Considerations: This Study was approved by Faculty of Public Health University of Indonesia Ethics Committee (No. 370/UN2.F10/PPM.00.02/2019).

Competing Interest: The authors declared that no competing interest exist.

Acknowledgement: The authors would like to

thank the Dr. Wahidin Sudirohusodo Makassar Hospital for sharing the data.

Source of Funding: This study was supported by self.

References

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2018 Nov;68(6):394-424.
2. Siegel R, DeSantis C, Virgo K, Stein K, Mariotto A, Smith T, Cooper D, Gansler T, Lerro C, Fedewa S, Lin C. Cancer treatment and survivorship statistics, 2012. CA: a cancer journal for clinicians. 2012 Jul;62(4):220-41.
3. Torre LA, Trabert B, DeSantis CE, Miller KD, Samimi G, Runowicz CD, Gaudet MM, Jemal A, Siegel RL. Ovarian cancer statistics, 2018. CA: a cancer journal for clinicians. 2018 Jul;68(4):284-96.
4. SEER. Cancer Stat Facts: Ovarian Cancer. National Cancer Institute: Surveillance, Epidemiology, and End Results Program. 2018. Available At: https://seer.cancer.gov/statfacts/html/ovary.html
5. Canadian Cancer Society. Prognosis and Survival in Ovarian Cancer. 2018. Available at: https://www.cancer.ca/en/cancer-information/cancer-type/ovarian/prognosis-and-survival/?region=on
6. Clark TG, Stewart ME, Altman DG, Gabra H, Smyth JF. A prognostic model for ovarian cancer. British journal of cancer. 2001 Oct;85(7):944.
7. Berek, JS. Epithelial Ovarian Cancer. Chapter 11. 1996. Williams & Wilkins. Baltimore.
8. Aziez, M.F, Andrijono, Saifuddin, AB. Buku Acuan Nasional: Onkologi Ginekologi. 2006. Jakarta: Yayasan Bina Pustaka Sarwono Prawirihardjo.
9. NCI. Understanding Ovarian Cancer. Society of Gynecology Oncology. 2015.
10. Ries LA. Ovarian cancer: survival and treatment differences by age. Cancer. 1993 Jan 15;71(S2):524-9.
11. Chan JK, Urban R, Cheung MK, Osann K, Husain A, Teng NN, Kapp DS, Berek JS, Leiserowitz GS. Ovarian cancer in younger vs older women: a population-based analysis. British journal of cancer. 2006 Nov;95(10):1314.
12. Junita SU. Kajian Epidemiologi Ketahanan Hidup 3 Dan 5 Tahun Penderita Kanker Ovarium Epithelial Pengaruh Stadium RSKD Jakarta Tahun 1993-2005. 2008. Depok: Universitas Indonesia
13. Radziszewska AU, Karczmarek-Borowska B, Wójcik S, Kluz T. Survival rates among women with ovarian cancers diagnosed in the area of Podkarpacie province in the years 1990–2015. Contemporary Oncology. 2018;22(3):151.
14. Chan JK, Tian C, Monk BJ, Herzog T, Kapp DS, Bell J, Young RC. Prognostic factors for high-risk early-stage epithelial ovarian cancer: A Gynecologic Oncology Group study. Cancer. 2008 May 15;112(10):2202-10.
15. Ezzati M, Abdullah A, Shariftabrizi A, Hou J, Kopf M, Stedman JK, Samuelson R, Shahabi S. Recent advancements in prognostic factors of epithelial ovarian carcinoma. International scholarly research notices. 2014;2014.
16. Sihombing M, Sirait AM. Angka ketahanan hidup penderita kanker ovarium di RS Dr. Cipto Mangunkusumo Jakarta. Maj Kedokt Indon. 2007;57(10):346-52.
17. Badgwell D, Bast Jr RC. Early detection of ovarian cancer. Disease markers. 2007;23(5-6):397-410.
18. Extermann M, Hurria A. Comprehensive geriatric assessment for older patients with cancer. Journal of Clinical Oncology. 2007 May 10;25(14):1824-31.
19. Yoshikawa K, Fukuda T, Uemura R, Matsubara H, Wada T, Kawanishi M, Tasaka R, Kasai M, Hashiguchi Y, Ichimura T, Yasui T. Age related differences in prognosis and prognostic factors among patients with epithelial ovarian cancer. Molecular and clinical oncology. 2018 Sep 1;9(3):329-34.

The Relationship between Selling Sex and HIV Status among Transgender in Indonesia
(Analysis of Integreted Biological and Behavioral Survey Data 2015)

Nurul Kholijah Aspia[1], Ratna Djuwita[2]

[1]Masters Program in Epidemiology, Faculty of Public Health, University of Indonesia,
[2]Department of Epidemiology Faculty of Public Health University of Indonesia

Abstract

HIV prevalence in transgender women is increasing compared to previous years. The aim of the Cross Sectional study was to find out the relationship between selling sex and HIV status among transgender in Indonesia. This study used secondary data for the 2015 Integrated Biological and Behavioral Survey (IBBS). Respondents were biologically male; ≥15 years old; recognized by friends of profession, "mami", or NGO workers as a transgender women; answer the questions, having sex partner and results of HIV test. The results showed that transgender who sell sex 1,358 times the risk of having a positive HIV status compared to transgender who do not sell sex (95% CI: 1.045 - 1.766) after being controlled with a variable STIs history.

Keywords *: HIV risk, transgender, transgender women, HIV status*

Introduction

Human Immunodeficiency Virus (HIV) is a retrovirus that damages and destroys the immune system so that the body's defense against infection becomes weak. A weakened immune system makes a person more susceptible to infection and disease.[1] Retroviruses have the ability to use their RNA and host DNA to form DNA viruses and are recognized during long incubation periods. Like other retroviruses, HIV infects the body with a long (clinic-latent) incubation period, and mainly causes signs and symptoms of AIDS.[2]

Based on UNAIDS data in 2017, in the world there were 36.9 million people living with HIV, 1.8 million of whom were new infections. The number of HIV infections in adults is 35.1 million, while in children under the age of 15 the number reaches 1.8 million. Deaths due to AIDS in 2017 were reported as many as 940,000 deaths.[3]

In Asia there are 5.2 million million people infected with HIV, 280 thousand of them are new infections and have caused the death of 170 thousand people in 2017.[4] In Indonesia, in 2016 there were 620,000 people living with HIV, 48,000 of whom were newly infected and there were 38,000 AIDS-related deaths. The key populations in Indonesia most affected by HIV are sex workers with an HIV prevalence of 5.3%, MSM groups with a prevalence of 25.8%, syringe users with a prevalence of 28.76%, transgender with a prevalence of 24.8% , and in prisoners with a prevalence of 2.6%. Since 2010, new HIV infections increased by 22% and AIDS-related deaths increased by 68%.[5]

A systematic review from Asia found that transgender people are 18 times more likely to be infected with HIV than those in the general population.[6] Transgender is one of the groups most affected by the HIV epidemic and 49 times more likely to live with HIV than the general population.[5]

Transgender has unique characteristics in shaping risk factors.[7] The main risk factors for transgender people to become infected with HIV are multiple sexual partners, anal or vaginal sex without using condoms, the use of hormones or drugs with the same syringe, commercial sex work, mental health problems, homelessness, unemployment, and drug abuse, and violence and lack of family support.[8] Transgenders who work selling sex will be at risk of contracting HIV.[9]

The purpose of this study was to determine the HIV prevalence and determinants of HIV status in transgender

transgender people in 5 major cities in Indonesia in 2015.

Material and Method

This study uses secondary data from the 2015 Integrated Biological and Behavioral Survey (IBBS) which was conducted in 5 major cities in Indonesia (DKI Jakarta, Bandung, Semarang, Surabaya, and Malang Raya). This type of observational research with cross sectional study design uses multistage cluster sampling technique which is done in several steps. A detailed description of the research design, sampling and main analysis can be found in the official IBBS report published by the Ministry of Health of the Republic of Indonesia.[10] The population in this study were all transgender respondents who were IBBS respondents in 2015. Whereas the sample was transgender transgender people from 5 major cities in Indonesia who had fulfilled the research inclusion criteria, namely a person who was biologically male; ≥15 years old; recognized by friends, "mami", or NGO workers as transgender; answering questions and there are results of HIV testing and syphilis testing. A total of 1,003 respondents were interviewed, but the number of respondents who entered into this study was transgender who had HIV test results and sex partners was only 867 people. Then, all respondents selected in the 2015 IBBS were included and used as samples in this study (total sampling).

This research was conducted by analyzing interview data based on a structured questionnaire from the 2015 IBBS in transgender transgender groups. The questionnaire contained questions to obtain information about the characteristics of the subjects, sexual behavior, scope of interventions, HIV and STIs testing, knowledge about HIV / AIDS and its prevention. HIV status is diagnosed by a rapid test, a test carried out to see antibodies arising from the presence of HIV infection. If the test shows a reactive (positive) result, then a follow-up test with confirmation is required. Respondents tested positive for HIV if positive results were obtained from the two tests. Syphilis status is determined based on the results of the RPR test (rapid plasma regain) and TP Rapid, which is a blood test to detect the presence of antibodies produced by the body against syphilis infection. While the anal swab is done to check for the presence of Chlamydia trachomatis and Neisseria gonorrhoeae. All IBBS data is officially documented and kept confidential by the Ministry of Health of the Republic of Indonesia.

Data Analysis

The collected data is then performed cleaning, processed and analyzed using univariate, bivariate and multivariate analysis. Univariate analysis was performed to see the frequency distribution of independent, dependent and covariate variables. Bivariate analysis in this study used the *chi square* test to determine the crude Prevalence Ratio (PR). All variables that are substantially related to HIV status were included in the multivariate analysis. Multivariate analysis in this study used a *cox regression* test with a significance level seen based on the value of 95% CI.

The strength of the association between the predictor variable and HIV status was measured using the Prevalence Ratio (PR) and adjusted PR. Confidence Interval (CI) for POR uses 95% CI with a significance value of 0.05..

Findings

Table 1 shows the transgender characteristics that were sampled in this study. Transgender who are HIV positive amounted to 26.1%. The main source of income for transgender from selling sex is 44.5%. Majority of respondents do not have STIs history (77.9%). Most respondents did not consistently use condoms (58.2%). 56.4% had good knowledge of HIV / AIDS transmission, 67.4% had good knowledge of HIV / AIDS prevention, 59.2% had less knowledge of HIV / AIDS misconception and 65.1% had comprehensive knowledge about HIV / AIDS which is good. For ages, some respondents were ≥25 years old (82.8%). Most respondents did not use injecting drugs (99.0%).

Bivariate analysis was performed to determine the *crude* Prevalenc Ratio (PR). All variables that are substantially related to HIV status were included in the multivariate analysis. The results of multivariate analysis of the relationship between selling sex and HIV status among transgender can be seen in table 3.

Transgender who sell sex 1,358 times the risk of having a positive HIV status compared to transgender who do not sell sex (95% CI: 1.045 - 1.766) after being controlled with a variable STIs history

Table 1. Characteristics of Respondents

Variable	Frequency (n)	Percentage (%)
HIV Status		
Positif	226	26,1
Negatif	641	73,9
Selling Sex		
Yes	386	44,5
No	481	55,5
STIs History		
No	675	77,9
Yes	192	22,1
Consistency of Condom Use		
Consistent	362	41,8
Inconsistent	505	58,2
Knowledge about HIV / AIDS transmission		
Good	489	56,4
Poor	378	43,6
Knowledge about HIV / AIDS prevention		
Good	584	67,4
Poor	283	32,6
Knowledge of HIV / AIDS Misconceptions		
Good	354	40,8
Poor	513	59,2
Comprehensive knowledge about HIV / AIDS		
Good	564	65,1
Poor	303	34,9
Age		
≥25 year	718	82,8
15-24 year	149	17,2
Injecting Drug Use		
No	858	99,0
Yes	7	0,8
Missing	2	0,2

Table 2. Bivariat Analysis of "The Realtionship of Selling Sex and HIV Status among Transgender in Indonesia"

Variable	HIV Status				Total		p-value	PR (CI 95%)
	Positif		Negatif					
	n	%	n	%	n	%		
Selling Sex								
Yes	120	31,1	266	68,9	386	100	0,003	1,596
No	106	22,0	375	78,0	481	100		(1,177 – 2,165)
STIs History								
Yes	72	37,5	120	62,5	192	100	0,000	2,030
No	154	22,8	521	77,2	675	100		(1,440 – 2,861)
Consistency of Condom Use								
Consistent	125	24,8	380	75,2	505	100	0,298	0,850
Inconsistent	101	27,9	261	72,1	362	100		(0,626 – 1,154)
Knowledge about HIV / AIDS transmission								
Good	95	25,1	283	74,9	378	100	0,582	0,917
Poor	131	26,8	358	73,2	489	100		(0,675 – 1,247)
Knowledge about HIV / AIDS prevention								
Good	70	24,7	213	75,3	283	100	0,534	0,902
Poor	156	26,7	428	73,3	584	100		(0,651 – 1,250)
Knowledge of HIV / AIDS Misconceptions								
Good	110	21,4	403	78,6	513	100	0,000	0,560
Poor	116	32,8	238	67,2	354	100		(0,412 – 0,761)
Comprehensive knowledge about HIV / AIDS								
Good	64	21,1	239	78,9	303	100	0,015	0,664
Poor	162	28,7	402	71,3	564	100		(0,477 – 0,925)
Age								
≥25 year	30	20,1	119	79,9	149	100	0,070	0,671
15-24 year	196	27,3	522	72,7	718	100		(0,436 – 1,035)
Injecting Drug Use								
No	2	28,6	5	71,4	7	100	0,883	1,132
Yes	224	26,1	634	73,9	858	100		(0,218 – 5,877)

Table 3. Multivariate Analysis of "The Realtionship of Selling Sex and HIV Status among Transgender in Indonesia"

Variabel	p-value	PR adjusted	CI 95%	
Selling Sex (Yes vs No)	0,022	1,358	1,045	1,766
STIs History (Yes vs No)	0,001	1,592	1,202	2,109

Discussion

The results showed that the HIV prevalence in transgender in 5 big cities in Indonesia was 26.1%. This increased if compared to 2011. In 2011, HIV prevalence was 21.85%.[11]

As many as 83.2% of transgender have a history of selling sex. Similar figures were also obtained from UNAIDS data which states that the proportion of transgender people in Indonesia who sell sex is estimated to reach 81%.[12] Then, it was also obtained that 17.4% of respondents had positive syphilis status. The incidence of syphilis in HIV sufferers has clinical implications between HIV infection and syphilis. An HIV test is important for all patients with a new diagnosis of syphilis.[13]

HIV prevalence in trangender who sell sex is 31.1%, whereas in transgender who do not sell sex is 22,0%. This is in line with research Operario et. al (2008) which gives the result that HIV prevalence in transgender sex workers is higher than non-sex transgenders.[14]

Transgender that selling sex has an a-PR value = 1,358 (95% CI: 1,045 – 1,766), this value indicates that respondents who selling sex are 1,358 times more likely to be infected with HIV than those who have no history of selling sex. Operario et al's research (2008) provides consistent results, where the risk of HIV infection in transgender sex workers is 1.46 times greater than transgenders who are not sex workers.[14] According to Altaf et al (2012), transgenders who work sex have a risk of 5 , 5 times more likely to be infected with HIV compared to other occupations.[15] The risk of transmitting HIV and STIs to transgender increases due to the behavior of transgenders who have sexual relations with many partners whose HIV and STIs status are unknown, have unprotected sex, and more often to engage in high-risk sexual activities.[16-18]

HIV prevalence in transgender who have STIs history is 37.5% while in transgender who haven't STIs history is 22.8%. This is in line with Mutmainah's study (2015) which gives the result that HIV prevalence in transgenders who have a positive STIs status is higher than that of transgenders who have a negative STIs status.[19]

The STIs history variable has a-PR value = 1.592 (1.202-2.109), this value indicates that respondents who have STIs history are 1.592 times more likely to be infected with HIV than those with haven't STIs history. This is in line with research conducted by Rompalo, et al (2001) that the median syphilis serology test is higher in patients infected with HIV compared with patients who are not infected with HIV ($p < 0.05$).[20] The results of a study conducted by Lee (2008) in Hong Kong gave the result that a history of STIs had a risk of 1.77 times having HIV (95% CI: 1.09-2.86).[21] Then, Pisani's research (2004) also gave the same result that transgenders who had syphilis had 3.8 times risk to experience HIV positive.[22] Ulcerative and non-ulcerative STIs have been found to increase the risk of sexual transmission of HIV.[23]

Limitations in this study are the use of secondary data with Cross Sectional study design where the associations in this study cannot see causal relationships. Then because risky behavior related to HIV transmission is sensitive enough to be asked of respondents, respondents may not fully answer honestly the questions asked.

Conclusions

Respondents who had HIV positive status were 26.1% and HIV negative status were 73.9%. Based on the final results of the multivariate analysis in table 3, it is known that transgenders who sell sex are 1,358 times at risk of having a positive HIV status compared to transgenders who do not sell sex (95% CI: 1.045 - 1.766) after being controlled with a variable STIs history. HIV status can be prevented by controlling its risk factors.

Conflict of Interest: Both authors declare that there is no competing interest in this paper.

Source of Funding: This research was received no external funding.

Ethical Clearance: This research guarantees the confidentiality of the data and the identity of the respondents. The data usage permit was obtained from Subdirektorat HIV and PIMS of the Indonesian Ministry of Health and written in the letter of approval and stated in the statement letter number PM.02.01/3/3313/2019. This research has also been through the ethics review from Ethical Commite Faculty of Public Health University of Indonesia with Ethical Approval number 717/UN2.F10/PPM.00.02/2019.

Acknowledgment: Author would like to thank the Subdirektorat HIV and PIMS of the Indonesian Ministry of Health for giving permission and providing data.

References

1. World Health Organization. HIV/AIDS. Switzerland: World Health Organization; 2015
2. Nursalam. Asuhan keperawatan pada pasien terinfeksi HIV/AIDS. Jakarta: Salemba Medika; 2007
3. The Joint United Nations Programme on HIV/AIDS. Global HIV & AIDS Statistics – 2018 Fact Sheet. Geneva: The Joint United Nations Programme on HIV/AIDS; 2018
4. The Joint United Nations Programme on HIV/AIDS. UNAIDS Data 2018. Geneva: The Joint United Nations Programme on HIV/AIDS; 2018
5. The Joint United Nations Programme on HIV/AIDS. Overview of HIV/AIDS in Indonesia. Geneva: The Joint United Nations Programme on HIV/AIDS; 2016
6. Bhatta D.N. HIV-related sexual risk behaviors among male-to-female transgender people in Nepal. International Journal of Infectious Diseases. 2014; 22:11-5.
7. Chemnasiri, T., Guadamuz, T.E., Naorat, S., Utokasenee, P., Visarutratana, S., Varangrat, A., & Van, G.F. Predictors of condom use during most recent anal intercourse among populations of young men who have sex with men in Thailand. Proceedings of the XVI International AIDS Conference, Toronto, Canada; 2006.
8. Centers for Diseases Control and Prevention. HIV among transgender people. Geneva: Centers for Diseases Control and Prevention; 2019. Available from: https://www.cdc.gov/hiv/group/gender/transgender/index.html
9. Poteat, T., Wirtz, A.L., Radix, A., Borquez, A., Silva-Santisteban, A., Deutsch, M.B., Khan, S.I., Winter, S., & Operario, D. HIV risk and preventive interventions in transgender women sex workers. Lancet. 2015; 385(9964):274-86.
10. Kementerian Kesehatan Republik Indonesia. Laporan Survei Terpadu Biologis dan Perilaku Tahun 2015. Jakarta: Kementerian Kesehatan Republik Indonesia; 2016. Available from: http://siha.depkes.go.id/portal/laporan-hasil-survey#
11. Kementerian Kesehatan Republik Indonesia. Laporan Survei Terpadu Biologis dan Perilaku Tahun 2011. Jakarta: Kementerian Kesehatan Republik Indonesia; 2011. Available from: http://siha.depkes.go.id/portal/laporan-hasil-survey#
12. The Joint United Nations Programme on HIV/AIDS. The Gap Report. Geneva: The Joint United Nations Programme on HIV/AIDS; 2014.
13. Centers for Diseases Control and Prevention., Workowski, K.A., & Berman, S.M. Sexually transmitted diseases treatment guidelines. Morbidity and Mortality Weekly Report. 2006; 55(RR-11):1-94.
14. Operario., Soma, T., & Underhill, K. Sex work and HIV status among transgender women: systematic review and meta-analysis. Journal Acquired Immune Deficiency Syndrome. 2008; 48(1):97-103.
15. Altaf, A., Zahidie, A., & Agha, A. Comparing risk factors of HIV among hijra sex workers in Larkana and other cities of Pakistan: an analytical cross sectional study. BioMed Central Public Health Journal. 2012; 12(279):1-9.

16. Schulden, J.D., Song, B., Barros, A., Mares-DelGrasso, A., Martin, C.W., Ramirez, R., Smith, L.C., Wheeler, D.P., Oster, A.M., Sullivan, P.S., & Heffelfinger, J.D. Rapid HIV testing in transgender communities by community-based organizations in three cities. Public Health Reports: Association of Schools and Programs of Public Health and the United States Public Health Service. 2008; Report No: 123.
17. Clements-Nolle, K., Guzman, R., & Harris, S.G. Sex trade in a male-to-female transgender population: psychosocial correlates of inconsistent condom use. Sexual Health Journals. 2008; 5(1):49-54.
18. Sausa, L.A., Keatley, J., & Operario, D. Perceived risks and benefits of sex work among transgender women of color in San Francisco. Archives of Sexual Behavior Jounal. 2007; 36(6):768-777.
19. Mutmainah, C. Faktor-faktor yang berhubungan dengan status HIV pada waria di Kota Makassar [Skripsi]. Depok: Universitas Indonesia; 2015.
20. Rompalo, A.M., Joesoef, M.R., O'Donnell, J.A., Augenbraum, M., Brady, W., Radolf, J.D., Johnson, R., & Rolfs, R.T. Clinical manifestations of early syphilis by HIV status and gender. Sexually Transmitted Diaseases Journals. 2001; 28(3):158-65.
21. Lee, P.M. & Ho, K.M. Risk factors associated with human immunodeficiency virus (HIV) infection among attendees of public sexually transmitted infection clinics in Hong Kong: implications for HIV prevention. Hong Kong Medical Journal. 2008; 14(4):259-266.
22. Pisani E., Girault P., Gultom M., Sukartini N., Kurnalawati J., Jazan S., & Donegan, E. HIV, syphilis infection, and sexual practices among transgenders, male sex workers, and other men who have sex with men in Jakarta, Indonesia. Sexually Transmitted Infection Journal. 2004; 80(6):536-540.
23. Inna D.R., Julie G., Ilene W., & Dorothy C. The effects of expressivewriting on adjustment to HIV. AIDS and Behavior Journal. 2006; 10(1):13-26.

Prevalence of Demographic Profiles and Loneliness among Elderly Women in Private Care Institution

Nurunsaadah S.[1], Lukman Z.M.[2], Zulaikha M.Z.[1], M.Y. Kamal[1]

[1]Post Graduate Student, [2]Prof, School of Social Work, Faculty of Applied Social Sciences, Sultan Zainal Abidin University, Gong Badak Campus, Terengganu, Malaysia

Abstract

Loneliness among elderly women living in nursing home based on demographic profile become a phenomenon in many developed countries. In most research, loneliness has been identified as a negative feeling that can lead to death. Loneliness among elderly women occur when they are 60 years and above once their children grow up and married. Then, there retired from occupations and their spouse died and make they live alone. Thus, this study aimed to identify the factors of demographic profiles have an impact on loneliness among elderly women. This research was conducted at a private institution in Terengganu, Malaysia with 78 elderly women as respondents quantitatively. The questionnaires from UCLA Loneliness Scale were adopted to analyse the risk of elderly having loneliness in nursing home. The result showed the factors of demographic profile have an impact on loneliness among elderly women in private institution its strength and significant. As a conclusion, the study on loneliness among elderly women in nursing home is important to raise awareness about this alarming issue in the society especially among elderly women.

Keywords: *Loneliness, demographic profiles, elderly women, private care institution.*

Introduction

Loneliness are prevalent among elderly women in the institution [1]. In a cross-sectional study by Barg et al. (2006), it was revealed that in persons 65 years and older, the perceived adequacy of emotional and tangible support was clearly associated with isolation symptoms three years later [2]. According to Adams et al. (2004), the elderly women living in retirement, nursing homes and institution, away from previous homes and neighborhoods and separated from extended families, will continue to increase [3]. There are living in facilities for the elderly women will have to modify to a changed living situation, and this modification can lead to fatal psychosocial problems of loneliness in the absence of positive social networks [4]. The elderly women and depression related when they are 60 years old and above when their children grow up and married [5]. Then, there are retired and their spouse died and make they live alone [6 7].

Corresponding author:
Lukman Z.M. Prof, the School of Social Work, Faculty of Applied Social Sciences, Sultan Zainal AbidinUniversity, Gong Badak Campus, Terengganu, Malaysia(lukmanzm1@gmail.com)

Material and Method

Population and Sampling: The population of the study was the 78 elderly women in welfare institution in Terengganu, Malaysia during the years 2017.

Instruments: An individual information frame, the UCLA Loneliness Scale were utilized as the information gathering devices in the exploration.

UCLA Loneliness Scale: It was created by Russell, Peplau, and Ferguson and was re-requested in 1980. It is a scale made of 20 things of which 10 are immediate and the other 10 turns around coded. In everything of the scale, a situation that expresses a sense or a pondered the social connection is exhibited and the people are requested to state how frequently they meet this condition, on a four–point Likert scale. The higher score is acknowledged as an indication of depression that is met once in a while. The least scores to be gotten from the scale is 20 and the most astounding is 80. The internal consistency coefficient as 0.96; and the correlation coefficient as 0.94 by the test-retest method.

Findings

Respondent Backgrounds

Table 1 shows the marital status of the respondents who participated in this survey. Among the elderly women in PKWTNS, only 2.6 percent were single, (n=2). Similarly, only 3.8 percent were married, (n=3). The majority of the elderly women were widows at 93.6 percent (n=73). The age distribution of the respondents, the percentage of those who were, 60-64 and 70-74 years old was the same at 30.8 percent, with 24 respondents for each age group. Next, 19.2 percent (n=15) were of 65-69 years old while 17.9 percent (n=14) were between 75-80 years old. The smallest age group was the 80 and above, with only 1.3 percent (n=1). Meanwhile, the level of education of the elderly women participating in this research was low. The majority at 53.8 percent (n=42) only finished lower secondary education (SRP), while 18 percent (n=14) had no education experience whatsoever. Only 28.2 percent (n=22) received basic education (SPM). The working history of respondents in this research were majority of the respondents were self-employed (60.2 percent, n=47). Those who were not working comprised of 26.9 percent (n=21). Out of all of the respondents, only 10.3 percent (n=8) were public workers while 2.6 percent (n=2) were working in the non-government sector. Many of the elderly women interviewed came from small families. Table 1 shows that the majority of the respondents at 46.2 percent (n=36) had only 1-4 children. The next largest group was with 5-9 children that comprised of 37.2 percent (n=29) of the respondents. Only 12.8 percent (n=10) had 10-14 children in their families, 1.2 percent (n=1) had 15-19 children and 2.6 percent (n=2) had no children. Besides, the person(s) whom the respondents spent most their time before coming to PKWTNS are almost half of the respondents (47.5 percent, n=37), lived alone prior to coming to institution. The remaining 52.5 percent were living with someone else, of which 3.8 percent (n=3) was with a husband or spouse while 48.7 percent (n=38) either lived with children, relatives, or others. Below the table shows the reasons to live in PKWTNS. The majority of them want a better life in the institution (21.8 percent) because they lack caretakers (19.2 percent), or because they have a family conflict (14.1 percent). A few respondents mentioned that they live in PKWTNS because they do not want to disturb their children (11.5 percent), or have been abandoned by children (10.3 percent) and lack of energy in doing household chores (6.4 percent). Other reasons for choosing to live in an institution are due to loneliness (10.3 percent) and being poor (6.4 percent). Table 1 shows the level of loneliness among elderly women in PKWTNS as determined using the UCLA Loneliness Scale instrument. It is worth nothing that none of the respondents reported "never" feeling lonely (0-20) and only 5.1 percent (n=4) were feeling minimal loneliness or "rarely" (21-40). A very large majority of respondents at 94.9 percent (n=74) were classified as "sometimes" feeling lonely (41-60). None of the respondents were classified as experiencing high levels of loneliness or "often" (more than 61).

Table 1: Respondent Backgrounds

Respondent's Background	Frequency (n=78)	Percentage (%)
Marital Status		
Single	2	2.6
Married	3	3.8
Widowed	73	93.6
Age		
60-64	24	30.8
65-69	15	19.2
70-74	24	30.8
75-80	14	17.9
More than 80	1	1.3
Level of Education		
SRP	42	53.8

Cont... **Table 1: Respondent Backgrounds**

SPM	22	28.2
No Education	14	18.0
Working History		
Not Working	21	26.9
Self-employed	47	60.2
Public Worker	8	10.3
Non-government	2	2.6
Number of Children		
1-4	36	46.2
5-9	29	37.2
10-14	10	12.8
15-19	1	1.2
No Children	2	2.6
The Majority of Elderly Women Spent with		
Self	37	47.5
Husband/Spouse	3	3.8
Children	20	25.6
Relatives	17	21.8
Others	1	1.3
Reason for Choosing to live in institution		
Do not Want to Disturb Their Children	9	11.5
Abandoned by Children	8	10.3
Family Conflict	11	14.1
Lack of Caretakers	15	19.2
Lack of Energy in doing Household Chores	5	6.4
Want a better life in the Institution	17	21.8
Poor	5	6.4
Feeling Lonely in their home	8	10.3
The Level of Loneliness		
0-20	0	0
21-40	4	5.1
41-60	74	94.9
More than 61	0	0

The findings of regression analysis show the impacts of independent variables that are factors of demographic profile on respondents' loneliness. Based on the correlation analysis, only four factors showed insignificant value, network and communication and trust. Only factors with significant correlation value can be measured by the effects of regression analysis.

Table 2: Model Summary

Institution	Model	R	R Square
Private institution	1	0.778	0.689

The r square value in the Model Summary in table 2 shows the amount of variance in the dependent variable that can be explained by the independent variables. In the research, the independent variables together account for 7.78 per cent of the variance in the loneliness scores. The r value (0.778) indicates the multiple correlation coefficient between all the entered independent variables and the dependent variable.

Table 3: Regression

Model B	Std. Error		Beta	T	Sig.
Frequency of visitors	0.367	0.043	1.227	8.516	0.00
Period of stay	-0.248	0.030	-1.005	-8.232	0.00
Level of health	0.005	0.029	0.016	0.183	0.00

The coefficient for period of stay was -0.248 have shown in table 3. Hence, for every unit increase in frequency of visitors score, researcher expect a 0.367 point increase in the depression score keeping the scores for variables period of stay and level of health fixed. The result obtained was statistically significant ($p=0.00 < 0.05$). The coefficient for level of health is 0.05. Hence, for every unit increase in level of health score, researcher expects a 0.05 point decrease in the loneliness score keeping the scores for variables frequency of visitors and period of stay fixed. This is statistically significant ($p=0.03 < 0.05$). The coefficient for frequency of visitors was 0.367. Hence, for every unit increase in frequency of visitors score, researcher expect a 0.043 point increase in the depression score keeping the scores for variables period of stay and level of health was fixed. This result is statistically significant ($p=0.00 < 0.05$). Symbol of t and Sig. was a constant is significantly different from zero at the 0.05 alpha level as in $p=0.00 < 0.05$.These variables statistically significant predicted loneliness, $F = 25.143$, $p < 0.05$, $R2 = 0.716$. All three variables added statistically significantly to the prediction, $p < 0.05$. Furthermore, the researcher will discuss further on the relationship between loneliness and factors of demographic profiles among elderly women in private care institution. Meanwhile, the distribution of frequency of visitors was found that there was a significant relationship between frequency of visitors and loneliness among elderly women in institution. However, in this section, focus will be given on the residents who were never visited by their children, neighbors, friends, and relatives. It is human nature the lack of attention from loved ones could lead to mental illness, especially depression [8 10]. Hence, residents who did not have any visitors were detected as having loneliness. Elderly women who stayed longer in homecare tend to have loneliness [11 12]. In the present research, it was found that most of the residents are staying more than 12 months. Hence, this might be another factor in most of the institution residents having loneliness. This statement is also supported by other researches which indicated that the elderly who are staying at nursing homes tend to have loneliness, regardless of having proper activities because for them, staying with children is more important than staying in the nursing home [13 14 15]. Table 3 shows that the prevalence of loneliness was higher to them who were staying in institutions for longer more than 12 months a (37 people) as compared to those staying for less than 6 months (18 people). The rationale behind the increased prevalence of loneliness with increasing duration of stay could be due to the feeling of loneliness from the outside world especially in an institution [16 17 18]. Thus, there are significant positive relationships between duration of stay with loneliness among elderly women. The relationship between levels of health with loneliness is a well-known issue and has been reported by numerous other researches. The literature suggests that loneliness may increase the risk of the subsequent level of health among them. According [19 20 21], many of them have diabetes and other chronic medical conditions that are associated with an increased risk of depression. The presence of a chronic medical illness may in fact decrease the chances of recognition and therefore treatment of loneliness in the setting. The more severe condition of the illness, the higher the risk of loneliness [22]. A meta-analysis of interventions among elderly women with diabetes and loneliness showed that both psychotherapies and antidepressants were efficacious in treating loneliness among the elderly women with diabetes. In the study, the relationship between financial support and loneliness among elderly women in institution was investigated. According to [23 24] most of them are economically disadvantaged. In those

cases, the economic crisis especially unemployment acts as a precipitant among elderly women. It is therefore especially important to screen for loneliness among them during these periods of economic hardship. In other researches by [25] loneliness among elderly women was found to be related to financial difficulties and poverty where lack of financial support was cited as the most prevalence factors for the occurrence of loneliness.

Conclusion

As a conclusion, the study on the prevalence between demographic profiles and loneliness among elderly women in private care institution is important to raise awareness about this alarming issue in the society especially among elderly women. Hence, the findings of this research will give a better understanding regarding function of the nursing home in reducing loneliness among them.

Ethical Clearance: Taken from School of Social Work Ethics' Committees Faculty of Applied Social Sciences.

Conflict of Interest: NIL

Source of Funding: Self.

References

1. Holwerda TJ, Van Tilburg TG, Deeg DJH, Schutter N, Dekker J, Stek ML, et al. Impact of loneliness and depression on mortality: Results from the longitudinal ageing study Amsterdam. Br J Psychiatry. 2016;
2. Hao G, Bishwajit G, Tang S, Nie C, Ji L, Huang R. Social participation and perceived depression among elderly population in South Africa. Clin Interv Aging. 2017;
3. Iannello P, Biassoni F, Bertola L, Antonietti A, Caserta VA, Panella L. The role of autobiographical story-telling during rehabilitation among hip-fracture geriatric patients. Eur J Psychol. 2018;
4. Lampert MA, Rosso ALP. Depression in elderly women resident in a long-stay nursing home. Dement Neuropsychol. 2015;
5. Steptoe A, Shankar A, Demakakos P, Wardle J. Social isolation, loneliness, and all-cause mortality in older men and women. Proc Natl Acad Sci U S A. 2013;110(15):5797–801.
6. Manrique-Espinoza B, Salinas-Rodríguez A, Rosas-Carrasco O, Gutiérrez-Robledo LM, Avila-Funes JA. Sarcopenia Is Associated With Physical and Mental Components of Health-Related Quality of Life in Older Adults. J Am Med Dir Assoc. 2017;
7. Nurun Saadah S, Lukman ZM, Syafiq MS, Zulaikha MZ, Bukhari WMY, Kamal MY. The Study of Depression and Loneliness among Elderly Women. 2018;II(X):110–3.
8. Wei M, Russell DW, Zakalik RA. Adult attachment, social self-efficacy, self-disclosure, loneliness, and subsequent depression for freshman college students: A longitudinal study. J Couns Psychol. 2005;
9. Singh A, Misra N. Loneliness, depression and sociability in old age. Ind Psychiatry J. 2009;18(1):51.
10. Matthews T, Danese A, Wertz J, Odgers CL, Ambler A, Moffitt TE, et al. Social isolation, loneliness and depression in young adulthood: a behavioural genetic analysis. Soc Psychiatry Psychiatr Epidemiol. 2016;51(3):339–48.
11. Russell DW. Ucla Loneliness Scale Version 3 (description of Measure). J Pers Soc Psychol. 1996;
12. S. IR, S. S. Impact of Widowhood and Disability Among Elderly. In 2018.
13. Steventon A, Roberts A. Estimating length of stay in publicly-funded residential and nursing care homes: A retrospective analysis using linked administrative data sets. BMC Health Serv Res. 2012;
14. B Sangma R, Konjengbam S, Laishram J, Elangbam V. Depression and its associated risk factors among elderly in an urban area: A cross- sectional study. J Med Soc. 2018;
15. Liu HY, Yang CT, Tseng MY, Chen CY, Wu CC, Cheng HS, et al. Trajectories in postoperative recovery of elderly hip-fracture patients at risk for depression: A follow-up study. Rehabil Psychol. 2018;
16. Oliveira PB de, Tavares DM dos S. Health conditions of elderly residents in Long-stay Institution second basic human needs. Rev Bras Enferm. 2014;
17. Atif M, Saleem Q, Babar Z-U-D, Scahill S. Association between the Vicious Cycle of Diabetes-Associated Complications and Glycemic Control among the Elderly: A Systematic Review. Medicina (B Aires). 2018;

18. Aarts JWF, Deckx L, Van Abbema DL, Tjan-Heijnen VCG, Van Den Akker M, Buntinx F. The relation between depression, coping and health locus of control: Differences between older and younger patients, with and without cancer. Psychooncology. 2015;
19. Mata DA, Ramos MA, Bansal N, Khan R, Guille C, Di Angelantonio E, et al. Prevalence of depression and depressive symptoms among resident physicians a systematic review and meta-analysis. JAMA - J Am Med Assoc. 2015;
20. Adamson BC, Yang Y, Motl RW. Association between compliance with physical activity guidelines, sedentary behavior and depressive symptoms. Prev Med (Baltim). 2016;
21. Liu Y, Li T, Guo L, Zhang R, Feng X, Liu K. The mediating role of sleep quality on the relationship between perceived stress and depression among the elderly in urban communities: a cross-sectional study. Public Health. 2017;
22. Tapia-Muñoz T, Mascayano F, Toso-Salman J. Collaborative care models to address late-life depression: Lessons for low-and-middle-income countries. Front Psychiatry. 2015;
23. Martínez-Alcalá CI, Pliego-Pastrana P, Rosales-Lagarde A, Lopez-Noguerola J, Molina-Trinidad EM. Information and Communication Technologies in the Care of the Elderly: Systematic Review of Applications Aimed at Patients With Dementia and Caregivers. JMIR Rehabil Assist Technol. 2016;
24. Zin T, Myint T, Naing DK, Htay K, Wynn AA, SabaiAung T, et al. A study on health-related quality of life and comorbidity among elderly population in rural Sabah, Malaysia. South East Asia J Public Heal. 2016;
25. Berman G, Muttuvelu D, Berman D, Larsen JI, Licht RW, Ledolter J, et al. Decreased retinal sensitivity in depressive disorder: a controlled study. Acta Psychiatr Scand. 2018.

Prevalence and Risk Factors Associated with Bacterial Food Poisoning in College Students at the Primary Care Unit

Pat Nonjui[1], Wilawan Aunruean[2], Arkhom Bunloet[1]

[1]Lecturer, Department of Community Medicine, Faculty of Medicine, Khon Kaen University, Thailand,
[2]Registered nurse, Primary Care Unit 123, Khon Kaen University, Srinagarind Hospital, Thailand

Abstract

Food poisoning is defined as illness caused by the consumption of contaminated food, of which bacteria is a major cause. Khon Kaen province has the fourth highest rate of food poisoning in Thailand. A previous study in the province found raw meat contaminated with *Escherichia coli*, *Salmonella enterica*, and *Staphylococcus aureus*. The most commonly contaminated meat was pork, followed by beef and chicken. Despite this, there is insufficient awareness and concern regarding fsood poisoning among undergraduate students in the area, more than half of whom had experienced illness caused by consumption of local food. As there have been few studies conducted to examine food poisoning in college students in northeast Thailand, this retrospective descriptive study aimed to determine the prevalence and risk factors associated with bacterial food poisoning in these students at a primary care unit. Data were gathered from outpatient records, outbreak investigation data, and the electronic database at Primary Care Unit 123, Khon Kaen University, Srinagarind Hospital between August 2015 and July 2018.

The data of 155 participants, most of whom were female, were included in the study. The prevalence of bacterial food poisoning confirmed by rectal swab culture was 26.5%. The most common cause of illness was *Vibrio Parahaemolyticus* (39.0%), followed by *Plesiomonas shigelloides* (22.0%), *Vibrio Parahaemolyticus* with *Plesiomonas shigelloides* (12.2%), and *Salmonella* spp. (9.8%). Mucus in the stool (OR=8.40, 95% C.I=1.24-56.81) and consumption of papaya salad (OR=2.77, 95% C.I=1.22-6.27) were statistically significant risk factors for bacterial food poisoning in this group.

Keywords: *food poisoning, college student, primary care, factor, stool culture*

Introduction

Food poisoning is defined as an illness caused by the consumption of contaminated food. Bacteria is the cause of such outbreaks in about 75% of cases[1]. In the United States, most illnesses are caused by norovirus, and 39% are caused by bacteria, including nontyphoidal *Salmonella* spp., *Clostridium perfringens,* and *Campylobacter* spp.[2]. In 2018, there were 122,006 reported cases of food poisoning in Thailand, most commonly in patients aged 15-24, primarily caused by *Vibrio parahaemolyticus* and *Salmonella* spp. Khon Kaen province has the fourth highest rate of food poisoning in Thailand[3,4]. A previous study in the province found raw meat contaminated with *Escherichia coli, Salmonella enterica,* and *Staphylococcus aureus*. The most commonly contaminated meat was pork, followed by beef and chicken[5]. Despite this, there is insufficient awareness and concern regarding food poisoning among undergraduate students in the area, more than half of whom had experienced illness caused by the consumption of local food. Although about 27% of students in the area required medical care because of foodborne illness, approximately 35% continue to eat raw food[6]. As there have been few studies conducted to examine food poisoning in college students in northeast Thailand, this study aimed to determine the prevalence and risk factors associated with bacterial food poisoning

Correspondent author:
Pat Nonjui,
Department of Community Medicine, Faculty of Medicine, Khon Kaen University, Thailand 40002,
e-mail:patno@kku.ac.th

in these students at a primary care unit.

Method

Study design

This retrospective descriptive study was conducted using data from outpatient documentation at the Primary Care Unit 123, Khon Kaen University, Srinagarind Hospital (PCU 123 KKU), the routine national infectious diseases report (R506 report) and Srinagarind Hospital's electronic database from August 2015 to July 2018. This study was approved by the Center for Ethics in Human Research, Khon Kaen University (Sub office) (Reference No. HE611391).

Participants

We included data from 155 participant's in the study. The inclusion were as follows: 1) the patient was a college student 18 years of age or older, 2) the patient was clinically diagnosed with bacterial food poisoning, and 3) rectal swab culture results were available. Any cases in which there were insufficient data were excluded from the study

Data collection

Outpatient documentation from PCU 123 KKU, data from the routine national infectious diseases report (R506 report), and data from the Srinagarind Hospital electronic database were reviewed. Microsoft Excel 2016 was used to record the data.

Statistical analysis

SPSS Statistics version 26.0 was used for data analysis. Descriptive analysis was presented as percentages, medians, and interquartile ranges. A Chi-square Test and Fisher's Exact Test were used to examine the relationship between each independent variable and rectal swab culture results by crude OR with 95% confidence interval. The significance level was set at 0.05.

Results

The 155 patients included in the study. All were from 18 to 26 years old with a median of 21 years old. Most (65.8%) were female, and 12.3%, 11.0%, and 10.3% belonged to the Faculty of Science, Faculty of Agriculture, and Faculty of Humanities and Social Science, respectively. Most experienced abdominal pain (85.8%) and fatigue (71.0%). Watery stool (58.1%), mushy stool (53.5%), strong-smelling stool (19.4%), and mucus in the stool (3.2%) were common fecal symptoms. A total of 9.0%, 3.9%, and 3.2% of patients had previously used acetaminophen, Salol et Menthol Mixture, and activated charcoal, respectively. Only 3.2% of patients had taken antibiotics before visiting the primary care unit. Patients reported having eaten high-risk foods including papaya salad (20.6%), Thai barbecue (18.7%), and noodles (18.1%). Approximately 112 patients (70.0%) had moderate dehydration.

The prevalence of bacterial food poisoning was 26.5%. The most common causes of illness were *Vibrio Parahaemolyticus* (39.0%), *Plesiomonas shigelloides* (22.0%), *Vibrio Parahaemolyticus* with *Plesiomonas shigelloides* (12.2%), and *Salmonella* spp. (9.8%), as shown in Table 1.

Table 1 Rectal swab culture results in college students at the primary care unit

Results of rectal swab culture (n = 41)	No. (%)
Vibrio Parahaemolyticus	16 (39.0)
Plesiomonas shigelloides	9 (22.0)
Vibrio Parahaemolyticus with Plesiomonas shigelloides	5 (12.2)
Salmonella spp.	4 (9.8)
Aeromonas spp.	3 (7.3)
Vibrio cholera	2 (4.9)
Shigella Flexneri group B	1 (2.4)
Plesiomonas shigelloides with Salmonella spp.	1 (2.4)

One hundred twenty patients were prescribed antibiotics (77.4%; 78.8% of those with negative rectal swab cultures 75.6% of those with positive cultures), all of whom received norfloxacin. Durations of antibiotic treatment were five days (45.8%), three days (18.1%), and seven days (8.4%).

Mucus in stool and consumption of papaya salad were significantly associated with bacterial food poisoning. Students with mucus in their stool were about eight times more likely to have bacterial food poisoning than those without (OR=8.40, 95% C.I=1.24-56.81). And students with history of consumption of papaya salad were about three times more likely to have bacterial food poisoning than those without (OR=2.77, 95% C.I=1.22-6.27).

Discussion

In 2018, 1,230,314 patients were diagnosed with food poisoning without confirmation via diagnostic test in Thailand, the majority of whom were female. The mortality rate was approximately 0.01 per 100,000 population[7]. We found that most cases were caused by *Vibrio parahaemolyticus*, a common cause of seafood-borne illness in many Asian countries[8], which is consistent with the findings of another study conducted in Khon Kaen. However, the second and third most common causes in the previous study were Escherichia coli and Salmonella spp.[9], respectively, whereas those in our study were Plesiomonas shigelloides and Vibrio parahaemolyticus with *Plesiomonas shigelloides*, respectively, followed by *Salmonella* spp. This may have been due to the fact that the previous study included all patients, including those in the inpatient department, where ours only included college students in the outpatient clinic of the primary care unit. In the previous study, diarrhea was the most common symptom for *Vibrio parahaemolyticus* infection and was associated with abdominal cramps, nausea, and vomiting. The food vehicle for *Vibrio parahaemolyticus* infection was seafood or cross-contamination with seafood, especially raw fish or shellfish.[8,10,11]

The second most common cause of bacterial food poisoning in our study was *Plesiomonas shigelloides.* Plesiomonads can colonize in cows, pigs, poultry, and – in tropical areas – fish and shellfish[12]. The consumption of raw and undercooked food is common in Southeast Asia[13,14]. In our study, the consumption of papaya salad statistically significant increase the risk of bacterial food poisoning. Although we did not find an association between the consumption of seafood and bacterial food poisoning, some types of papaya salad contain seafood. Moreover, previous studies found that the microbiological quality indices for *Staphylococcus aureus* and *Escherichia coli* contamination in green papaya salad exceed the standard limits and that coliform bacteria was most-commonly found in this type of food[15,16] Another study found the consumption of chicken rice, food containing coconut milk, fried rice, and leftover food to be associated with food poisoning. [4].According to the Thailand treatment guidance of acute diarrhea for community pharmacist, antibiotics should be prescribed when patients have mucous or blood in the stool with a history of fever (higher than 38.5 °C). A 3-5 day course of 400 mg of norfloxacin b.i.d. is recommended as first-line treatment[17]. However, only 62.1% of patients were prescribed three-to-five-day antibiotic treatment. All of the patients who did undergo antibiotic treatment received norfloxacin.

Bacterial enteropathogens produce acute watery diarrhea, so this condition is clinically nonspecific. However, the passage of bloody stools suggests possible bacterial colitis, which is often caused by *shigella*, *campylobacter*, nontyphoid *salmonella*, and Shiga toxin-producing *E. Coli*[18]. Diarrhea, abdominal cramps, nausea, vomiting, headache, fever, and chills are symptoms of *Vibrio parahaemolyticus* infection. In the most severe cases, watery diarrhea is associated with mucus, blood, and tenesmus[11]. Although a previous study found that stool with visible mucous and did not indicate a specific infecting agents, stool examination is still useful in the diagnosis of patients with diarrhea[19].

Conclusion

About one-fourth of the clinical diagnoses of bacterial food poisoning were confirmed via rectal swab culture. A history of consumption of papaya salad and mucus in the stool were associated with bacterial food poisoning.

Acknowledgments: The authors would like to a thank the staff at the PCU 123 KKU for their assistance in our study.

Ethical Clearance: Taken from the Center for Ethics in Human Research, Khon Kaen University (Sub office) (Reference No. HE611391).

Source of Funding: The authors received no specific funding for this work.

Conflict of Interest: The authors declare no conflict of interest.

References

1. Feldman M, Friedman LS, Brandt LJ. Sleisenger and Fordtran's gastrointestinal and liver disease : pathophysiology/diagnosis/management [Internet]. 2016. Available from: https://www.clinicalkey.com/dura/browse/bookChapter/3-s2.0-C20121000197
2. Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson M-A, Roy SL, et al. Foodborne Illness Acquired in the United States—Major Pathogens. Emerg Infect Dis. 2011 Jan;17(1):7–15.
3. Bureau of Epidemiology, Department of Disease

Control, Ministry of Public Health. Routine national infectious disease report (R506 report), Food poisoning - Situation summary in 2018 [Internet]. [cited 2019 Mar 6]. Available from: http://www.boe.moph.go.th/boedb/surdata/disease.php?ds=03

4. Tungwongjulaniam C. Situation of food poisoning, 2017. Dis Control J. 2018 Sep 28;44(3):315–24.
5. Angkititrakul S, Polpakdee A, Chuanchuen R. Prevalence of *Salmonella enterica*, *Escherichia coli* and *Staphylococcus aureus* in Raw Meat in Thai Self-Service Style Restaurants in Khon Kaen Municipality. Thai J Vet Med. 2013;43(2):265–8.
6. Settheetham D, Ishida W. Study of Food Selection Behaviors among Khon Kaen University Students. Srinagarind Med J. 2002;17(4):239–46.
7. Bureau of Epidemiology, Department of Disease Control, Ministry of Public Health. 2018 Weekly report from Routine national infectious disease report (R506 report) [Internet]. [cited 2019 Mar 1]. Available from: http://www.boe.moph.go.th/boedb/surdata/506wk/y61/d02_5261.pdf
8. Su Y-C, Liu C. *Vibrio parahaemolyticus*: A concern of seafood safety. Food Microbiol. 2007 Sep 1;24(6):549–58.
9. Kanhakul P, Jamjane O, Chaimanee P. The surveillance acute diarrhea and food poisoning in laboratory in public health regian 10 and 12. J Off DPC7 KHON KAEN. 2013;20(2):11–20.
10. Daniels NA, MacKinnon L, Bishop R, Altekruse S, Ray B, Hammond RM, et al. *Vibrio parahaemolyticus* Infections in the United States, 1973–1998. J Infect Dis. 2000 May 1;181(5):1661–6.
11. Doyle MP, Buchanan R. Food microbiology: fundamentals and frontiers. Washington, DC: ASM Press; 2013.
12. Brenden RA, Miller MA, Janda JM. Clinical Disease Spectrum and Pathogenic Factors Associated with *Plesiomonas shigelloides* Infections in Humans. Rev Infect Dis. 1988 Mar 1;10(2):303–16.
13. Xayaseng V, Phongluxa K, van Eeuwijk P, Akkhavong K, Odermatt P. Raw fish consumption in liver fluke endemic areas in rural southern Laos. Acta Trop. 2013 Aug 1;127(2):105–11.
14. Grundy-Warr C, Andrews RH, Sithithaworn P, Petney TN, Sripa B, Laithavewat L, et al. Raw attitudes, wetland cultures, life-cycles: socio-cultural dynamics relating to *Opisthorchis viverrini* in the Mekong Basin. Parasitol Int. 2012 Mar;61(1):65–70.
15. Moonsri M, Settheetham D. Food Sanitation of Cafeterias Khon Kaen University. KKU J Public Health Res. 2014;42–9.
16. Srisai Y, Yasaka S. Situation of food sanitation in the area around Naresuan University Phitsanulok Province Thailand. Dis Control J. 2016 Dec 30;42(4):327–36.
17. Sathienluckana T, Pummangura C, Khan-asa B. Treatment Guidance of Acute Diarrhea for Community Pharmacist. Isan J Pharm Sci. 2018 Oct 31;14(4):1–17.
18. DuPont HL. Bacterial Diarrhea. N Engl J Med. 2009 Oct 15;361(16):1560–9.
19. Stoll BJ, Glass RI, Banu H, Huq MI, Khan MU, Ahmed M. Value of stool examination in patients with diarrhoea. Br Med J Clin Res Ed. 1983 Jun 25;286(6383):2037–40.

Source of Information and Experience of Participation in Elderly Health Promotion Program Funded by National Health Security Local Fund in Northeastern Part of Thailand

Piyathida Kuhirunyaratn[1], Bangonsri Jindawong[2]

[1]Associate Prof., Department of Community Medicine, Faculty of Medicine, Khon Kaen University,
[2]Registered Nurse, Department of Community Medicine, Faculty of Medicine, Khon Kaen University

Abstract

Background: Thailand has been deployed the health coverage policy which integrated into the activities of health promotion hospitals and the local administrative organization to provide the health promotion program for Thai people. Due to the population aging in Thailand had been increasing and expanding the number which experiences aging process incorporate with underlying diseases.

Objectives: This study aims to assess sources of information and experiences of participated proportion in health promotion programs among the elderly funded by the National Health Security Local Fund (NHSLF) in Northeastern Part of Thailand.

Methods: A descriptive study was conducted. Sample size calculation to estimate a proportion and systematic sampling was used. The sample included 577 elders 60 or more years of age, registered at 54 Primary Care Unit (PCU) and health promotion hospital in Khon Kaen and Kalasin province, Thailand. A structured questionnaire was used to collect the information which reviewed and tested by experts and Cronbach's alpha was 0.81.

Results: The response rate was 97.57%. The elders comprised more females than males (mean age 64.82, SD 1.36). The proportion of the elderly who perceived information on elderly health promotion services program funded by the NHSLF was 79.2%. The highest source of information proportion that the elderly perceived elderly health promotion services program were village health volunteers (80.3%), public health personnel (60.5%) and community leader announce via community broadcasting program (50.9%). This study also found the highest experience of participating in the elderly health promotion program was nutritional assessment screening, joined the community elderly club, and trained for appropriate exercise. In addition, this study also found having caregivers related to the elderly health promotion services program funded by NHSLF with statistically significant.

Conclusion: The humanize communication by community health volunteers and public health personal were good sources for access to health information among the elderly. In addition, the nutritional assessment joined the community elderly club and trained for appropriate exercise were popular activities among the elderly. The two-way communication technique and family caregiver made the elderly can access health information and participated in the health promotion program.

Keywords: *Source of information, Health promotion, Elderly*

Corresponding author:
Piyathida Kuhirunyaratn,
Department of Community Medicine, Faculty of Medicine, Khon Kaen University, 40002, Thailand.
Email: spiyat@kku.ac.th, Tel: 66-43-363588.

Introduction

According to the Thai government's policy created universal health coverage for the people since 2001 to make people access the medical services and public health by equal quality standards cover all areas as

well as promote encouraging health accessibility. In the universal coverage program, the NHSLF was an important part to enhance the participation of the sector in the management of community health systems by the cooperation between the local government organizations, health promotion hospitals, and the community. The important principles of the NHSLF were to support the budget for health promotion operations, disease prevention, medical treatment, and rehabilitation, as well as building a collaborative learning process between related organization-level and community level.

The elderly are the one special group that must be cared for inevitably due to the aging process dealing with the life events and social change that made the elderly fall into the high risk of diseases and disability. The Thai elderly health status found about three in five respondents (56%) reported that their health was either fair or very bad/bad [1]. In addition, three in four of Thai elderly had underlying diseases and mostly experienced at least one symptom in the past six months [2]. Therefore, the NHSLF supports health promotion programs for the elderly to improve their overall well-being. Understanding the health promotion project accessibility and involvement among the elderly of the health promotion program would be beneficial for policy and planning the project regard the elderly health in the community and another similar community context in Thailand.

Objectives

This study aims to assess sources of information and experiences of participated proportion in health promotion programs among the elderly funded by NHSLF in the Northeastern part of Thailand.

Materials & Method

A descriptive study was conducted in Khon Kaen province and Kalasin province, located in the Northeastern part of Thailand. The inclusion criteria were the elderly aged 60 years and over, living in the community where the provided the health promotion program and registered at 54 Primary Care Unit (PCU) or health promotion hospital in Khon Kaen and Kalasin province, Thailand. The exclusion criteria were the elderly who had severe health problems and were unable to communicate and participate. The sample size calculation was calculated based on a pilot study as assumed proportion = 0.40. The Win Pepi program was used for a sample size calculation with a confidence level of 95%, Acceptable difference = 0.04. Therefore, the sample size required 577samples.

The study tool was a questionnaire, comprising 3 parts: socio-demographic characteristics, source of information and participation in elderly health promotion programs funded by the National Health Security Local Fund. The questionnaire was reviewed and tested by experts and the reliability test found the Cronbach's alpha was 0.81.

Data were collected through the well-trained interviewers. The data was entered and transferred into the SPSS of Khon Kaen University licensed for data analysis. The data were analyzed using frequency, percentage, mean, SD and 95%CI, chi-squared.

Results

The response rate was 97.57%. The elders comprised more females than males (59.88%) and the mean age was 64.82 (SD 1.36) years old. had completed primary school (91.70%), half of the respondents were married (56.97%).

The highest proportion of the elderly experience in participated in the health promotion program funded by NHSLF were nutritional assessment (71.7%), joined the community elderly club (60.1%), and trained for appropriate exercise (50.0%) respectively.

The proportion of the elderly who perceived information on elderly health promotion services program funded by the NHSLF was 79.2%. The highest source of information proportion that the elderly perceived health promotion services program were village health volunteers (80.3%), public health personnel (60.5%) and community leader announce via community broadcasting program (50.9%) respectively. The lowest source of information proportion that the elderly perceived elderly health promotion services program were leaflet (4.0%), newspaper (4.7%), and radio (10.1%) respectively. (Table1)

Table 1 Source of information proportion that the elderly perceived elderly health promotion services program

Variables	Number	Percentage
Perceived information on elderly health promotion services program funded by the National Health Security Local Fund (n=563)		
Yes	446	79.2
No	117	20.8
Source of information proportion that the elderly perceived elderly health promotion services program (n=446)		
Village health volunteer	358	80.3
Public health personnel	270	60.5
community leader announce via community broadcasting program	227	50.9
Television	81	18.2
Neighbor	68	15.2
Radio	45	10.1
Newspaper	21	4.7
leaflet	18	4.0

Factor related to perceived information on elderly health promotion services program funded by the NHSLF

This study found having caregivers related to the elderly health promotion services program funded by the NHSLF by statistically significant. (Table 2)

Table 2 Factor related to Perceived information on elderly health promotion services program funded by the NHSLF

Variables	Elderly perceived information on elderly health promotion services program funded by the NHSLF				p-value
	Yes		No		
	n	%	n	%	
Gender					
Male	137	80.1	34	19.9	0.697
Female	306	78.7	83	21.3	
Age group (year)					
60-69-years-old	196	76.0	62	24.0	0.081
70 and over	250	82.0	55	18.0	
Education level					
Primary school	400	79.1	106	20.9	0.771
Secondary school and over	46	80.7	11	19.3	
Had chronic diseases					
Yes	274	79.9	69	20.1	0.627
No	172	78.2	48	21.8	
Had caregiver					
Yes	431	80.6	104	19.4	0.001*
No	15	53.6	13	46.4	

**Statistical significant at level 0.05*

Discussion

This study found nearly eighty percent perceived information on elderly health promotion services program funded by the NHSLF. Health promotion has long been recognizing as a tool and strategy for prevention of functional decline and improving the health and quality of life among the elderly [3]. Similar to the study of Booranarek et al [4] found most of the elderly reported easily and conveniently accessible to health services (91.19%). The information that the elderly perceive might be a protective factor that increases control with affect to the elderly health behavior and become even more important, particularly with regard to maintaining functional independence and improving quality of life (QoL) [5].

Regards nearly eighty percent that the elderly perceived health promotion information, the most source of information that the elderly accessed was from their social networks such as community health volunteers, public health personals, and community leaders. The social network influences the elderly as a primary factor in the adoption of health behaviors and their quality of life [6, 7]. The social interaction between the elderly and their social network were communicated by the two-way communication which the sender transmits a message to another person, who is the receiver. When the elderly get the message, they send back a response, acknowledging the message was received. This technique was effective to the elderly people who are the functional decline, facing with the hearing problems and poor eyesight. The two-way communication made the elderly easy to send back the response, and ask for more information. In addition, the health volunteers and public health personals working closely with the elderly, therefore, the elderly easily access those other sources of health promotion information.

Health promotion programs for the elderly funded by NHSLF includes health promotion activities, health screening, and prevention activities for decrease complications of the diseases and rehabilitation program. The most frequent that the elderly joined were nutritional assessment, joined the community elderly clubs, and trained for appropriate exercises. Due to functional decline may be the main reason for the high risk of malnutrition and increases the risk of multi-morbidity, and disease-related malnutrition [8]. The nutritional screening might be benefits to the elderly to meet the nutritional needs of people at old age.

The elderly joined the community elderly club benefit for social interaction with other peoples including the community health volunteers and public health personals that consequently the information in health promotion program [9]. Piriyakunkit et al [10] stated the elderly persons who were members of the elderly club had significantly higher knowledge about the elderly club activity than those who were not members. This study also found more than half of the elderly trained and joined exercise for the elderly club activities, similar to Ethisan et al [11] found 58.7% of the elderly performed exercise such as brisk walking, housework, and aerobic exercise which the elderly easily to perform by themselves no sporting equipment and practicing at their residence.

In part of factor related to perceived information on elderly health promotion services program, the elderly caregiver plays an important role to assist the elderly in psychological support, financial support, information support, and support the elderly in daily life [12], and also assistant to accessibility to the source of health promotion information.

Conclusions

The highest source of health promotion information among the elderly were community health volunteers, public health personnel and the elderly participated in the nutritional assessment, joined the elderly club, and trained for appropriate exercise regards the health promotion project funded by NHSLF. Two-way communication by close up people and the family caregiver made the elderly accessed health information and participated in the health promotion program.

Acknowledgment: The authors would like to thank all participants and the National Health Security Office (NHSO) Region 7 Khon Kaen Province, Thailand.

Conflict of Interest: none

Source of funding: National Health Security Office (NHSO) Region 7 Khon Kaen Province, Thailand.

Ethical Clearance: Taken from the Ethics Committee for Research on Human Subjects (HE 591493), Faculty of Medicine, Khon Kaen University, Thailand.

References

1. Haseen F, Adhikari R, Soonthorndhada K. Self-

assessed health among Thai elderly. BMC Geriatr 2010;10(30):1-9.

2. Phoomchaiya S, Isaramalai S, Naka K. Health status and dependency of Thai elderly in an urban area: Hat Yai Municipality. Journal of Liberal Arts Prince of Songkla University 2018:10(1):308-51.
3. Santos SSC, Barlem ELD, da Silva BT, Cestari ME, Lunardi VL. Health promotion for the elderly: gerontogeriatric nursing commitment. Acta Paul Enferm 2008;21(4): 649-53.
4. Booranarek S, Thummaraksa P, Kaewchuntra K, Khamwong M. Health status and health services accessibility: Samsen Community. Journal of Boromarajonani College of Nursing, Bangkok 2017;33(2):54-63.
5. Lee TW, Ko IS, Lee KJ. Health promotion behaviors and quality of life among community-dwelling elderly in Korea: a cross-sectional survey. Int J Nurs Stud 2006; 43(3):293-300.
6. Bahramnezhad F, Chalik R, Bastani F, Taherpour M, Navab E. The social network among the elderly and its relationship with quality of life. Electron physician 2017;9(5):4306–4311.
7. Centola D. Social media and the science of health behavior. Circulation 2013;127(21):2135-44.
8. Saragat B, Buffa R, Mereu E, Succa V, Cabras S, Mereu RM, et al. Nutritional and psycho-functional status in elderly patients with Alzheimer's disease. J Nutr Health Aging 2012;16(3): 231–6.
9. Kuhirunyaratn P, Pongpanich S, Somrongthong R, Love EJ, Chapman RS. Social support among elderly in Khon Kean Province, Thailand. Southeast Asian J Trop Med Public Health 2007;38(5):936-46.
10. Piriyakunkit N, Wanchai A. Decision making to participate in the elderly club's activities and needs for the elderly club's activities among elders in Phitsanulok Municipality. Boromarajonani College of Nursing, Uttaradit Journal 2019;11(1):238-51.
11. Ethisan P, Somrongthong R, Ahmed J, Kumar R, Chapman RS. Factors related to physical activity among the elderly population in rural Thailand. J Prim Care Community Health 2017;8(2):71-6.
12. Noohi E, Peyrovi H, Imani Goghary Z, Kazemi M. Perception of social support among family caregivers of vegetative patients: A qualitative study. Conscious Cog 2016;41:50-8.

Identification of Norovirus Infection in Adults with Acute Gastroenteritis in Jambi, Indonesia

Putri Sari Wulandari[1], Rury Mega Wahyuni[2], Mochamad Amin[2], Laura Navika Yamani[2,3], Takako Utsumi[4], Maria Inge Lusida[2,5], Juniastuti[1,2,5]

[1,5]Master Program of Tropical Medicine and Department of Microbiology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [2]Institute of Tropical Disease, Universitas Airlangga, Surabaya, Indonesia, [3]Department of Epidemiology, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia, [4]Center for Infectious Diseases, Kobe University Graduate School of Medicine, Kobe, Japan, Uniastuti

Abstract

Background: Norovirus (NoV) infection is the most common cause of non-bacterial acute gastroenteritis (AGE), which affects both adults and children. However, study of NoV in adults with AGE in Indonesia is still limited.

Objectives: This study aimed to investigate the incidence and clinical characteristics of NoV infection, and also genotype distribution of NoV in adults with AGE in Jambi, Indonesia.

Methods: Stool samples were collected from adults (≥18 years of age) with AGE at 3 participating hospitals in Jambi from February to April 2019. The detection of NoV and its genotyping were carried out by Reverse Transcriptase PCR and direct sequencing.

Results: Of the 44 stool samples collected, 4 (9.1%) were positive for NoV. Four different genotypes were identified, namely GI.2, GII.3, GII.6, and GII.20. All adults with AGE and NoV-positive showed abdominal pain and no dehydration, most of them experienced watery diarrhea (75%) for <5 days and half of them showed vomiting for 1 day.

Conclusion: NoV was detected in 9.1% of adults with AGE. The various rare genotypes of NoV in Indonesia were identified in Jambi. The common symptoms in AGE infected with NoV included abdominal pain and watery diarrhea with a short duration. Further surveillance is needed to complete the database of circulating NoV strains for its control.

Keywords *: Norovirus, genotype, acute gastroenteritis, adult, Indonesia*

Introduction

Acute gastroenteritis (AGE) is one of the most common illnesses and a major public health problem worldwide. Approximately 1.7-5 billion cases and nearly 1.7 million AGE-associated deaths still occur each year.[(1)] Over the eight-year study period, gastroenteritis-associated deaths from all causes increased from nearly 7,000 to more than 17,000 per year. Adults over 65 years old accounted for 83% of deaths. Norovirus (NoV) was one of the most common infectious causes of gastroenteritis-associated deaths.[(2)]

Noroviruses have been recognized as the leading cause of epidemics of gastroenteritis and an important cause of sporadic gastroenteritis in individuals of all ages in both developed and developing countries.[(3)] It is estimated that NoVs account for 12% of severe

Corresponding author:
Juniastuti
Work Address : Department of Microbiology, Faculty of Medicine, Universitas Airlangga,
Jl. Mayjen. Prof. Dr. Moestopo 47, Surabaya 60131, East Java, Indonesia, Telephone: +6231-5030252, Facsimile: +6231-5022472
E-mail : junsf@fk.unair.ac.id

gastroenteritis cases (hospitalized) among children under-5 years and 12% of mild and moderate diarrhea cases (outpatient) among persons of all ages.[4] Clinical infection with NoV generally has an incubation time of 12 to 48 hours, with nausea, vomiting, watery diarrhea, and abdominal pain.[1]

Norovirus, a member of the family Caliciviridae, is a non-enveloped, positive-sense, single-strand RNA virus. Its genome contains approximately 7.7 kb in length, which is organized into three open reading frames (ORFs): ORF1 encodes non-structural proteins including the RNA-dependent RNA polymerase (RdRp), ORF2 encodes the major capsid protein VP1, and ORF3 encodes the minor structural protein VP2. NoV is classified at least into 7 genogroups, GI–GVII. GI, GII, and GIV genogroups have been found in humans[5,6,]. More than 30 genotypes were characterized within the 7 genogroups[7,8].

Acute gastroenteritis is one of the most common public health problems in Indonesia and other countries. During the past several years, most studies of NoV infection in Indonesia focused on the role of human NoV in AGE in children, while the study of NoV in adults with AGE is still limited. In Jakarta, Indonesia, Norwalk-like viruses (NLV) were detected in 9.7% from patients >12 years of age with acute AGE.[9] Another study in Surabaya, Indonesia reported that the prevalence of NoV in asymptomatic adult population was 2.7%.[10]

Jambi is a capital and the largest city of Jambi province, located on the east coast of cental part of Sumatra island, Indonesia. Ministry of Health of Indonesia reported 96,397 diarrhea cases in all ages in Jambi[11] with the prevalence about 4.1%,[12] however the causative agents have not been reported. This study aimed to investigate the incidence and clinical characteristic of NoV infection, and also genotype distribution of NoV in adults with AGE in Jambi, Indonesia.

Methods

Sample and clinical data collection

Stool samples were collected from adults (≥18 years of age) with AGE at 3 participating hospitals in Jambi, Indonesia between February to April 2019. They were collected within the first 48 hours after admission according to the World Health Organization (WHO) protocol[13] and examined in Institute of Tropical Disease, Universitas Airlangga, Surabaya, Indonesia. Acute gastroenteritis was defined by the diarrhea (≥3 loose stools or liquid stools within a 24 hours period) and lasts no longer than 14 days, possibly accompanied by vomiting, fever, and abdominal pain. The level of dehydration were classified according to WHO.[14] The characteristics (age and sex) and clinical data of the patients were retrieved from medical records.

RNA extraction and reverse transcriptase polymerase chain reaction (RT-PCR)

A 10% (w/v) stool suspension of each sample in distilled water was prepared, then the supernatant was subjected to RNA extraction using QIAamp Viral RNA Mini Kit (Qiagen, Valencia, CA). The extracted RNA was reverse transcribed and amplified using Superscript III reverse transcriptase (Invitrogen, New York, NY) and random primers (Takara Bio, Kyoto, Japan). Polymerase chain reaction (PCR) amplification was subsequently performed to detect NoV GI and GII in the capsid gene (VP1) using the previously published primer pair of G1SKF/R and G2SKF/R, respectively.[15]

PCR products were electrophoresed on a 2% agarose gel containing ethidium bromide and visualized under UV illumination.

Sequencing and sequence analysis

Amplified cDNA fragments were sequenced by a direct sequencing method with the BigDye terminator cycle sequencing kit using an Applied Biosystems 3500XL Genetic Analyzer (Applied Biosystems, Foster, CA).

Nucleotide sequences were aligned with the reference strains by the program Molecular Evolutionary Genetic Analysis (MEGA) X (http://www.megasoftware.net). Phylogenetic trees were constructed by the Neighbor Joining method and bootstrap resampling was performed 1000 times.

Results

Study population

A total of 44 stool samples were collected from adults with AGE at 3 participating hospitals in Jambi city. The age of patients ranged from 19 to 78 years (median, 45 years). More patients were female (56.8%), with the sex ratio (female/male) was 1.3.

Virus detection rate and clinical characteristics

Of the 44 stool samples collected, 4 (9.1%) were positive for NoV. Noroviruses were identified mostly in adults 36-64 years of age group (ranged 34-70 years, median 45 years, mean 48.5 years) and more frequently in female patients (75%) of cases.

Most of adults with NoV-positive had watery diarrhea (75%) for <5 days, while half of the adults showed vomiting for 1 day. Abdominal pain and no dehydration were observed in all adults with AGE and NoV-positive (Table 1).

Genogroup and genotype of NoV

Among 4 NoV-positive stool samples, most of them was classified as GII genogroup (75%) and the rest was GI. Four different genotypes were identified, namely GI.2, GII.3, GII.6, and GII.20 (Figs. 1-2).

Table 1. Clinical characteristics among adults with AGE

Clinical characteristics	**NoV-positive (n = 4)**	**NoV-negative (n = 40)**
Fever (>38ºC)		
• Yes	1 (25%)	22 (55%)
• No	3 (75%)	18 (45%)
Vomiting		
• Yes	2 (50%)	25 (62.5%)
Frequency of vomiting (episodes/day)		
1-4	1 (50%)*	10 (40%)*
≥5	1 (50%)*	15 (60%)*
Duration of vomiting (days)		
1	2 (100%)*	17 (68%)*
≥2	0 (0%)*	8 (32%)*
• No	2 (50%)	15 (37.5%)
Diarrhea		
• Stool type		
Watery	3 (75%)	17 (42.5%)
Mushy	1 (25%)	23 (57.5%)^
• Frequency of diarrhea (times/day)		
3-9	2 (50%)	23 (57.5%)
≥10	2 (50%)	17 (42.5%)
• Duration of diarrhea (days)		
1-4	4 (100%)	34 (85%)
≥5	0 (0%)	6 (15%)
Abdominal pain		
• Yes	4 (100%)	36 (90%)
• No	0 (0%)	4 (10%)
Dehydration		
• No dehydration	4 (100%)	32 (80%)
• Mild to moderate dehydration	0 (0%)	8 (20%)

* The percentage was calculated using the number of patients with vomiting only as a denominator ^ 1 patient have mushy and bloody stool type

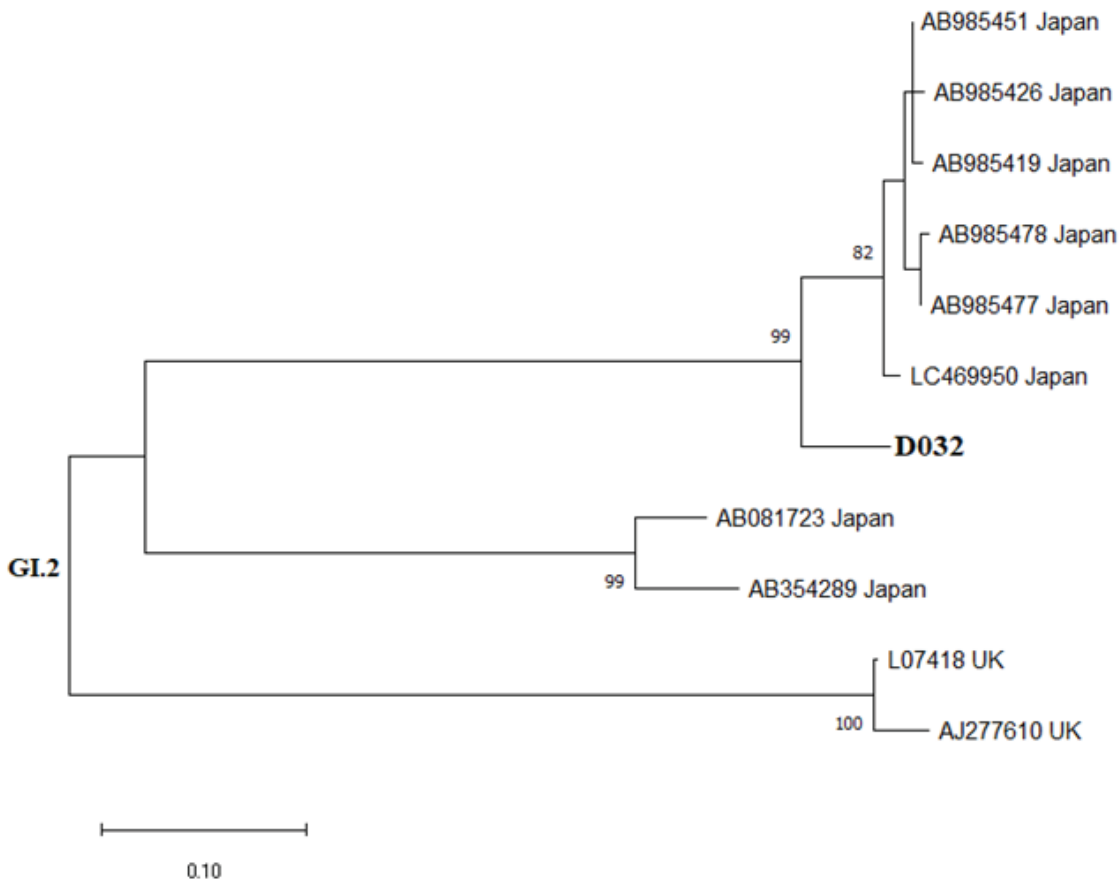


Fig 1. Neighbor-joining phylogenetic tree of partial sequences of the capsid (VP1) of 1 NoV GI isolate from Jambi (shown in bold) and 10 reference strains

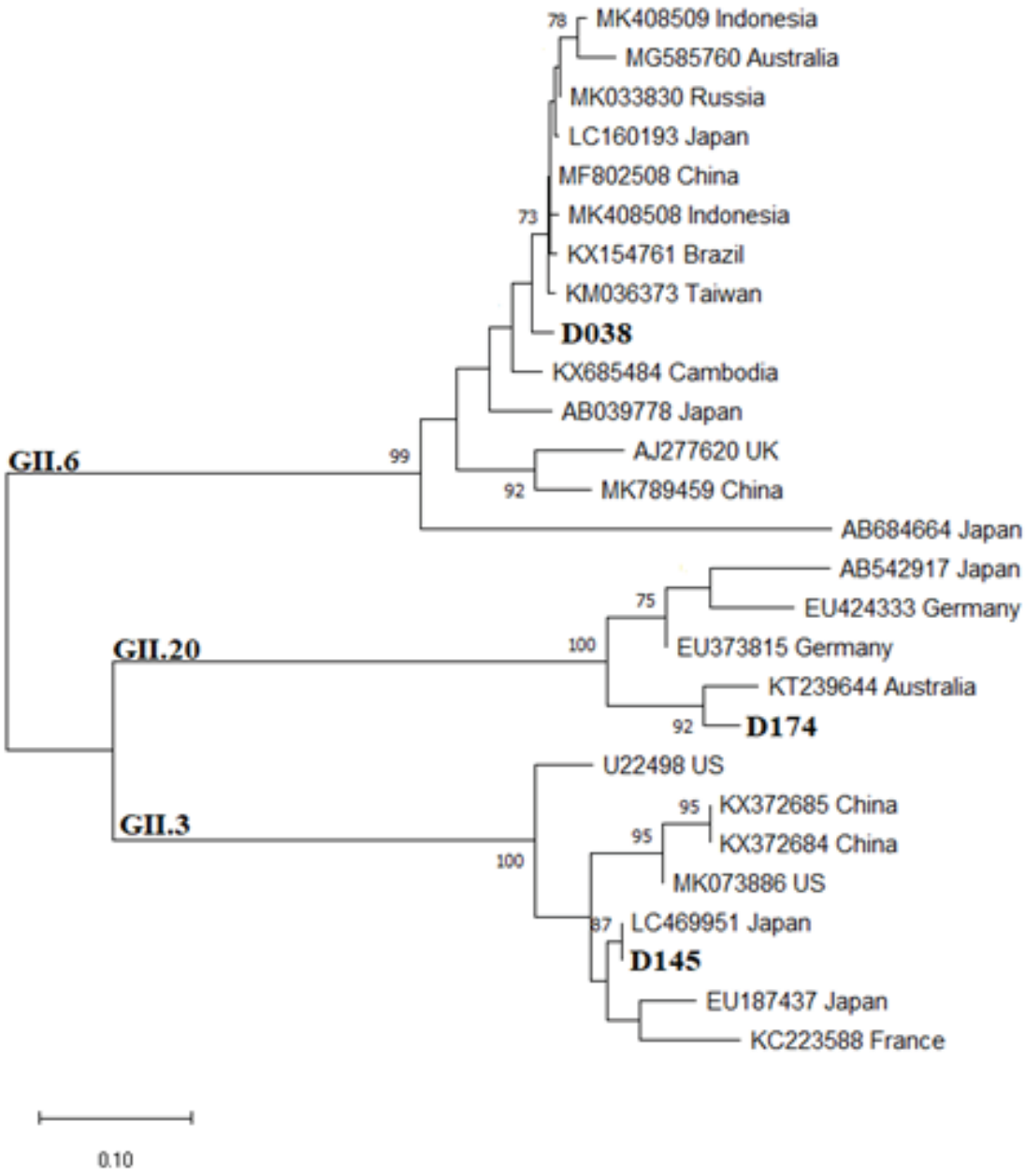


Fig 2. Neighbor-joining phylogenetic tree of partial sequences of the capsid (VP1) of 3 NoV GII isolates from Jambi (shown in bold) and 24 reference strains

Discussion

In this study, the proportion of NoV in adults with AGE was 9.1% in Jambi, quite similar to that in the ≥12 years with AGE in Jakarta, Indonesia (9.7%)[9], but more than that in asymptomatic aduls in Surabaya, Indonesia (2.7%)[11]. However, the rate was lower than the previous studies in China, United States, and France (17.0%-49%).[16-18]

The percentage of GII NoV (75%) strains detected was greater than GI NoV (25%). It confirmed the previous report that GII NoV was the most prevalent (96%) of all sporadic AGE worldwide.[19] Our study identified GI.2, GII.3, and GII.20 genotypes which have never been reported in Indonesia, and GII.6 genotype which has already been reported previously in children <5 years of age hospitalized with AGE in other cities in Indonesia.[20]

In other countries, NoVs with genotypes GI.2, GII.3, GII.6, and GII.20 have been reported. Norovirus GI.2 emerged in Singapore in 2014 causing outbreaks of NoV AGE in military camps.[21] This genotype was also reported in ice-associated NoV outbreak in Taiwan, 2015. Norovirus GI was reported more predominant in waterborne outbreaks.[22] Genotype GII.3 is a major cause of sporadic gastroenteritis, particularly in children[23] and it was identified also as a causative agent of gastroenteritis outbreaks in China [24] and Australia. [25] Genotype GII.20 was reported in a small number among gastroenteritis cases in Thailand in 2007 and Australia during 2013-2014.[26,27] GII.6 is one of the common agents of gastroenteritis.[28] An AGE outbreak caused by NoV GII.6 was first reported in China in 2013. [29] In 2015, GII.6 accounted for 10% of NoV infections, whilst before 2014 it was identified only sporadically. Circulation of GII.6 has also been reported elsewhere in recent years.[30,31] These findings suggest that this genotype has an important epidemiological role in NoV incidence.[28] Our finding of rare genotypes in Indonesia is interesting, however it needs further surveillance on a larger scale.

The predominant symptoms of NoV infection were vomiting and diarrhea, generally of a short duration.[32] Diarrhea occurred more frequently in people aged >18 years infected by NoV, whereas in the ≥65 years age group, the predominant symptom was diarrhea (87.9%) and vomiting (52.9%).[33] In 4 outbreaks over 3 years in an inpatient psychiatric unit in Taiwan that affected 172 patients and 7 health care workers, the most common symptom was diarrhea (87.5%), followed by vomiting (25.5%), abdominal pain (4.4%) and fever (2.2%).[34] In our study, watery diarrhea for <5 days was common in adults with NoV-positive, while vomiting for 1 day was found in half of the patients. Abdominal pain and no dehydration were observed in all adults with AGE and NoV-positive (Table 1). Generally, they showed mild symptoms with a short duration, which is quite similar with the previous studies.

Conclusion

Norovirus was detected in 9.1% of adults with AGE in Jambi, Indonesia, with various genotypes of NoV. The common symptoms in the adults with AGE and NoV-positive included abdominal pain and watery diarrhea with a short duration. Norovirus genotyping should be performed continuously to provide databases of circulating NoV strains for its control.

Acknowledgment: The authors are grateful to all participants who provided stool specimens for supporting the specimen collection.

Conflict of Interest: There was no conflict of interest in this study.

Ethics Statement: The ethical clearance was obtained from the Ethics Committees of Faculty of Medicine and Health Science, Universitas Jambi, Indonesia (No. B/248/UN21.8/PT.01.04/2019). Informed consent was provided by the parents or guardians of each child' to patients.

Source of Funding: This study was supported by a grant from Faculty of Medicine, Universitas Airlangga.

References

1. Patel MM, Hall AJ, Vinjé J, Parashar UD. Noroviruses: A comprehensive review. J Clin Virol. 2009;44(1):1–8.
2. Centers for Disease Control and Prevention (CDC). Deaths from gastroenteritis double : C. difficile and norovirus are the leading causes. 2012. Available from: https://www.cdc.gov/media/releases/2012/p0314_gastroenteritis.html
3. Cremon C, De Giorgio R, Barbara G. Norovirus gastroenteritis. N Engl J Med. 2010;362:557.
4. Patel MM, Widdowson MA, Glass RI, Akazawa K, Vinjé J, Parashar UD. Systematic literature review of role of noroviruses in sporadic gastroenteritis. Emerg Infect Dis. 2008;14(8):1224–31.
5. Centers for Disease Control and Prevention (CDC). Norovirus activity–United States, 2006-2007. MMWR Morb Mortal Wkly Rep. 2007;56:842–6.
6. Vinjé J. Advances in laboratory methods for detection and typing of norovirus. J Clin Microbiol. 2015;53(2):373–81.
7. Green K. Caliciviridae: the noroviruses. In: Knipe D, Howley P, Cohen J, Griffin D, Lamb R, Martin M, Racaniello V, Roizman B. Fields virology. Philadelphia: Lippincott Williams & Wilkins; 2013. p. 582–608.
8. de Graaf M, Van Beek J, Koopmans MPG. Human norovirus transmission and evolution in a changing world. Nat Rev Microbiol. 2016;14:421–33.
9. Subekti D, Lesmana M, Tjaniadi P, Safari N, Frazier E, Simanjuntak C, et al. Incidence of Norwalk-like viruses, rotavirus and adenovirus

infection in patients with acute gastroenteritis in Jakarta, Indonesia. FEMS Immunol Med Microbiol. 2002;33(1):27–33.

10. Utsumi T, Lusida MI, Dinana Z, Wahyuni RM, Yamani LN, Juniastuti, et al. Occurrence of norovirus infection in an asymptomatic population in Indonesia. Infect Genet Evol. 2017;55(August):1–7.
11. Ministry of Health, Republic of Indonesia: Indonesian Health Profile, 2018. Available from: https://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Data-dan-Informasi_Profil-Kesehatan-Indonesia-2018.pdf
12. Ministry of Health, Republic of Indonesia: Report on National Basic Health Research, 2018. Available from: http://labmandat.litbang.depkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
13. World Health Organization (WHO). Generic protocol for (i) hospital-based surveillance to estimate the burden of rotavirus gastroenteritis in children and (ii) a community-based survey on utilization of health care services for gastroenteritis in children. Field test version. Geneva, Switzerland: Department of Vaccines and Biologicals, World Health Organization; 2002.
14. World Health Organization (WHO). Dehydration. In: Treatment of diarrhea: A manual for physicians and other senior health workers. Geneva: WHO; 2005. p. 4. Available from: https://apps.who.int/iris/bitstream/handle/ 10665/43209/9241593180.pdf;jsessionid= 9DE1BF7F490D459DCACAC6A65F435903?sequence=1
15. Kojima S, Kageyama T, Fukushi S, Hoshino FB, Shinohara M, Uchida K, et al. Genogroup-specific PCR primers for detection of Norwalk-like viruses. J Virol Methods. 2002;100(1–2):107–14.
16. Bresee JS, Marcus R, Venezia RA, Keene WE, Morse D, Thanassi M, et al. The etiology of severe acute gastroenteritis among adults visiting emergency departments in the United States. J Infect Dis. 2012;205(9):1374–81.
17. Arena C, Amoros JP, Vaillant V, Ambert-Balay K, Chikhi-Brachet R, Silva NJ Da, et al. Acute diarrhea in adults consulting a general practitioner in France during winter: Incidence, clinical characteristics, management and risk factors. BMC Infect Dis. 2014;14(1):1–7.
18. Wu X, Han J, Chen L, Xu D, Shen Y, Zha Y, et al. Prevalence and genetic diversity of noroviruses in adults with acute gastroenteritis in Huzhou, China, 2013–2014. Arch Virol. 2015;160(7):1705–13.
19. Hoa Tran TN, Trainor E, Nakagomi T, Cunliffe NA, Nakagomi O. Molecular epidemiology of noroviruses associated with acute sporadic gastroenteritis in children: Global distribution of genogroups, genotypes and GII.4 variants. J Clin Virol 2013;56:269–77.
20. Nirwati H, Donato CM, Mawarti Y, Mulyani NS, Ikram A, Aman AT, et al. Norovirus and rotavirus infections in children less than five years of age hospitalized with acute gastroenteritis in Indonesia. Arch Virol. 2019;164(6):1515–25.
21. Ho ZJM, Vithia G, Ng CG, Maurer-Stroh S, Tan CM, Loh J, et al. Emergence of norovirus GI.2 outbreaks in military camps in Singapore. Int J Infect Dis. 2015;31:e23–30.
22. Cheng HY, Hung MN, Chen WC, Lo YC, Su YS, Wei HY, et al. Ice-associated norovirus outbreak predominantly caused by GII.17 in Taiwan, 2015. BMC Public Health. 2017;17(1):1–8.
23. Mahar JE, Bok K, Green KY, Kirkwood CD. The Importance of Intergenic Recombination in Norovirus GII.3 Evolution. J Virol. 2013;87(7):3687–98.
24. Liu L, Guan H, Zhang Y, Wang C, Yang G, Ruan S, et al. The prevalence of non-GII.4 norovirus genotypes in acute gastroenteritis outbreaks in Jinan, China. PLoS One. 2018;13(12):1–14.
25. Bruggink LD, Moselen JM, Marshall JA. The molecular epidemiology of norovirus outbreaks in Victoria, 2014 to 2015.Commun Dis Intell Q Rep. 2017; 41(1):E21–E32.
26. Diakoudi G, Lanave G, Catella C, Medici MC, De Conto F, Calderaro A, et al. Analysis of GII.P7 and GII.6 noroviruses circulating in Italy during 2011–2016 reveals a replacement of lineages and complex recombination history. Infect Genet Evol. 2019;75:1-10.
27. Luo LF, Qiao K, Wang XG, Ding KY, Su HL, Li CZ, et al. Acute gastroenteritis outbreak caused by a GII.6 norovirus. World J Gastroenterol. 2015;21(17):5295–302.
28. Chan MCW, Lee N, Hung TN, Kwok K, Cheung K, Tin EKY, et al. Rapid emergence and

predominance of a broadly recognizing and fast-evolving norovirus GII.17 variant in late 2014. Nat Commun. 2015;6.

29. Bruggink LD, Moselen JM, Marshall JA. Genotype analysis of noroviruses associated with gastroenteritis outbreaks in childcare centres, Victoria, Australia, 2012-2015. Epidemiol Infect. 2017;145(9):1933–41.
30. Cannon JL, Barclay L, Collins NR, Wikswo ME, Castro CJ, Magaña C, et al. Genetic and Epidemiologic Trends of Norovirus Outbreaks in the United States from 2013 to 2016 Demonstrated Emergence of Novel GII.4 Recombinant Viruses. J Clin Microbiol. 2017;55(7):2208–21.
31. van Beek J, de Graaf M, Al-Hello H, Allen DJ, Ambert-Balay K, Botteldoorn N, et al. Molecular surveillance of norovirus, 2005–16: an epidemiological analysis of data collected from the NoroNet network. Lancet Infect Dis. 2018;18(5):545–53.
32. Robilotti E, Deresinski S, Pinsky BA. Norovirus. Clin Microbiol Rev. 2015;28(1):134–64.
33. Arias C, Sala MR, Domínguez A, Torner N, Ruíz L, Martínez A, et al. Epidemiological and clinical features of norovirus gastroenteritis in outbreaks: A population-based study. Clin Microbiol Infect. 2010;16(1):39–44.
34. Tseng CY, Chen CH, Su SC, Wu FT, Chen CC, Hsieh GY, et al. Characteristics of norovirus gastroenteritis outbreaks in a psychiatric centre. Epidemiol Infect. 2011;139(2):275–85.

Classification of Neonatal Mortality Risk Factors

Raesita Aliefa Sekardira[1], Sulistiawati[2], Risa Etika[3]

[1]Clinical Student at Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [2]Head of Department of Public Health-Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [3]Lecturer at Department of Child Health, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

Abstract

Background: The efforts to reduce neonatal mortality were not optimal as targeted by MDGS's 2015. The number revealed, seen from the mortality rate of neonatal, is still quite high. This study aims to determine and to classify the risk factors of neonatal mortality in Situbondo district based on neonatal factors, maternal factors, and health care factors. **Method:** a retrospective descriptive research with survey research design and secondary data was used. The population of this study were neonates who died at RSUD Dr. Abdoer Rahem Situbondo period 2015-2016 in total sampling according to inclusion and exclusion criteria. The number of samples that fulfilled the inclusion and exclusion criteria was 50 people. **Result:** The results showed that of 50 neonatal mortality consisted of 46 (92%) early neonatal mortality and 4 (8%) late neonatal mortality. Neonatal mortality were most common in neonates of male sex, low body weight, premature, and asphyxia. Based on maternal factors, neonatal mortality occurs in mothers of <20 and> 35 years of age, primary education, housewives, less family income, less or more nutritional status, abdominal massage history, incomplete ANC, women with no previous birth (nulliparous) and deliver normally. **Conclusion:** Factors affecting neonatal mortality are classified into three components, namely neonatal factors, maternal factors and health service factors.

Keywords: *risk factors, neonatal mortality, classification, maternal, health service.*

Introduction

Neonatal mortality constitute 2/3 of infant deaths.[1,2] Based on the results of the 2012 Indonesian Demographic and Health Survey (IDHS), the Neonatal Mortality Rate (NMR) was 19 per 1,000 live births.[3]

Neonatal mortality is perinatal disorders as a result of high-risk pregnancies such as asphyxia, low birth weight babies, and birth trauma. The degree of neonatal health itself is also closely related to the health of the mother during pregnancy, knowledge of the mother and family about the importance of antenatal care delivery and new-born care and the availability of health facilities. [4] Factors affecting infant safety include age, parity and birth spacing. In addition, many factors influence it, among others, mothers rarely check the content to health facilities, pregnant at a young age, distance that is too close, pregnant at old age, lack of nutrition for mothers and infants, food consumed by unclean mothers, sanitation facilities and inadequate hygiene.[5]

In 2014, the number of infant mortality in Situbondo was higher (53.06 per 1,000 live births) than the total infant mortality in East Java province. This figure was not insignificant and requires serious treatment from the local health service system to overcome the incident.[6]

Method

This study aims to analyse the description of classification of neonatal mortality risk factors. Retrospective descriptive using primary data from interview surveys and secondary data, namely medical records was used in this study.

Sample, Research Instrument and Data Analysis

The research samples were neonates who died in Dr. Abdoer Rahem Situbondo District Hospital starting from January 2015 to December 2016. The instrument checklist included the recorder condition of patients who experienced neonatal mortality in secondary data or medical records and confirmation of data using structured questionnaires. The data collected was analysed based

on the formulation of the research problem using the Microsoft Excel 2013 program.

Result

Neonate Factor (Table 1)

Male neonates mortality were had higher percentage (56%) than women. Neonatal birth weight in the moderate or normal birth weight group was 20 neonates, while 60% were outside the normal group either in the group of underweight or more. The highest gestational age was in the preterm group with 35 neonates and the lowest was in the serotines/postdate group with 1 neonate. The most common cause of neonatal mortality was asphyxia with a percentage of 32%. The majority of neonates were in the age category of early neonatal mortality with a percentage of 92% neonates.

Maternal Factors (Table 2)

It is known that the age of most mothers was in the high risk group of 27 mothers, the highest level of education of mothers was elementary school with a percentage of 40% mothers. Mother's work was a housewife with a percentage of 60% mothers, family income was less by 52% families, mothers with normal nutritional status was as much as 38%, while mothers with less nutritional status and more was as much as 62%.

History of consumption of herbal medicine was about 16% mothers. History of abdominal massage during pregnancy was 72% mothers, mothers who did antenatal examinations <4 times were 54% mothers, most were nulliparous with a percentage of 52% mothers. The majority of parturition process was spontaneous (80%). The most complications of parturition was premature rupture of membranes as many as 7 mothers and there were 29 mothers who did not experience childbirth complications.

About 90% of mothers do not experience medical problems during pregnancy. Meanwhile, the most obstetric problems experienced by mothers were anaemia by 12%, mothers.

Health Service Factor (Table 3)

The most neonatal childbirth places were in the Hospital of Dr. Abdoer Rahem as many as 19 neonates and the least in primary care (Polindes/Poskesdes) was 1 neonate. Distance of home to the place of delivery was the most in the close group as much as 80%.

Table 1: Distribution of neonatal mortality factors on neonates

	Frequents	**Percentages (%)**
Sexuality		
- Male	28	56
- Female	22	44
New-born Body Weight		
- Extremely low	8	16
- Very low	10	20
- Low	10	20
- Normal	20	40
- macrosomia	2	4
Gestation's Age		
- Premature	35	70
- Term	14	28
- Serotinus/postdate	1	2

Cont... **Table 1: Distribution of neonatal mortality factors on neonates**

Cause of mortality		
- *Hyaline Membrane Disease*	5	10
- *Asphyxia*	16	32
- Respiratory Distress	1	2
- Asphyxia Meconium	8	16
- Sepsis	4	8
- Anencephaly	1	2
- Respiratory Failure	8	16
- Meningitis	1	2
- Multiple congenital anomaly	1	2
- Cerebral Oedema	1	2
- Gastroschisis	1	2
- Milk Aspiration	1	2
- Encephalitis	1	2
- Neonatal seizure	1	2
Neonates Mortality Age		
- Early	46	92
- Along	4	8

Table 2: Distribution of neonatal mortality factors on mothers

	Percentages (%)
Mother's Age	
- Risky (<20 and >35)	54
- Normal (20-35)	46
Educational	
- Un-graduated primary school	4
- Primary school	40
- Junior School	18
- High School	20
- Vocational	6
- University	12
Occupation	
- Teacher	8
- Fisher	2
- Merchant	8
- Honorary Employee	6
- Housemaid	2
- Farmer	14
- Housewife	60
Family Income	
- Under standard	52
- Standard	48

Cont.... **Table 2: Distribution of neonatal mortality factors on mothers**

Nutrition Status	
- Under (≤18.5)	30
- Normal (18.5-25)	38
- Over (>25)	32
Herb Consumption	
- Positive	16
- Negative	84
Abdominal Massage	
- Yes	72
- No	28
Frequency of antenatal care visits	
- <4 times	54
- ≥4 times	46
Parity	
- Nulliparous	52
- Prim parous	26
- Multiparous	22
Parturition	
- Vagina birth	80
- Caesarean section	18
- Extraction Version	2
Complication of parturition	
- Long period	12
- Placenta Previa	6
- Umbilical cord twist	2
- Premature rupture of membranes	14
- Others	8
- None	58
Medical problem of Mother	
- Hypertension	4
- Kidney	2
- Others	4
- None	90
Obstetric Problem	
- Anaemia	12
- Hypertension	4
- None	84

Table 3: Distribution of neonatal mortality factors on health facilities

	Frequent	Percentages (%)
Parturition Location		
- Home	4	8
- Primary care in districts	3	6
- Primary care in Village	1	2
- Midwife	14	28
- General Hospital	19	38
- Other Hospitals	9	18
Distance between home and healthcare facilities		
- Near (<10 kilometres)	40	80
- Average (10-100 kilometres)	10	20
- Far (>100 kilometres)	0	0

Discussion

More neonates are male than female with a ratio of 1.2: 1. Biological factors involved with an increased risk of neonatal death in male infants are delayed immune system maturity which increases the risk of infectious diseases,[7] also results in high respiratory diseases[8] and congenital malformations of the urogenital system in male infants.[9]

Neonates with lower birth weight are more likely to die, as many as 56%. Low birth weight is universally recognized as a major risk factor for major neonatal mortality. It is known in other studies that 52% of neonates who die have a birth weight <500 grams.[10]

The most gestational age was in the range of 28-36 weeks or preterm gestational age (70%). The risk of infection and sepsis increases in premature births which will result in mortality if proper medical care is not sought as early as possible.[11] The most common cause of mortality was asphyxia (32%). Asphyxia is a condition in when a new-born baby or shortly after birth is the failure to start and continue breathing spontaneously and regularly.[12]

The age range of 0-7 days or often referred to as early neonatal mortality was 92%. The risk of neonatal mortality has increased during the early days of their lives.[13, 14] The high risk of neonatal mortality occurs in mothers under the age of 20 years and more than 35 years. This period is the safest for giving birth because the reproductive organs have developed perfectly.[15, 16]

This study was found that 62% of neonatal mortality occur in mothers with low education levels. This shows that mothers with low education pay less attention to the conditions of pregnancy and childbirth.[17, 18] The majority of mothers were 60% housewives. The dominance of housewives as maternal occupation can be related to factors that influence neonatal mortality due to low income families is not tended to spend their income for health care costs.[11, 19,20-22]

Neonatal mortality occurred in mothers with under and over nutritional status (62%). The nutritional status of the mother before and during pregnancy greatly affects the growth of the fetus. Babies born with low weight and premature are generally less able to reduce new environmental stresses which can cause stunted growth and development and can even interfere with their survival.[23-29]

There were 16% of respondents who consume herbal medicine during pregnancy. Mothers who during pregnancy consume herbal medicine have 7 times the risk of giving birth to asphyxia babies compared to mothers who did not consume herbal medicine during pregnancy. This is due to the deposition of medicinal material in the amniotic fluid which causes the amniotic fluid to become turbid so that the baby's hypoxia and respiratory tract will be disturbed.[30]

It was found that the majority of respondents (72%) had a history of doing abdominal massage during pregnancy which is usually done in trimester 3 or after 7 months of gestation.[31] In the abdomen there is direct contact with the fetus in the womb which can affect the position of the fetus into abnormal, the umbilical cord can be wrapped around so that the compression occurs in the umbilical cord blood vessels, consequently the blood

supply containing oxygen and nutrients is reduced, and the fetus experiences hypoxia.

Neonatal mortality occurred at parity 0 and more than 3 times (54%). At parity 0, the birth canal has not been tested besides that the mother has not been trained in fetal care efforts. Similarly, parity of more than 3, because in labour can cause a risk that is damage to blood vessels in the uterine wall which will affect the circulation of nutrients to the fetus.[18 32]

It was found that 80% of neonates were born spontaneously or normally through the vagina.[33, 34] This is because the normal parturition process without tools has a high percentage of asphyxia birth events (89.2%), whereas in parturition section caesarean total incidence of asphyxia was 4.8%.[16, 35] Parturition complications such as antepartum haemorrhage, malpresentation, eclampsia, prematurity, and premature rupture of membranes increase the risk of neonatal mortality 8-fold.[36]

Neonatal mortality occurred in women who do not experience problems during parturition because the majority of respondents (62%) were referral patients from other health facilities so there may be incomplete information received by the hospital from the referral letter.

Conclusion

Factors affecting neonatal mortality are classified into three components, namely neonatal factors, maternal factors and health service factors.

Conflic of Interest: The authors declare that they have no competing interests.

Source of Funding: The authors declare that this study was self-funded.

Ethical Clearance: This study received a certificate of ethical clearance from ethical commission of Faculty of Medicine, Universitas Airlangga Indonesia, No:216/EC/KEPK/FKUA/2017.

References

1. WHO. Neonatal & Perinatal Mortality. Genev: WHO; 2006.
2. KEMENKES. Kesehatan dalam Rangka Sustainable Deveplomen Goals (SDGs) Jakarta: Kementerian Kesehatan RI; 2015 [cited 2016 29 June]. Available from: http://www.pusat2.litbang.depkes.go.id/pusat2_v1/wpcontent/uploads/2015/12/SDGs-Ditjen-BGKIA.pdf.
3. KEMENKES. Profil Kesehatan Indonesia tahun 2014 Jakarta: Kementerian Kesehatan RI; 2015 [cited 2016 29 June]. Available from: http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/profil-kesehatan-indonesia-2014.pdf.
4. Depkes RI. Pedoman Pelaksanaan Upaya Peningkatan Kesehatan Neonatal. 1994a.
5. Sulistyawati A. Buku Ajar Asuhan Kebidanan Pada Ibu Nifas. Yogyakarta: C.V Andi Offset; 2009.
6. Statistic Indonesia. Indonesia Demographic and Health Survey. 2015.
7. Hossain M, M. I. Socio-economic variables affecting infants and children mortality in Bangladesh. Internet J Health 2009;92.
8. Yi B, Wu L, Liu H, Fang W, Hu Y, Wang Y. Rural-urban differences of neonatal mortality in a poorly developed province of China. BMC public health 2011;11:477.
9. Yanping W, Lei M, Li D, Chunhua H, Xiaohong L, Mingrong L, et al. A study on rural-urban differences in neonatal mortality rate in China, 1996-2006. Journal of epidemiology and community health 2010;6410:935-6.
10. Wati LS, Winarsih NA, Nugroho AB. Gambaran penyebab kematian neonatal di RSUD Dr. Moewardi. Surakarta: Faculty of Medicine, Universitas Muhammadiyah Surakarta; 2013.
11. Desta BN, Assefa N, Damte TD, H L. Neonatal Mortality and its risk factors in Eastern Ethiopia : A Prospective Cohort Study in Kersa Health and Demographic Surveillance System Kersa HDSS 2016;134:1-8.
12. Sudarti, Fauziah, Afroh. Asuhan Kebidanan Neonatus Risiko Tinggi dan Kegawatan. Yogyakarta: Nuha Medika; 2013.
13. Gizaw M, Molla M, Mekonnen W. Trends and risk factors for neonatal mortality in Butajira District, South Central Ethiopia, (1987-2008): a prospective cohort study. BMC pregnancy and childbirth 2014;14:64.
14. Mekonnen Y, Tensou B, Telake DS, Degefie T, Bekele A. Neonatal mortality in Ethiopia: trends and determinants. BMC public health 2013;13:483.
15. Ndayisenga T. Maternal and Newborn Risk Factors associated With Neonatal Mortality in Gitwe

District Hospital in Ruhango District, Rwanda. International Journal of Medicine and Public Health 2016;62:98-102.

16. Prabamurti PN, Cahya TP, Laksmono W, Sigit S. Analisis Faktor Risiko Kematian Neonatal Studi Kasus Kontrol di Kecamatan Losari Kabupaten Brebes Tahun 2006. E-Journal Undip 2008;31.
17. Djaja S, Dwi H, Ning S, Dina BL. Peran Faktor Sosio-Ekonomi, Biologi dan Pelayanan Kesehatan terhadap Kesakitan dan Kematian Neonatal. Majalah Kedokteran Indonesia 2009;598.
18. Astri I, Rahma, Ikhsan M. Analisis Faktor Risiko Kematian Neonatal Dini Di Rumah Sakit Khusus Daerah Ibu Dan Anak Pertiwi Kota Makassar Tahun 2011-2012. 2012.
19. Lee AC, Mullany LC, Tielsch JM, Katz J, Khatry SK, LeClerq SC, et al. Risk factors for neonatal mortality due to birth asphyxia in southern Nepal: a prospective, community-based cohort study. Pediatrics 2008;1215:e1381-90.
20. Noor. Epidemiologi. Jakarta: Rineka Cipta; 2008.
21. Titaley CR, Dibley MJ, Agho K, Roberts CL, Hall J. Determinants of neonatal mortality in Indonesia. BMC public health 2008;8:232.
22. Yunita A, Istiyani N, Muslihatinningsih F. Description Of Sosio-Economic Factors On Infant Mortality In District Of Sukowono Jember Regency. 2014.
23. Berntorp K, Anderberg E, Claesson R, Ignell C, Kallen K. The relative importance of maternal body mass index and glucose levels for prediction of large-for-gestational-age births. BMC pregnancy and childbirth 2015;15:280.
24. Cnattingius S, Villamor E, Johansson S, Edstedt Bonamy AK, Persson M, Wikstrom AK, et al. Maternal obesity and risk of preterm delivery. JAMA 2013;30922:2362-70.
25. Singh J, Huang CC, Driggers RW, Timofeev J, Amini D, Landy HJ, et al. The impact of pre-pregnancy body mass index on the risk of gestational diabetes. The journal of maternal-fetal & neonatal medicine : the official journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstet 2012;251:5-10.
26. Stothard KJ, Tennant PW, Bell R, Rankin J. Maternal overweight and obesity and the risk of congenital anomalies: a systematic review and meta-analysis. JAMA 2009;3016:636-50.
27. Tennant PW, Rankin J, Bell R. Maternal body mass index and the risk of fetal and infant death: a cohort study from the North of England. Human reproduction 2011;266:1501-11.
28. Johansson S, Villamor E, Altman M, Bonamy AK, Granath F, Cnattingius S. Maternal overweight and obesity in early pregnancy and risk of infant mortality: a population based cohort study in Sweden. Bmj 2014;349:g6572.
29. Tang L, Pan XF, Lee AH, Binns CW, Yang CX, Sun X. Maternal lifestyle and nutritional status in relation to pregnancy and infant health outcomes in Western China: protocol for a prospective cohort study. BMJ open 2017;76:e014874.
30. Purnamawati D, Ariawan I. Konsumsi Jamu Ibu Hamil sebagai Faktor Risiko Asfiksia Bayi Baru Lahir. Jurnal Kesehatan Masyarakat Nasional 2012;66:267–72.
31. Abdullah A, Hort K, Butu Y, Simpson L. Faktor Risiko Kematian Neonatal Di Provinsi Nusa Tenggara Timur : A Matched Case-Control Study. 2015.
32. Rahmah H. Faktor-faktor yang Berhubungan dengan Kematian Perinatal di Rumah Sakit Umum Daerah Kota Bau-bau Tahun 2009 [Skripsi]. Makassar Universitas Hasanuddin; 2010.
33. Indongo N. Risk Factors And Causes Of Neonatal Deaths In Namibia. European Scientific Journal 2014;8Special Edition:466–71.
34. Pratama N, Sulastri B, Listyorini D. Analisis faktor-faktor penyebab kejadian kematian neonatus di Kabupaten Boyolali. Surakarta: Universitas Muhammadiyah Surakarta; 2013.
35. Tjandrarini D. Aspek Kehamilan dan Persalinan Pada Kematian Neonatal Akibat Asfiksia Lahir Sebelum dan Setelah Intervensidi Kabupaten Cirebon. Jurnal Ekologi Kesehatan 2009;83:1057-65.
36. Weiner R, Ronsmans C, Dorman E, Jilo H, Muhoro A, Shulman C. Labour complications remain the most important risk factors for perinatal mortality in rural Kenya. Bulletin of the World Health Organization 2003;818:561-6.

Elevated Corticosterone Level Due To Chronic Stress on Hb-Egf Expression as a Marker of Endometrial Receptivity Disorder in *Rattus norvegicus*

Risya Secha Primindari[1], Ashon Sa'adi[2], Reny I'tishom[3]

[1] Master degree of Reproductive Health Science, [2] Department of Obstetrics and Gynecology, [3]Departemen of Biomedical Science, Faculty of Medicine Universitas Airlangga, Surabaya, Indonesia

Abstract

Endometrial receptivity is a physiological state in which the endometrium obtains an adhesive phenotype that allows embryo implantation and have a role in the problem of implantation failure. Endometrial receptivity disorders can be caused by interference with the Hypothalamus-Pituitary-Gonad (HPG) axis due to the activation of the Hypothalamus-Pituitary-Adrenal (HPA) axis by stress. HB-EGF is a biomarker of endometrial receptivity that plays a role in the decidualization of endometrial stromal cells to reach the receptive state and initiation of implantation. Corticosterone is the dominant glucocorticoid hormone in rodents, as is cortisol in humans. High corticosterone due to chronic stress triggers disruption of homeostasis in the endometrium by resulting in decreased levels of HB-EGF. This study aims to find out the effect of increased corticosterone levels due to chronic stress on HB-EGF expression in endometrium *Rattus norvegicus*. This research has obtained ethical eligibility from the Research Ethics Commission of the Faculty of Medicine Airlangga University. The samples on this study were 34 rat (*Rattus norvegicus*) which were divided into 2 groups, the control group and the stress treatment group using the Chronic Unpredictable Mild Stress (CUMS) method. Corticosterone level were obtain from blood serum detected via ELISA and HB-EGF expression was obtained from endometrial in diestrus phase was evaluated by immunohistochemical methods. Corticosterone levels in the stress treatment group were higher (72.84 ± 64.03) than in the control group (23.29 ± 8.42). HB-EGF expression in the stress treatment group was lower (82.06 ± 5.91) than in the control group (118.76 ± 13.20). Statistical tests showed significant differences in HB-EGF expression in endometrium Rattus norvegicus p = 0,000 (p <0.05). Elevated level of corticosterone can decrease HB-EGF expression in endometrium *Rattus norvegicus.*

Keywords : *chorticosterone, chronic stress, HB-EGF expression, endometrial receptivity*

Introduction

Endometrial receptivity is a physiological state in which the endometrium obtains an adhesive phenotype that allows embryo implantation and occurs over a period of time known as the implantation window in the middle phase of endometrial secretion. In this phase endometrium is very dependent on the presence of endogenous or exogenous progesterone and stimulation of 17β-estradiol. Implantation can only occur when the endometrium is in its receptive phase[1,2].

A study shows that endometrial receptivity has a 60% role in the incidence of implantation failure [3]. Another study conducted in India found that 25% of implantation failures are known to be caused by endometrial receptivity[4]. As many as 30% of secondary infertility in women is caused by implantation failure and endometrial receptivity disorders being one of them[5,6,7]. One factor that can interfere with endometrial receptivity is stress[8].

Endometrial receptivity disorders can be caused by several factors, such as interference with the

Corresponding Author:
Dr. Reny I'tishom, M.Sc; Tambaksari, Surabaya, East Java, Indonesia; ritishom@fk.unair.ac.id; +628121644432

Hypothalamus-Pituitary-Gonad (HPG) axis due to the activation of the Hypothalamus-Pituitary-Adrenal (HPA) axis by stress. Excessive activity of Corticotrophine Releasing Hormone (CRH) in the hypothalamus, in response to stress, is a mechanism for suppression of GnRH. Furthermore, as the body's effort to adapt to stress causes the production of a glucocorticoid hormone, cortisol, by the adrenal glands. Increased cortisol levels can indirectly cause interference with GnRH pulsation, causing a decrease in the amount of gonadotropin hormone produced by the anterior pituitary[9]. Increased cortisol results in impaired levels of the hormones estrogen and progesterone in the ovary. Decreased levels of the hormones estrogen and progesterone in the ovary also have an impact on estrogen and progesterone levels in the endometrium[10].

One of the biomarkers that plays a role in determining endometrial receptivity is Heparine Binding Epidermal Growth Factor (HB-EGF) which affects cell-to-cell interactions and is a dependent estrogen progesterone[1]. HB-EGF is needed for normal decidualization of endometrial stromal cells to reach the receptive state in the endometrium and for the initiation of implantation. HB-EGF has been identified as an initial mediator of embryo-uterine interactions during implantation and is expressed both in the blastocyst and in the endometrium during implantation and plays a role in stimulating embryonic development during hatching. The high cortisol hormone due to chronic stress triggers homeostasis in the endometrium due to the inhibition of the formation of the hormone progesterone which results in decreased levels of HB-EGF[6]. When HB-EGF levels decrease, the number of mature ErbB4 and HB-EGF receptors released in the endometrium decreases. ErbB4 has an important role in stimulating blastocyte implantation. ErbB4 in endometrium will communicate in juxtacrine with ErbB1 contained in blastocytes. Communication between these two receptors is an important key in mediating implantation[10,11].

Chronic stress in this study uses the Chronic Unpredictable Mild Stress (CUMS) method. Chronic Unpredictable Mild Stress is giving various treatments as a stressor and resembles a stressor of everyday life that is not too heavy but continuously[12]. This method has been shown to significantly increase corticosterone levels (cortisol in mice) within 20 days[13]. In Rattus, cortisol secretion is replaced by corticosterone[14]. Chronic stress increases glucocorticoid synthesis and secretion (cortisol in humans and corticosterone in rodents). Increased glucocorticoids are biomarkers for stress and depression disorders[15]. Based on this background, this study was aim of to find the effect of increased corticosterone on HB-EGF expression as a marker of interference with endometrial receptivity.

Material and Method

This study was true laboratory experimental designs with randomized post test only control group design. The study was conducted from April to June 2019 at the Experimental Animal Laboratory, Department of Biology, Faculty of Science and Technology, Universitas Airlangga. The samples of this study were female rats *(Rattus norvegicus)* Wistar strains aged 5-6 months, have ever given birth to the consideration of mice in fertile conditions, never been used as an object of research before, and in healthy condition. All animals are injected with PGF2α at a dose of 25 µg / g body weight intraperitoneally to synchronize the lust cycle. The purpose of synchronizing the lust cycle is to equalize and obtain the diestrus phase during surgery. Female rat was taken randomly into 2 groups, each group consisting 17 female rat. The control group (K1) consisting rat with negative treatment were mice that were not given a stressor and the treatment group (K2) consisting rat with stressors treatment. Stressors treatment in rat using Chronic Unpredictable Mild Stress (CUMS) method for 20 days.

Corticosterone level were obtain from blood serum detected via ELISA and HB-EGF expression was obtained from endometrial in diestrus phase was evaluated by immunohistochemical methods. HB-EGF was assessed semi-quantitatively on the scale of Rammele-Stegner using the Immuno Reactive Score (IRS). Statistical analysis uses IBM SPSS Statistic 25. Data with normal distribution was tested by Independent T test. If the data was not normally distributed, the data was tested by the Mann Whitney test. This study uses a significance level of 0.05 with a confidence level of 95%.

Findings

1. Corticosterone Levels

Table 1. The mean and standard deviation of corticosterone levels in serum *Rattus norvegicus*

Group	n	Corticosterone Levels
		Mean ± Standard Deviation
K1	15	23.29 ± 8.42
K2	16	72.84 ± 64.03

The results showed a mean of corticosterone levels in the treatment group was higher (72.84 ± 64.03) than control group (23.29 ± 8.42).

Table 2. Mann Whitney analysis results of corticosterone levels in serum *Rattus norvegicus*

Group		P Value	Different test analysis
K1	K2	0,000*	Mann Whitney Test

*Significantly different $P<0,05$

Analysis of the Mann Whitney test showed that there were significant differences in the corticosterone levels between the control and treatment groups with a value of $P= 0,000$ ($P<0.05$).

2. HB-EGF Expressions

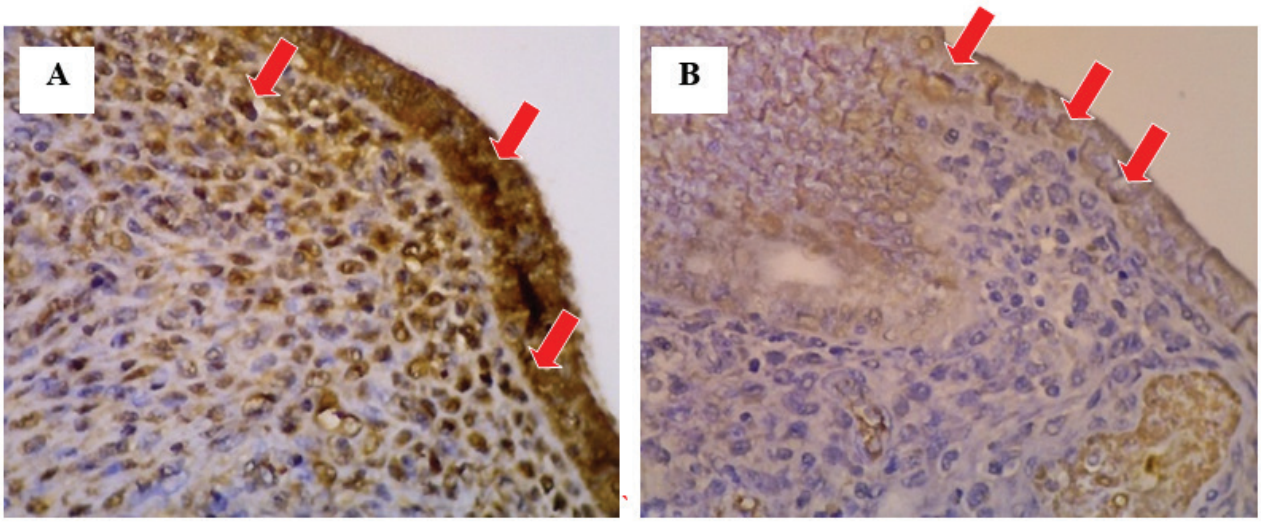


Figure 1. Comparison of HB-EGF expressions represented by chromogen brown color on the endometrial tissue, red arrows showing the maximum expression area using immunohistochemical staining, 400x magnification; Miconos microscope MCX50LED; Optilab Plus camera. (A) HB-EGF expression in the control group (B) HB-EGF expression in the treatment group.

Table 3. Mean and standard deviation of endometrium HBEGF expression

Group	n	HBEGF expression (IRS)
		Mean ± Standard Deviation
K1	15	118.76 ± 13.20
K2	16	82.068 ± 5.91

The examination results of the endometrium HBEGF expression showed a mean and deviation standard in the stress treatment group (82.068 ± 5.916) lower than the control group (118.76 ± 13.208).

Table 4. Results of Independent T analysis of endometrium HBEGF expression

Group		P Value	Different test analysis
K1	K2	0,000*	Independent T

*Significantly different $P<0,05$

The results of the Independent T test showed that there was a significant difference in the HBEGF expression between the control and treatment groups with a value of $P= 0,000$ ($p<0,05$).

Discussion

Chronic stress increases glucocorticoid synthesis and secretion (cortisol in humans and corticosterone in rodents). Increased glucocorticoids are biomarkers for stress and depression disorders[15]. Corticosterone is the dominant glucocorticoid hormone in rodents, as is cortisol in humans[14].

In normal conditions, glucocorticoids will provide negative feedback by suppressing CRH secretion to prevent excessive stress responses, but this does not occur in chronic stress where the activity of the HPA axis continues[13]. Increased of glucocorticoids also affects the HPO axis directly by releasing GnRH release from the hypothalamus and suppressing the release of the gonadotropin hormone from the pituitary which can interfere with various mechanisms that occur in the ovaries so that it can lead to reproductive disorders[9].

There are many theories that present the mechanism of chronic stress on changes in reproductive function. Apart from the activity of CRH and glucocorticoids, which will be discussed next with the effect on the gonadotropin hormone, the disturbed circadian cycle also becomes the mechanism used in this study. The sample unit in this study is Rattus norvegicus which is a nocturnal animal[16], while all treatment activities are carried out in the morning - afternoon so that it changes the circular cycle of Rattus norvegicus. Disorders of sleep patterns that are applied to experimental animals cause disruption of the circandian rhythm in the central arrangement of the circandian rhythm in the hypothalamus, the Supra Chiasmatic Nucleus (SCN). Circandian rhythm is the body's biological clock 24 hours a day. This system regulates hormone secretion, and one of the physiological processes of the sleep cycle is awake[17]. Disorders of sleep patterns that are not sought to overcome it will fall in a state of psychosocial stress. In addition to the physical stress that is given, the change in circular rhythm also has an impact on the psychological stress of the experimental animal, thereby increasing the existing stress. The circadian cycle is an integral part of the reproductive system, when the 24-hour program is irregular the endocrine system can be disrupted. The high corticosterone levels in Rattus norvegicus in this study are in line with the Lopez-Lopes *et al*. study which states that CUMS can increase corticosterone levels with a minimum of treatment for 20 days[13].

HB-EGF has been identified as an initial mediator of embryo-uterine interactions during implantation and is expressed both in the blastocyst and endometrium during implantation and is a dependent estrogen and progesterone[1,6]. Chronic stress causes elevated serum corticosterone levels, resulting in impaired estrogen and progesterone levels in the ovaries. Decreased levels of the hormones estrogen and progesterone in the ovary also have an impact on estrogen and progesterone levels in the endometrium[10]. Increased cortisol has an impact on homeostasis disruption in the endometrium resulting in decreased levels of HB-EGF which is a dependent estrogen and progesterone [6]. HB-EGF is expressed in luminal endometrial epithelial cells and on the surface of pinopods. Disregulation in HB-EGF expression in the endometrium has been associated with infertility whose causes cannot be explained (unexplained infertility). HB-EGF is needed for normal decidualization of endometrial stromal cells to reach the

receptive state in the endometrium and for the initiation of implantation[1,18].

HB-EGF performs two simultaneous functions during the human implantation as an attachment factor and a growth factor. It was reported that HB-EGF plays an important role in the preparation of the uterine luminal epithelium for blastocyst attachment at the beginning of pregnancy. HB-EGF, as a growth factor, accelerates the development of human embryos to the blastocyst stage and their subsequent hatching from the zona pellucida. HB-EGF, as an attachment factor, upregulates many important proteins expressed from a uterine luminal epithelial surface such as integrin β3, leukemia inhibitory factor (LIF), and HOXA10. Integrin αvβ3 serves for osteopontin to mediate the embryo attachment. LIF stimulates human embryo development to the blastocyst stage and is required for embryo implantation. HOXA10 was found in the human endometrium during the mid-secretory phase abundantly and may be involved in implantation and decidualization of endometriumduring early pregnancy. HOXA10 induction by progesterone during the window of implantation leads to a blockage in the stromal cell cycle, facilitating decidualization[19].

HB-EGF induces endometrial cell proliferation through activating the cascade of ERK1 / 2 signals in epithelial cells and increasing DNA synthesis and cyclin D3 in stroma cells[10,20]. Decreased levels of HB-EGF have an impact on disruption of endometrial proliferation and angiogenesis, this can have an impact on the inability of the endometrium to reach its receptive phase. The sequence of endometrial proliferation and angiogenesis disorders can be interpreted as a disturbance in endometrial receptivity.

Conclusion

Elevated level of corticosterone can decrease HB-EGF expression in endometrium *Rattus norvegicus.*

Ethical Clearance: Ethical clearance of this study was taken from Ethical Committee of the Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia. Number: 129/EC/KEPK/FKUA/2019

Source of Funding: This study was self funding by authors.

Conflict of Interest: The authors have no conflicts of interest.

References

1. Horcajadas JA, Jaime G. Reproductomics - The Omics Revolution and its Impact on Human Reproductive Medicine. London : Elsevier Inc; 2018. 279 – 301.
2. Skinner MK. Encyclopedia of Reproduction. 2nd ed. London : Elsevier Inc; 2018. 231-8.
3. Song M, Xian X, Yongli L, Rong H, Junli Z, Lingxia H, et al. Expression of heparin-binding epidermal growth factor in the endometrium is positively correlated with IVF-ET pregnancy outcomes. Int J Clin Pathol. 2016 August 15; 9(8) : 8280-85.
4. Mahajan N. Endometrial receptivity array : Clinical application. Journal of Reproductive Science. 2015 July 10; 8(3) : 121–9.
5. Mascarenhas MN, Seth RF, Ties B, Sheryl V, Gretchen A, Steven. National, regional, and global trends in infertility prevalence since 1990: a systematic analysis of 277 health surveys. PLoS Medicine. 2012 December 18; 9(12) : 1-13.
6. Wang H, Guangwen S, Ming L, Hong F, Hong M, Li S. Correlation of IL-1 and HB-EGF with endometrial receptivity. Experimental and Therapeutic Medicine. 2018 September 4; 16 : 5130-6.
7. Zhao LH, Xiang ZC, Hong JY, Bong L, Liang-liang Z, Yu XL, et al. Restrain stress inhibits mouse implantation : temporal window and the involvement of HB-EGF, estrogen, and progesterone. PLoS Medicine. 2013 November 14; 8(11) : 1-8.
8. Fritz MA, Leon S. Clinical Gynecologic Endocrinology and Infertility. 8th ed. Philadelphia : Lippincott Williams & Wilkins. 2011.
9. Whirledge S, John AC. Glucocorticoids, stress, and fertility. Minerva endocrinol. 2010 June; 35(2) : 109-25.
10. Lim HJ, Dey SK. HB-EGF : a unique mediator of embryo-uterine interactions during implantation. Experimental Cell Research. 2009 February 15; 315(4) : 619-26.
11. Fang CX, Ying-Qi N, Feng-Hua L, Lin F, Yen C. Heparin binding epidermal growth factor like growth factor enhances aquaporin 3 expression and function during mouse embryo implantation. Reproductive Science. 2016 July 19; 24(3) : 1-8.
12. Maramis MM. Mekanisme Gangguan Fungsi

Memori Kerja Spasial dan Fleksibilitas Kognitif Melalui HSP70, IL-6,5-HT,BDNF dan pCREB Pada Model Tikus Putih (Rattus norvegicus) Depresi [Disertasi]. Surabaya : Universitas Airlangga ; 2015.

13. López-López AL, Herlinda BJ, María DCEV, Mailinalli BP, Gonzalo VP, Fransisco JAA. Chronic unpredictable mild stress generates oxidative stress and systemic inflammation in rats. Physiology & Behavior. 2016 April 7; 161 : 15-23.
14. Hall J. Guyton dan Hall : Buku Ajar Fisiologi Kedokteran. 12nd ed. Singapore : Elsevier Pte Ltd; 2016.
15. Joseph DN, Shannon W. Stress and the HPA axis: balancing homeostasis and fertility. Molecular Science. 2017 October 24; 18(10) : 2224-39.
16. Kusumawati D. *Bersahabat dengan Hewan Coba. 4th ed*. Yogyakarta : UGM Press; 2016.
17. *Zee PL, Hayr A, Aleksandar V*. Circadian rhythm abnormalities. Learning in Neurology. 2013 February; 19(1): 132–47.
18. Lessey BA, Yaoting G, Apparao KBJ, Steven LY, Joy M. Regulated expression of heparin-binding EGF-like growth factor (HB-EGF) in the human endometrium : a potential paracrine role during implantation. Molecular Reproduction and Development. 2016; 62 : 446-55.
19. Ozbilgin K, Fatma K, Afsin T, Can K, Seda V, Tayfun O. The higher heparin-binding epidermal growth factor (HB-EGF) in missed abortion. Taiwanese Journal of Obstetrics & Gynecology. 2015 February; 54 : 13-8.
20. Strauss JF, Robert LB. *Yen & Jaffe's Reproductive Endrocinology, Physiology, Pathophysiology, and Clinical Management. 7th Edition*. Philadelphia : Elsevier Inc. 2014.

The Determinant Factor Premariral Sexual Behavior in Female Student Migrant Workers

Sri Susanti[1.2], Asmadi Alsa[3], Akif Khilmiyah[3]

[1] Islamic Education Psychology Doctoral Program, Posgraduate of Universitas Muhammadiyah Yogyakarta, [2]Lecture at the Faculty of Health Sciences, Muhammadiyah University of Ponorogo, [3]Islamic Education Psychology Doctoral, Program Posgraduate of Universitas Muhammadiyah Yogyakarta

Abstract

This research is a qualitative phenomenological approach, aims to analyze the factors that trigger the student premarital sexual behavior in children of migrant workers. Data collected by the snowball technique and purposive through observation, interviews, and documentation. The validity of the data using triangulation confirmation. Analysis of the data used is an interactive model of Miles and Huberman. The findings of this study indicate: (1) a permissive attitude towards dating; (2) lack of knowledge and information that is not true of reproductive health; (3) lack of self-control on mahasisianak migrant workers; (4) conformity peers makes the subject tends to follow the custom of peergropnya; (5) social and cultural conditions of permissiveness towards modernization and globalization; (6) family background and lack of moral education from an early age from family; (7) lack of good role models and a lack of parental supervision. Further studies should be done on a pornographic media exposure variables, and modeling of the environment.

Keywords: *determinants, sexual behavior, female student, phenomenology.*

Introduction

Social phenomenon which is currently rife is premarital sexual behavior that leads to abortion, where most of the perpetrators and the victims are teenagers. For some teens, Pre sexual behaviormarriage is regarded as a natural thing with the change of times today, so it was perceived as a lifestyle that can be consumed by anyone[1]. Women as actors is the most suffer the consequences of the current behavior, ranging from physical, psychological and social. for those who initially only dabble intercourse or sexual contact, tend to be hooked and will do again, because they get enjoyment from this illicit relationship[2].

An initial survey conducted by the author with the observation and interviewing student revealed that most of them have a serious relationship with a boyfriend. In fact, their behavior there is shown directly incompatible with the norms of ethical, moral, and religious, have a picture as seen from the display screen laptop or her WhatsApp profile. In fact, they deliberately skipped college and went to entertainment venues or clubs with their partner.

Problem.

Premarital sexual behavior into cultural issues in everyday student life of children of migrant workers. The main problem in this study is the number of factors that encourage student of child labor migrants committing premarital sexual behavior, include: factors attitude towards dating, a factor of knowledge about reproductive health, factors of self-control and self-efficacy, factors conformity peers, social environmental factors of culture community, family background factors, and factors of parental supervision.

Literature Review

Premarital sexual behavior that becomes a social problem for society and the state because it is done outside of marriage is legitimate and legal. Notoatmojo say that premarital sexual behavior is an act committed by juveniles associated with sexual urges that come both from within and from outside himself[3]. Soetjiningsih define premarital sexual behavior is any sexual behavior that is driven by sexual desire in the opposite sex performed before marriage[4]. Meanwhile, according to Ajzen, premarital sexual behavior is closely related to

a permissive attitude toward premarital sexual behavior. Attitudes and behaviors can be consistent when attitudes and behavior in question is specific and of no relevance to each other. Because the permissive attitude toward premarital sexual relations is relevant with each other, then that attitude can be a predictor for behavior[5].

Based on some sense it can be concluded that premarital sexual behavior is the behavior that leads to intimacy heterosexual, which is a manifestation of their sexual drive in the stages of sexual behavior ranging from dating, holding hands, kissing to intercourse involving a pair of teenagers without going through the process of marriage legitimate according to religious and legal according to the law. According Sarwono, stages and forms of sexual activity can be categorized into four activities, namely kissing, necking, petting and intercouse[6].

Methods

This research is a phenomenological study with a qualitative approach, the source of the data obtained through interviews with respondents that female student of migrant workers who perform premarital sexual behavior, which is obtained through the snowball technique and purposive. The technique of collecting data using interviews, observation and documentation. The validity of the data using triangulation confirmation of the source, where the researchers matched the findings of the data obtained by confirming the findings with the data source. Data analysis techniques using interactive analysis of Milles and Hubberman.

Results and Discussion

The result showed that most of the subjects had sexual intercourse before marriage originated from trial and error when they are going through high school, and some other subjects in premarital sexual intercourse because of sexual urges and desires wanted to achieve pleasure and satisfaction in dating. This is supported by data interviews with the subject as follows: *"..... I do it before marriage bond because of the insistence of lust I wanted to try, and I think that sexual intercourse should be performed by young people, the interaction free and we were in college may not have to get married first because not ready to become husband and wife. We still want to have fun like other children"*, According to Freud's theory of "Psychoanalysis" on instinct, suggested that a person with libidinal instincts have destructive impulse that ensures the survival of reproduction. In this case the subject get satisfaction related to the sexual organs, namely erogen areas on the body that are sensitive to excitation. The subject will feel satisfaction and can relieve strain on her after having sexual intercourse.

For those subjects who have never had sexual intercourse at the time of dating, he was able to facing challenges and improve a strong commitment to her. The results showed that, apparently subjects with high self-efficacy, they have the ability to control themselves to abstain from sexual relations before marriage. Whereas subjects with low self-efficacy, they do not have the ability to resist a challenge when it invited the couple to have sexual intercourse. According to Bandura's theory of "self-efficacy", that individuals who have high self-efficacy will feel confident that they are able to deal effectively with their situation, and enhance a strong commitment to her, whereas individuals who have self-efficacy poor feel helpless, and quickly give up when faced with challenges and a commitment to the objectives to be achieved.

Regarding things that encourage premarital sexual behavior, the subject reveals that there are several factors, both internal and eksterenal, among others:

(1) factors attitudes toward premarital sexual behavior. Based on the findings that almost all subjects permissive attitude toward dating. Attitudes toward premarital sexual behavior that is typical in adolescents usually begins with freshly interested, dating, making out until the desire for sexual intercourse. The results of this study indicate that, Subject permissive to have a chance of dating a high enough toward premarital sexual behavior. As pointed out by the subject as follows: "*I am dating since junior grade 3 was initially just to find a friend to confide in, because I see friends that others also had a boyfriend then I also want to have a boyfriend, for support in learning, sharing and commitment so*". This fact is in line with research by Rony, et al. showed that there is a positive correlation between courtship with premarital sexual behavior (Cc = 0.433). This positive relationship means that the courtship is done teenagers will increasingly lead to premarital sexual behavior, teenagers who do not reverse the lower dating leads to premarital sexual behavior. In Erik Erikson's psychosocial theory, states that adults beginning is ready to form a new relationship of trust and intimacy with another person, a partner in friendship, sex, competition, and cooperation. They were not looking for intimacy or failure, may withdraw into isolation. The most important

social agent at this stage is the friend (boyfriend) to be faithful to their commitment to pasangannya[7].

(2) factors subject knowledge about premarital sexual behavior, on average, they have a good knowledge. This is because they claimed while in high school never received counseling on sexuality and reproductive health collaboration whith the National Family Planning Agency and other institutions providing extension at the school. This fact is in line with research conducted by Rahmawati, showed that the level of knowledge of students at the National High School Semarang on premarital sexual behavior mostly have good knowledge, it is evident that out of 70 respondents there, as many as 41 students or as much as 58.6% have good knowledge, and only very few of the 70 respondents were knowledgeable about as many as seven students or 10.0%, and knowledgeable enough as many as 22 students or 31.4%. Students who have a good knowledge of this is because of the counseling on sexuality and reproductive health, and easy access to imternet around sekolah[8]. According Notoatmojo in education and health behavior theory, saying that knowledge is influenced by the experience of someone who can be expressed and believed that lead to motivation, as well as other factors, namely the environment, both physical and non-physical environment, including socio-cultural. So it is desirable to improve the knowledge of the younger generation, by providing outreach activities in order to better understand the theory obtained by the fact that there[9].

(3) The factor of self-control and self-efficacy. Low self-control and self-efficacy subjects in this study are shown in the attitude of their inability to hold and control his lust when dating. They feel helpless,and quickly give up and a weak commitment in the face of the challenges that come from the couple. As disclosed subject as follows: "..... *if lust is urgent and can not longer hold back, finally we make a pact to do it. And it is always we do because we've been married fiance where the latter will become husband and wife*". In line with research from Iga & Goddess, that there is a correlation between self-control sexual behavior before marriage, with a significance value of 0.042 <0.05, it can be said that between premarital sexual behavior with self-control relationship exists linier[9]. Inability adolescents in control of himself is what can lead to a tendency to sexual behavior pranikah[11]. In the "low self-control theory" Travis Hirschi said that individuals with low self-control have a tendency to be impulsive, risky behavior and thinking happy sempit[12].

(4) The conformity factors peers. Based on the results of research in the field, conformity to peer very closely associated with premarital sexual behavior on the subject, because more time with friends than with family. And the influence and pressure from the peer group is greater than the influence of the family. It's like saying the subject when asked about the status of a girlfriend in conformity peers, as follows: *"..... courtship that has become a trend for teens right now, if not have a boyfriend so like being buillied whith our friends, arguably not slang so I adherents trend alone"*, According Sarwono, the strong emotional bond and group conformity in adolescents, is usually considered as a factor that led to the emergence of bad behavior in adolescents[13]. If the adolescent peer environment that supports toward premarital sexual behavior, as well as the conformity of teenagers who are also high on his peer, then a teenager is very likely to commit other forms of sexual behavior before marriage. While in the "social learning theory" Bandura said that the process of observing and imitating the behavior and attitudes of others as a model of action learning. If teenagers live in an environment of peers who have a habit of sexual behavior before marriage, then he is likely to behave in the same[14].

(5) factors of social and cultural environment. Ponorogo is well known for the largest Indonesian Workers in East Java, after two other cities that Blitar and Malang. The results showed that the number of Labor Migrant Workers has an impact on social change Ponorogo, as well as a negative impact especially on the internal family left behind; from the problem of disharmony in the family, divorce, abandoned children, until the child delinquency cases. As disclosed subject matter that: "..... *the parents did not know anything about it, because at home there is only my father and grandmother are old while the mother is a migrant worker in Malaysia, I feel the loss of a mother figure and affection of a mother, threrefore I was more comfortable staying at the boarding house with boyfriend without anyone caring*". The workers will leave their families for months or even years, as a result the child loses a parent figure in the long term. They lost the role and function of parents is very important for children's growth both physically, and socially.

(6) family background factor. The family is the first social environment that provides a huge influence to the growth and development of children and adolescents. Ideally adolescent development will be optimal if they

shared a harmonious family, so that the various needs required can be met and have positive role models from their own parents. As revealed by Bandura in "modeling" is one important step in learning, most human behavior is influenced by others, people will learn to imitate the behavior tungkah or in certain cases to make someone else as a model for him[15]. The family lacks the function of socialization which is expected to instill the values and norms on children. There has been a shift in the role and function of the family in terms of socialization. Lack of parental supervision and lack of cultivation of religious values will impact on promiscuity which results in adolescent premarital sexual intercourse.

(7) the factors parents. Parents as primary socialization agent who first role is to introduce the values and norms applicable to children both in the family and in society. This socialization of values and norms cannot possibly be fulfilled perfectly when parents go to become migrant workers. Even children whose parents are left behind are migrant workers experiencing many psychological problems such as emotional disturbances, problems with behavioral disorders and hyperactivity. Often parents think only of his external needs by working hard regardless of how children grow and develop. Parental supervision is absolutely necessary as a filter for children to prevent negative influences of social. Unfavorable conditions often experienced by subjects as child workers. They live separately with their parents in a long period of time so that less supervision and prone to deviant behavior. Even some of them must feel the role of parents is replaced by the grandmother as caregivers. The grounds are a single parent because of work a migrant worker or both parents are divorced. This will impact on the formation of the personality of children and adolescents to be more influenced by the social environment, even the role of the mass media might replace the role of the other.

Conclusions and recommendations.

Premarital sexual behavior that occurs in a student's child labor migrants originated almost entirely from courtship in which they live since junior high school or senior high school, and partly since the beginning of college. Courtship is one of the reasons they commit acts of premarital sexual behavior. In addition triggered by several factors, among others, the factors of knowledge and attitudes toward premarital sexual behavior, self-control factor, conformity peers, social and cultural conditions, family background and parental factors. Among the factors that most influence is a factor family and parents. Many of those who came from a family full of conflict and division (broken). This is due tothe lack of intensity of communication between members of the family, because parents become migrant workers abroad so rarely communicate intensively with her son. Conditions parent who is a migrant worker makes the subject to lose the need for love and comfort of the family, which then makes the student look for meeting those needs to others who can serve as the outpouring of all the problems of life faced.

It is recommended that all parties to make efforts to address premarital sexual behavior and for further research may make observations and thoughts as well as the development of models and strategies for the handling of premarital sexual behavior through stages that are arranged in a systematic and applicable.

Ethical Clearance: This research was approved by R&D numbers 1409/III.6/PN/2016

Conflict of Interest: The authors declares that there is no conflict of interest

Source of Funding: This research was funded by Universitas Muhammadiyah Ponorogo

References

1. Alo O, & Akinde I. Premarital sexual activities in an urban society of Southwest-Nigeria Ea;2010;2(1)
2. Syamsulhuda BM & Winarti P. Factors affecting the Premarital Sexual Behavior The Influencing Factors of a Pre-Marital Sexual Behavior Among College Students in Pekalongan. Journal of Reproductive Health;2010;1(1)
3. Najati MU. Review of Psychology in the hadith. Jakarta; Mustaqeem;2003
4. Soetjiningsih. Growth and Youth. Jakarta; King Grfindo Persada;2004
5. Sparks P, Ajzen I, & Hall-box T. Perceived Behavioral Control Self-Efficacy, Locus of.pdf;2002 6,13. Sarwono. Adolescent sexuality and fertility. Jakarta; Eagles;2001
7. Slavin RE. Educational Psychology Theory and Practice trans. Marianto Naidoo. Jakarta; The index;2019
8. Rahmawati D, Yuniar N, & Ismail CS. Analysis of factors associated with premarital sexual behavior of students boarding house in the village of

Lalolara 2016. Student Scientific Journal of Public Health;2017;2(5)

9. Notoatmojo S. Education and Health Behavior. Jakarta; Rineka Reserved;2007
10. Puspitadesi, IN., Yuliadi, AAN. Figure Stickiness Relationship Between Parents and Self-Control in Adolescent Sexual Behavior, Scientific Journal of Psychology Candrajiwa;2012;1(4)
11. Vidya TN & Rev. IW. Relationship Between Attitudes toward Religiosity with trend Attitudes toward Premarital Sexual Behavior in Adolescents End Average Dating at Airlangga University in Surabaya. Journal of Personality and Social Psychology;2014;3(2)
12. Aroma IS., & Suminar DR. The relationship between the level of the trend Behavioral Self-Control Juvenile Delinquency. Journal of Educational Psychology and Development;2012;01(02) 14,15. Tarsono T. Implications of Social Learning Theory From Albert Bandura in Guidance and Counseling. Psympathic; Scientific Journal of Psychology; 2018;3(1);https://doi.org/10.15575/psy.v3i1.2174

Knowledge, Attitude, and Practice (KAP) regarding Personal Hygiene among Primary School going Children in Sadar Upazilla, Noakhali District, Bangladesh

Susmita Ghosh[1], Md. Ruhul Kabir[1], Md. Mahmudul Islam Khan[2], Lincon Chandra Shill[2], Syeda Saima Alam[3]

*[1]Assistant Professor, [2]*Student, [3]Lecturer, *Department of Food Technology & Nutrition Science, Noakhali Science Technology University, Noakhali- 3814, Bangladesh*

Abstract

Personal hygiene which should be started from childhood and having proper knowledge and practice during this time period will help to attenuate the infectious disease, thus increase the productivity of an individual in his or her life cycle. Investigating the knowledge, attitude and practice regarding personal hygiene among primary school going children was the aim of this study. A school based cross sectional study involving 408 children by probability proportionate was carried out in eight government and private primary schools at Sadar Upazilla, Noakhali District. The mean age of the respondents were 9.77±1.62 years with equal numbers of boys and girls. Overall 78.4% (N=320) respondents had good knowledge regarding hygiene and the percentage was higher among girls (79.4%) compared to boys and there have been also significant correlation among knowledge, attitude and practice about personal hygiene (P= 0.000). The study also revealed that respondents having adequate knowledge of proper hygiene were more likely to have clean clothes and clean teeth (AOR 2.37, CI 1.2-4.6 and AOR 2.51, CI 1.4-4.5 respectively). Thus continuous health education and behavioral change program are essential and should be conducted frequently to improve overall hygiene situation.

Keywords *– Knowledge, Practice, Attitude, Children, Primary School, Hygiene.*

Introduction

Hygiene is the discipline which helps in maintaining the health and is one of the determinants of good health which varies according to one's moral and practices [1]. In Greek mythology, the meaning of Hygiene is derived from "Hygiea" which means goddess of health [2]. Personal hygiene is art of wellbeing living of individual and it can be defined as the science of health and it embraces all the factors that will help for a healthy living such as bathing, washing hands before a meal and after using toilet, cleaning the face, eye, feet, washing hair, trimming nail, wearing clean clothes etc.

Children in their primary schooling age can learn specific health-promoting behaviors, even if they do not fully understand the connections between illness and behavior [3]. As a socializing institution, school plays an important role for the children and as well as for the adolescent to develop a healthy citizen and after introducing about the knowledge of personal hygiene and life style in school, when they will mature, they will in better position as an adult to maintain their own health and also to maintain the health of their family [4].

Having lack of awareness of health benefits of personal hygiene can result poor health outcomes among school children especially infectious diseases such as diarrheal diseases, skin diseases, worm infestations and dental diseases [5]. About 50% gastrointestinal and respiratory infections can be reduced significantly

Corresponding author:
Susmita Ghosh
Susmita Ghosh, Assistant Professor,
Department of Food Technology & Nutrition Science,
Noakhali Science Technology University, Noakhali-3814, Bangladesh.
Email: susmita.drsity@gmail.com

by improving awareness and hand hygiene practices especially among children, which are two leading causes of childhood morbidity and mortality around the world [6-8]. Thus personal behavior are discrete and independently modifiable, individuals can voluntarily alter such behavior and can maintain good personal hygiene.

Hence the present study was conducted aiming in to investigate the knowledge, attitude and practices concerning personal hygiene among primary school going children in Sadar upazila, Noakhali District, Bangladesh and also to find out the association of socio-demographic characteristics with KAP of the respondents regarding hygiene.

Materials and Method

The descriptive cross sectional study was conducted among primary school going students of class I to class V in eight government and private primary school in Noakhali region, Bangladesh. The schools were selected randomly and the respondents were also included by randomization. Total 408 students were included by probability proportionate in the study from four government and four private primary school. An interviewer administered questionnaire was used to collect all the information including demographic data, morbidity data and KAP regarding personal hygiene from the respondents. Face validity and content validity of the questionnaire were done and the value for the Cronbach alpha was 0.68. After validation the questionnaire was translated to Bangla and a pilot study was conducted in three primary schools. Then the questionnaire was modified and finalized for the final data collection.

Consent from the authority of the school was taken before the study was conducted and also from the guardians of the children. Data were collected by face to face interview and physical appearance and hygiene were observed directly and carefully and recorded in the check list in the questionnaire.

All the collected data were checked, verified and edited and then analyzed (Chi square test, logistic regression) using statistical package for social science (SPSS version 23.0) with 95% level of confidence. There were 12 questions for assessing knowledge, 9 questions for attitude and 14 questions for practice. Each questions were scored according to the options and the category of the KAP was done according to Elsabagh HM (2016) [9].

Results

The study was conducted among the primary school (Class I to V) children and the mean age of the children were 9.77±1.62. Most of the respondents (94.1%) of the study are Muslims and male and female ratio was 1:1. In the study it was seen that there were huge difference regarding personal hygiene between government and private school. Most of the fathers of the respondents (99.75%) are employed where about 86.8% of the mothers are unemployed and most of them are housewife. About 16.17% mothers are illiterate or can sign, read and write where 38.16% fathers are illiterate or can sign, read and write. Fathers have done higher studies (38.65%) more than the mothers (31.63%).

According to the BMI for age, about 77% of the respondents are underweight and only 17.4% are normal. Approximately 6% students fall in the overweight and obese group.

The present study also found that, girls had have higher knowledge and practice than that of the boys but attitude was seen higher in the boys than girls. According to categorization of the KAP, about 78.4% and 64.7% students have good knowledge and practice but only 35.3% students have positive attitudes on personal hygiene (figure 1) and there have significant correlation among knowledge, attitude, and practice (table 1). Table 2 shows the significant association between category of knowledge and attitude (p=0.000) and category of knowledge and practice (p=0.000). Table 3 shows the association of KAP with various demographic variables such as types of school, sex, education and occupation of the parents of respondents. From the table 3, it is seen that, type of schools is significantly affect the knowledge, attitude and practice (p=0.000) of the respondents, in where the sex is statistically significant with practice only (p=0.036). The level of education of the parents also statistically signifies with KAP (p= 0.000 and p=0.001) but the occupation has no significant effect on KAP of the students. About 78.4% students have adequate knowledge of personal hygiene (figure1). Those who have adequate knowledge about personal hygiene as more likely to have clean cloths and clean teeth (AOR 2.37, CI 1.2-4.6 and AOR2.51, CI 1.4-4.5 respectively) though the other factor such as clean eye, clean hand, cleanliness of hair, trimmed nail and clean face did not have statistical significant association.

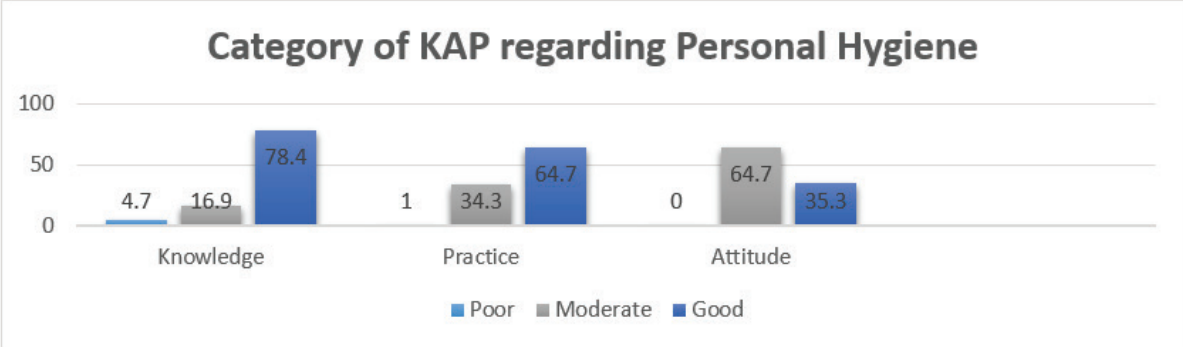


Figure 1: Category of KAP regarding Personal Hygiene

Table 1: Correlation between Knowledge score and both, Practice and Attitude scores:

		Attitudes score	Practice score
Knowledge score	Correlation coefficient Sig. (2-tailed)	0.329** 0.000	0.347** 0.000

Table 2: The relationship between children knowledge with their attitude and practice:

Attitude and Practice		Knowledge						Significant Test P value*
	Poor (<50%) (N=19)		Moderate (score50-75%) (N=69)		Good (score>75%) (N=320)			
		No.	%	No.	%	No.	%	
Attitude	Negative N= N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	Indifferent N=144	18	12.5	37	25.69	89	61.81	X^2= 47.391 P= 0.000*
	Positive N=264	1	0.38	32	14.02	231	85.6	
Practice	Poor N=04	1	25.0	1	25.0	2	50.0	
	Moderate N=140	12	8.57	37	26.43	91	65.0	X^2= 28.761 P= 0.000*
	Good N=264	6	2.27	69	26.14	227	71.59	

Table 3: Association between Demographic characteristics of the respondents with KAP score regarding personal hygiene:

Demographic Characteristics	Association between Demographic characteristics of the respondents with KAP score regarding personal hygiene:											
	Knowledge (%)			Significant Test P value*	Attitudes (%)			Significant Test P value*	Practice (%)			Significant Test P value*
	Poor	Moderate	Good		Negative	Indifferent	Positive		Poor	Moderate	Good	
Type of school Government private	7.92 1.46	27.55 6.84	64.53 91.7	X2 =43.422 P= 0.000*	N/A N/A	46.04 24.88	53.96 75.12	X2 =19.929 P= 0.000*	1.96 N/A	48.04 20.98	50.0 79.02	X2 =38.95 P= 0.000*
Sex Male Female	5.39 3.92	17.16 16.7	77.5 79.4	X2 = 0.538 P= 0.764	N/A N/A	31.9 38.7	68.1 61.3	X2 = 2.104 P= 0.089	1.96 N/A	37.74 30.9	60.3 69.1	X2 = 6.627 P= 0.036*
Mothers Education Illiterate Can sign, read and write JSC SSC Higher secondary Others	8.33 9.35 N/A 3.08 1.49 1.23	29.17 29.50 18.52 9.23 2.99 7.41	62.5 61.15 81.48 87.69 95.52 9.36	X2 =56.163 P= 0.000*	N/A N/A N/A N/A N/A N/A	41.67 0.48 33.33 21.54 37.31 20.99	58.33 99.52 67.67 78.46 62.69 79.01	X2 =25.262 P= 0.001*	4.16 2.16 N/A N/A N/A N/A	25.0 4.32 33.33 26.15 20.90 24.69	70.84 93.52 67.67 73.85 79.10 75.31	X2 =44.663 P= 0.000*
Mothers Occupation Employed Unemployed	3.71 4.81	5.55 18.64	90.74 76.55	X2 =7.740 P= 0.654	N/A N/A	27.78 36.45	72.22 63.55	X2 =6.831 P= 0.077	1.86 0.85	31.48 34.75	66.66 64.40	X2 =16.889 P= 0.234
Fathers Education Illiterate Can sign, read and write JSC SSC Higher secondary Others	5.27 8.20 7.40 11.11 N/A 1.94	26.31 29.85 11.11 16.66 4.16 9.09	68.42 61.95 81.49 72.23 95.84 88.97	X2 =48.984 P= 0.000*	N/A N/A N/A N/A N/A N/A	21.05 48.51 51.85 38.89 35.42 23.38	78.95 51.49 48.15 61.11 64.58 76.62	X2 =30.525 P= 0.000*	N/A 2.98 N/A N/A N/A N/A	42.10 48.51 48.15 50.0 20.83 21.43	57.90 48.51 51.85 50.0 79.17 78.57	X2=131.115 P= 0.000*
Fathers occupation Employed Unemployed	4.75 N/A	16.75 1.0	78.50 N/A	X2 =9.297 P= 0.677	N/A N/A	36.0 N/A	64.0 100.0	X2 =14.789 P= 0.755	1.0 N/A	34.5 N/A	64.5 100.0	X2 = 3.414 P= 0.253

Table 4: Observed personal hygiene characteristics according to adequate knowledge of proper hygiene practices among primary school children

Characteristics	**Distribution N =408 N (%)**	**Presence of adequate knowledge of hygiene N =320 N (%)**	**Unadjusted Odds Ratio (95% CI)**	**Adjusted Odds Ratio (95% CI)***
Wearing clean cloths No Yes	 57(14) 351(86)	 36(11.25) 284(88.75)	 1 2.47 (1.3-4.5)***	 1 2.37 (1.2-4.6)***
Fingernails trimmed No Yes	 135(33.1) 273(66.9)	 102(31.87) 218(68.13)	 1 1.31 (0.7-2.1)	
Cleanliness of eye No Yes	 10(2.5) 398(97.5)	 7(2.18) 313(97.82)	 1 1.52 (0.4-6.2)	

Cont... **Table 4: Observed personal hygiene characteristics according to adequate knowledge of proper hygiene practices among primary school children**

Cleanliness of hair				
No	9(2.2)	5(1.56)	1	
Yes	399(97.8)	315(98.44)	3.01 (0.7-11.4)	
Clean hand				
No	33(8.1)	26(8.12)	1	
Yes	375(91.9)	294(91.88)	0.92 (0.4-2.3)	
Clean teeth				
No	77(18.9)	49(15.31)	1	1
Yes	331(81.1)	271(84.69)	2.58 (1.5-4.4)***	2.51 (1.4-4.5)***
Clean face				
No	20(4.9)	13(4.06)	1	
Yes	388(95.1)	307(95.94)	2.04 (0.7-5.2)	

***P<0.005, *Adjusted for age of the child (continuous), gender (male/female) & religion (Muslim/Hindu)

Discussion

The study focused on the KAP about personal hygiene and sanitation of the primary school going children (Grade I to V) and helped to find out the association between knowledge, attitude and practices with different socio demographic variables and also the correlation between knowledge with attitude and practice. Among all the respondents, 78.4% had have proper knowledge of personal hygiene though about 64.7% respondents had have the positive attitude and good practice. Appropriate knowledge is necessary for the practice of proper hygiene in their daily life but the findings from the author Vivas et al (2010) reported that approximately half of the students did not have adequate knowledge of proper hygiene[10] in Angolela, Ethiopia.

It was found from the present study that the students from private schools had greater knowledge, attitude & practice than that of the government school students. The percentage of students for knowledge, attitude & practice of government schools were 64.53%, 53.96% & 50% respectively, in where the findings for private were 91.7%, 75.12%, 79.02% respectively, which was quite higher, however to the best of our knowledge, no published report have assessed KAP between government and private schools in Bangladesh.

As the literacy rate and educational status of women in Bangladesh is growing up gradually due to ongoing awareness among government and NGOs [4], in the current study, it was found that girls had significantly better knowledge and practice than male ones though the boys had greater attitude than girls. A study which was conducted in Iran, has also reported that females had better knowledge, attitude and practice scores than males [11]. Whereas in another study males had shown significantly higher scores compared to females [12]. This dissonance in results may be explained by the cultural and social differences from different regions of the world between male and female.

As the children spend most of the time with their mother and she is typically the primary caretaker of the family, that's why she has to charge with teaching her children proper health and hygiene practices[10]. Due to illiteracy of mother, may have less knowledge to teach their children about proper hygiene practices and it would lead to increase rates of infectious disease amongst her children [13]. In our study it was seen that children whose mothers was literate and who studied up to college or university had a good knowledge in hygiene practices and was almost similar to another study carried out in Gambia in 1996 [14]. The findings also found that father's education significantly related to the children's knowledge, attitude and practice of personal hygiene.

According to this study, the children who had adequate knowledge regarding personal hygiene were more likely to have clean clothes and clean teeth and the study from Ethiopia also found that except clean teeth[10]. A study conducted in Munshigonj, Bangladesh reported that 93.33% children trimmed their nail

[15] in where our study found only 66.9% and found insignificant association with knowledge about proper hygiene (AOR 1.31, CI 0.7-2.1). Another study which was also conducted in Mymansing, Bangladesh revealed that almost 77% secondary school students trimmed their nail[4], which was quite near to our study result.

Conclusion

Childhood is the best period in which one can easily adopt the behaviors that they have seen around their environment. If hygiene education and information would give in this early stage of life, the prevalence of communicable diseases can be reduced in a significant level. So that more health education is needed concerning personal hygiene to ensure that all children would aware of the hazardous effect of poor hygiene and this can be implemented through formal (as a part of the curriculum) and informal health education messages.

Acknowledgement: Authors are thankful to all the children, teachers and the authority of the schools for their cooperation and participation in the study, without them, the study would not have been possible.

Conflict of Interest: Nil

Source of Funding: The study was funded by Research cell, Noakhali Science and Technology University, Bangladesh.

Ethical Clearance: The Ethical approval was taken from the Ethical Board of Noakhali Science and Technology University.

References

1. Hazazi A, Chandramohan S, Khan J, AL-Mohaithef M. Knowledge Attitude and Practices Regarding Personal Hygiene among the Male Primary School Children in Abha, Kingdom of Saudi Arabia: A Cross-Sectional Study. HELIX. 2018;8(2):3215-23.
2. Pal J, Pal AK. Knowledge, attitude and practice of personal hygiene and its predictors: A school-based study among adolescent girls in an urban slum. International Journal of Medical Science and Public Health. 2017;6(9):1411-7.
3. Richmond JB, Kotelchuck M. Personal health maintenance for children. Western Journal of Medicine. 1984;141(6):816.
4. Ghose JK, Rahman MM, Hassan J, Khan MSR, Alam MA. Knowledge and practicing behavior related to personal hygiene among the secondary school students of Mymensingh Sadar Upazilla, Bangladesh. Microbes and Health. 2012;1(1):34-7.
5. Sarkar M. Personal hygiene among primary school children living in a slum of Kolkata, India. Journal of preventive medicine and hygiene. 2013;54(3):153.
6. Pittet D. Clean hands reduce the burden of disease. The Lancet. 2005;366(9481):185-7.
7. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. The Lancet infectious diseases. 2003;3(5):275-81.
8. Rabie T, Curtis V. Evidence that handwashing prevents respiratory tract infection: a systematic review. Trop Med Int Health. 2006;11(3):1-10.
9. Elsabagh HM, Atlam SA, Shehab NS. Knowledge, attitude and practice regarding personal hygiene among preschool children in Tanta city, Gharbia Governorate, Egypt. Practice. 2016;75:3.75.
10. Vivas A, Gelaye B, Aboset N, Kumie A, Berhane Y, Williams MA. Knowledge, attitudes, and practices (KAP) of hygiene among school children in Angolela, Ethiopia. Journal of preventive medicine and hygiene. 2010;51(2):73.
11. اکرام‌ن, زعزی, رایت‌خب, کتاوی‌ن, حیدری, الهٔ ح, et al. Survey of Oral Hygiene Behaviors, Knowledge and Attitude among School Children: A Cross-Sectional Study from Iran. International Journal of Health Sciences. 2014;2(2):95-83.
12. Khami MR, Virtanen JI, Jafarian M, Murtomaa H. Oral health behaviour and its determinants amongst Iranian dental students 1. European journal of dental education. 2007;11(1):42-7.
13. Nematian J, Nematian E, Gholamrezanezhad A, Asgari AA. Prevalence of intestinal parasitic infections and their relation with socio-economic factors and hygienic habits in Tehran primary school students. Acta tropica. 2004;92(3):179-86.
14. Barrett H, Browne A. Health, hygiene and maternal education: Evidence from The Gambia. Social science & medicine. 1996;43(11):1579-90.
15. Rahman A. A study on practice regarding personal hygiene among school going and non-school going children in a selected rural area. Dhaka (NIPSOM): Bangladesh. 2001.

Relationship of Mothers' Parenting and Stunting in Toddlers Aged 12-36 Months in Bogor Regency, West Java Province, Indonesia in 2019

Sakina Makatita[1], Ratna Djuwita[2]

[1]Master of Epidemiology, Faculty of Public Health, University of Indonesia,
[2]Department of Epidemiology, Faculty of Public Health, University of Indonesia

Abstract

Background: Stunting is a nutritional problem in toddlers who experience growth failure due to long-term malnutrition so that the z-score is less than -2SD / standard deviation (stunted) and less than - 3SD (severely stunted). According to the 2016 Global Nutrition Report, the prevalence of stunting in Indonesia shows that Indonesia ranks 108 out of 132 countries. Based on previous reports, Indonesia is included in 17 countries that experience problems with nutrition, both excess and malnutrition. For the Southeast Asian region, the prevalence of stunting in Indonesia is the highest in the world, after Cambodia. In addition to nutritional factors, stunting is also caused by indirect factors, namely parenting. Therefore the aim of the study is to assess the relationship between mothers' parenting and stunting in toddlers aged 12-36 months in Bogor Regency, West Java Province, Indonesia in 2019.

Method: Cross-sectional study design from primary data with a total sample of 500 toddlers aged 12-36 months taken in Bogor Regency, West Java Province, Indonesia in 2019. Stunting status was assessed based on the TB / U indicator <-2 z-score, while categorizing variables Mothers' parenting was done scoring. Analysis of the relationship between mothers' parenting with stunting in this study using multivariate cox regression analysis and the magnitude of the effect expressed in the prevalence ratio (PR) with confident interval (CI: 95%.)

Results: This study shows the prevalence of stunting in toddlers aged 12-36 months in Bogor Regency in 2019 of 39.2%. The result of cox regression test of the relationship between mothers' parenting and stunting showed PR 1.47 (95% CI: 1.09-1.97) meaning that mothers with poor parenting had a prevalence of stunting toddlers 1.47 times higher than mothers with good parenting after controlling for the variable "Mothers' Education".

Conclusion: Mothers' parenting is one of the factors that causes the high prevalence of stunting in toddlers aged 12-36 months in Bogor Regency, West Java Province, Indonesia in 2019. The efforts to prevent stunting are very important, one of which is based on mothers' parenting factors, therefore it needs to be increased education for expectant mothers, and especially adolescent girls as well as increasing knowledge of pregnant women who have low education about parenting in toddlers in accordance with aspects of parenting that are good and right. So that hopefully mothers have enough knowledge about parenting, and it can be applied during parenting.

Keywords: *Stunting, Mothers' Parenting, 12-36 Months, Toddler, Bogor Regency*

Corresponding Author:
Ratna Djuwita:
djuwita257@gmail.com

Introduction

Nutritional status plays an important role in the development of a child's body weight or height which is strongly influenced by nutrition(1). Stunting is a situation

where children under the age of five fail to grow due to lack of chronic nutritional intake caused by long-term malnutrition so that the child's height does not match the age of the child or the child can be said too short when compared to his age[2]. According to the WHO Child Growth Standard, stunting is based on a body length index compared to age (PB/U) or height compared to age (TB/U) with a z-scoring limit of less than -2SD / standard deviation (stunted) and less than -3SD (severely stunted)[2][3].

In 2017, the world experienced 150.8 million stunting, or 22.2%. This figure has decreased when compared with the stunting rate in 2000 which was 32.6%. In 2017, more than half the stunting toddlers in the world came from Asia (55%) while more than a third (39%) lived in Africa. Of the 83.6 million stunting toddlers in Asia, the largest proportion came from Asia (58%) and the lowest proportion in Central Asia (0.9%)[4]. According to the 2016 Global Nutrition Report, the prevalence of stunting in Indonesia shows that Indonesia ranks 108 out of 132 countries. Based on previous reports, Indonesia is included in 17 countries that experience problems with nutrition, both excess and malnutrition[4][5]. For the Southeast Asian region, the prevalence of stunting in Indonesia is the highest in the world, after Cambodia[4][6]. Results of Basic Health Research (RISKESDAS) 2018 stunting prevalence fell to 30.8% from the previous 37.2% (2013)[2]. While for toddlers who have normal height increased to 57.8% (2018) from 48.6% (2013)[4][2]. Even so, West Java Province is a province in Indonesia that still has a high prevalence of stunting, even a significant increase in cases from 25.1% in 2016 to 29.2% in 2017. Meanwhile the Districts in West Java with Stunting cases are still high, one of which is Bogor Regency 28.5%[7].

Mothers' parenting plays an important role in the occurrence of growth disorders in children. To support good nutritional intake needs to be supported by the mothers' ability to provide good care for children in feeding practices, personal hygiene practices and the environment[8]. According to the United Nations Children's Fund (UNICEF) parenting is one of the indirect factors related to the nutritional status of children including stunting[10][11]. Mothers when caring for children with affection, spending time with children such as playing storytelling, teaching children discipline, giving praise or appreciation if the child succeeds in doing well, and implementing a clean and healthy lifestyle (PHBS) can indirectly affect growth and development children[9]. This is because the pattern of parenting from the psychological side of the child is also one of the factors that play an important role in the growth and development of children under the age of five. At this age children are still very dependent on the parenting of their mothers[12].

Venny research on factors related to stunting among toddlers aged 24-59 months in Wawatu Village, North Moramo District, South Konawe Regency in 2017 shows that out of 35 toddlers (100%) who have unfavorable mothers' parenting patterns there are 23 toddlers (65.7%) who experienced stunting and there were 12 toddlers (34.3%) who did not experience stunting (normal). Whereas out of 45 toddlers (100%) who have good mothers' parenting, there are 11 toddlers (24.4%) who experience stunting and 34 toddlers (75.6%) who do not experience stunting (normal). This shows that there is a relationship between mothers' parenting and stunting among toddlers aged 24-59 months in Wawatu Village, North Moramo District, South Konawe Regency, 2017[13].

Based on the description above, the researcher is interested to see "The Relationship of Mothers' Parenting and Stunting in Toddlers Age 12-36 Months in Bogor Regency, West Java Indonesia in 2019".

Method

The research design used in the study is a cross-sectional study using primary data taken in Tamansari District, Bogor Regency in 2012. Tamansari District has the highest stunting prevalence in Bogor Regency. The target population in this study are all toddlers under the age of 12-36 months in Bogor Regency in 2019, where based on data from the Public Health Sector of the Bogor District Health Office in 2019 there were 10,447 toddlers. The selected sample is the inclusion criteria of all toddlers aged 12-36 months, living with parents, has complete data according to the variables to be studied and has lived for one year in the area of 500 samples, while the exclusion criteria are toddlers with abnormalities or defects that can hinder the process of anthropometric measurement and mothers who refuse to be interviewed. In the research, 111 posyandu (integrated service post) were sampled using the probability proportional to size method.

Data collection was carried out on 02 to 18 July

2019 using questionnaires by recruiting enumerators of Nutritionist and Epidemiology Masters Students who were trained in advance. The data that has been collected is edited by checking the instrument that has been filled in, encoding the data, then entering the data into the data processing system, and cleaning up the data by checking the completeness and correctness of the data.

The dependent variable is stunting while the independent variable is mothers' parenting with mothers' education, income, URI, diarrhea, number of children, protein intake and calorie intake covariate. Stunting data was obtained by measuring the length of a toddler aged 12-24 using the Length Measuring Board (LMB) and the height of a toddler over 25-36 months using microtoise. The age data is obtained by reading the birth certificate or the child MCH book. Other data were obtained by filling in the questionnaire.

Data analysis was performed using the STATA 13 program. To determine stunting based on TB/U z-score value using WHO Anthro software, while categorizing data for Mothers' parenting variables the composite method was performed by scoring the questions from Mothers' parental variable from questionnaire, as well as for variables Other covariates are mothers' education, income, number of children, diarrheal disease, URI, protein intake and calorie intake. Analysis of the relationship between independent and dependent variables in this study was influenced by the prevalence ratio (PR) with a 95% confident interval (CI) using multivariate analysis of multivariate cox regression.

Results

Table 1. Frequency Distribution based on Research Characteristics in Bogor Regency, West Java Province in 2019

Variable	Frequency	Percentage
	n=500	%
Stunting		
Stunting	196	39.20
Normal	304	60.80
Mothers' Parenting		
Bad	277	55.40
Good	223	44.60
Mothers' Education		
Low (<12 years)	376	75.20
High (≥12 years)	124	24.80
Income		
<2 million	177	35.40
≥ 2 million	323	64.60
URI		
Yes	213	42.60
No	287	57.40
Diarrhea		
Yes	139	27.80
No	361	72.20

Cont... **Table 1. Frequency Distribution based on Research Characteristics in Bogor Regency, West Java Province in 2019**

Number of Children		
> 2 Children	111	22.20
≤ 2 Children	389	77.80
Protein Intake		
Poor	293	58.60
Satisfactory	207	41.40
Calorie Intake		
Poor	287	57.40
Satisfactory	213	42.60

Table 1 shows that toddlers in Taman Sari District of Bogor Regency in 2019 mostly had stunting problems which was 39.20%. The proportion of mothers' parenting to toddlers with poor parenting is 55.40%. Mothers with low education have a greater proportion of 75.20%. While income ≥ 2 million has a greater proportion of 64.60%. The proportion of those who do not have URI is 57.40%, while the proportion of those who do not diarrhea was 72.20%. For the number of children ≤ 2 people have a greater proportion of 77.80%. In poor protein intake has a greater proportion of 58.60%, while poor calorie intake has a greater proportion of 57.40%.

Table 2. Relationship of Mothers' Parenting and Stunting in Toddlers Age 12-36 Months in Bogor Regency, West Java Province in 2019

Mothers' Parenting	**Stunting Situation**				**Total**	**PR**	**95% CI**	**P-Value**
	Stunting		**Normal**					
	n=500	**%**	**n=500**	**%**				
Bad	128	46.21	149	53.79	277			
Good	68	30.49	155	69.51	223	1.96	1.35-2.83	0.0003
Total	196	39.20	304	60.80	500			

Table 2 shows the results of the analysis of the relationship between mothers' parenting with stunting obtained that there were 128 (46.21%) Mothers with poor parenting had stunted toddlers. While mothers with good parenting, there were 68 (30.49%) having stunted toddlers. Chi-Square test results obtained p = 0.0003, it can be concluded that there is a difference in the proportion of stunting between mothers who have poor parenting and mothers who have good parenting means that there is a significant relationship between parenting mothers with stunting in toddlers Aged 12- 36 months in Bogor Regency, West Java Province in 2019. From

the analysis results also obtained PR 1.96, meaning that mothers with poor parenting have a prevalence of stunted toddlers 1.96 times higher than mothers with good parenting.

Table 3. Full Multivariate Initial Model

Stunting Prevalence Factors	PR	95% CI	P-Value
Mothers' Parenting	1.40	1.03-1.90	0.030
Mothers' Education	1.47	1.00-2.17	0.050
Income	1.30	0.97-1.74	0.078
URI	1.27	0.95-1.71	0.097
DIARRHEA	1.22	0.90-1.66	0.188
Number of Children	1.35	0.98-1.85	0.062
Protein Intake	0.79	0.52-1.18	0.250
Calorie Intake	1.05	0.70-1.56	0.807

Table 3 shows the results of the selection of all variables produce p value <0.25, there are only two variables whose value> 0.25, namely the variable protein intake and calorie intake. However, the two variables are still analyzed by multivariate because substantially protein intake and calorie intake are very important variables related to stunting status in toddlers.

Table 4. Final Multivariate Model

Stunting Risk Factors	PR	95% CI	P-Value
Mothers' Parenting	1.47	1.09-1.97	0.010
Mothers' Education	1.63	1.12-2.39	0.011

Table 4 shows the results of the final multivariate model. Where there are no variables that are confounding variables. This is due to the difference in PR crude and PR adjust which is still <10%, but mothers' education is still included in the final model because in substance mothers' education is related to mothers' parenting. Cox regression test results obtained a PR value of 1.47 with 95% CI 1.09-1.97 meaning that mothers with poor parenting have a prevalence of stunted toddlers 1.47 times higher than mothers with good parenting after being controlled by the variable "Mothers' Education ".

Discussion

The results of this study indicate that mothers' parenting is one of the causes of stunting in toddlers aged 12-36 months in Bogor Regency in 2019 after being controlled by the mothers' education with a PR value of 1.47 (1.09-1.97). This is in line with research from Venny which shows that there is a significant relationship between mothers' parenting and stunting (p = 0.001)[13].

Parenting is one of the indirect factors related to the nutritional status of children one of which is stunting[14]. Mothers with good parenting will tend to have toddlers with optimal growth[13]. Mothers with good parenting patterns are also related to mothers' education level[10]. Mothers with low levels of education are more difficult

to receive information than Mothers with high levels of education, causing mothers' knowledge to be lacking which can make mothers' parenting bad. This can affect the nutritional intake of toddlers to be not optimal[14]. It also affects the emotional and social development of children so that it can cause stunting in toddlers. Whereas the main principle in a positive parenting pattern other than optimal nutritional status is that children must be treated with appreciation, free from acts of violence, love and affection, and provide a comfortable and friendly environment for children's growth and development[9].

Research from Irdawati and Dewati shows that there is a significant relationship between the level of knowledge and mothers' behavior in fulfilling nutritional needs and child health monitoring patterns[15], and Taufiqurrahman's research shows that there is a significant relationship between the level of mother's knowledge about nutrition and parenting behavior in toddlers[1]. Research from Judith and Stand in their study in Filipina concluded that mothers' education also affected the incidence of stunting[16][17]. In line with this, Semba et al showed that mothers' education was a determinant of stunting in Indonesia and Bangladesh[18] [17].

Conclusions

From the results of the analysis it can be concluded that the relationship between mother's parenting style and stunting status after being controlled by mothers' educational variables showed significant. Prevalence of stunting shows that nutritional problems in Indonesia are chronic problems that are directly related to factors, one of which is education and indirectly is mother's parenting. Therefore, the Health Office and the Local Health Services Unit need to make efforts to increase knowledge about positive parenting patterns for toddlers targeting pregnant women through routine socialization conducted with village midwives and posyandu (integrated service post) cadres. This effort is expected to be able to improve optimal parenting patterns in toddlers from before birth until the next life so they do not experience stunting.

Ethical Considerations: This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Indonesia University (Ket-560/UN2.F10/PPM.00.02/2019).

Competing Interests: The authors declared that no competing interests exist.

Acknowledgement: The authors would like to thank the Research and Community Development Center of Indonesia University of the financial support. We also thank the Bogor Regency government & Study Participants sharing the data.

Source of Funding: This publication fees was supported by Hibah Publikasi Internasional Terindeks Tugas Akhir (Hibah PITTA B) No: NKB-0600/UN2. R3.1/HKP.05.00/2019.

References

1. Taufiqurrahman M. Hubungan Tingkat Pengetahuan Ibu Tentang Gizi dengan Status Gizi Balita di Kecamatan Kalibagor Kabupaten Banyumas. Purwokerto: Universitas Jendral Soedirman; 2013.
2. Kementerian Kesehatan RI. Laporan Nasional RISKESDAS 2018. Jakarta: Badlibangkes; 2019.
3. World Health Organization. Nutrition Landscape Information System (NLIS) Country Profile indiCators. Geneva, Switzerland: WHO; 2010.
4. Tim Nasional Percepatan Penanggulangan Kemiskinan. Strategi Nasional Percepatan Pencegahan Anak Kerdil (Stunting) Periode 2018 - 2024. Jakarta: TNP2K; 2018.
5. Research IFP. The Global Nutrition Report. Washington DC: IFPRI; 2014.
6. Research IFP. The Global Nutrition Report. Washington DC: IFPRI; 2016.
7. Dinas Kesehatan Kabupaten Bogor. Profil Dinas Kesehatan Kabupaten Bogor. Bogor: Dinkes Bogor; 2018.
8. Kementerian Kesehatan RI. Buku Kesehatan Ibu dan Anak. Jakarta: Kemenkes RI dan JICA; 2016.
9. Kementerian Pendidikan dan Kebudayaan. Seri Pendidikan Orang Tua: Pengasuhan Positif. Jakarta: Kemendikbud; 2016.
10. Ni'mah C, Muniroh L. Hubungan Tingkat Pendidikan, Tingkat Pengetahuan dan Pola Asuh Ibu dengan Wasting dan Stunting Pada Balita Keluarga Miskin. 2015;84–90.
11. World Health Organization. 10 Facts On Nutrition. New York: World Health Organization; 2017.
12. Lubis R. Hubungan Pola Asuh Ibu dengan Ststus Gizi Anak Balita di Wilayah Kerja Puskesmas Panatai Cermis Kecamatan Tanjung Pura

Kabupaten Langkat. Sumatera Utara: Universitas Sumatera Utara; 2018.

13. Kullu VM, Yasnani, Lestari H. Faktor-faktor Yang Berhubungan dengan Kejadian Stunting Pada Balita Usia 24-59 Bulan Di Desa Wawatu Kecamatan Moramo Utara Kabupaten Konawe Selatan Tahun 2017. Kendari: Universitas Halu Oleo; 2018. 1–11 p.
14. Anugrahaeni HS, Kartasurya MI. Faktor Resiko Kejadian Stunting Pada Anak Usia 12-36 Bulan di Kecamatan Pati, Kabupaten Pati. Vol. 1. Semarang: Universitas Diponegoro; 2012.
15. Dewati A, Irdawati. Hubungan Antara Pengetahuan dengan Perilaku Ibu Dalam Pemenuhan Kebutuhan Nutrisi Anak Batita Malnutrisi di Posyandu Desa Sembungan Boyolali. Surakarta: Universitas Muhammadiyah Surakarta; 2010. 69–77 p.
16. Ricci JA, Becker S. Risk Factors For Wasting and Stunting Among Children In Metro Cebu, Philippines. 2018;(February):966–75.
17. Rosha BC, Hardiansyah, Baliwati YF. Analisis Determinan Stunting Anak 0-23 Bulan Pada Daerah Miskin Di Jawa Tengah Dan Jawa Timur. Vol. 35. Jakarta: Badlibangkes; 2012. 34–41 p.
18. Semba RD, Pee S De, Sun K, Sari M, Akhter N, Bloem MW. Eff ect of parental formal education on risk of child stunting in Indonesia and Bangladesh : a cross-sectional study. 2008;371:322–8.

Association of Immature Platelet Fraction and Trombopoietin Levels Based on the Grades of Sepsis Severity

Steven Tiro[1], Uleng Bahrun[1], Mansyur Arif[1]

[1]Department of Clinical Pathology, Faculty of Medicine, Hasanuddin University-Dr.Wahidin Sudirohusodo Hospital Makassar, Indonesia. Jl. Perintis Kemerdekaan Tamalanrea, Makassar, Telp. (0411)581226.
Corresponding author: Steven Tiro, Jl. Sumba no 34b, Makassar

Abstract

Sepsis is one of the major causes of morbidity and mortality around the world. Organ dysfunction in sepsis can be identified using *Sepsis-related Organ Failure Assessment*. The dysfunction of the coagulation cascade, the number of pro-inflammatory cytokines, and endothelial dysfunction promote the consumptive thrombocytopenia in sepsis patients, which triggers a compensatory response in the body by increasing thrombopoietin release. As a result, it increases platelet production which can be assessed by immature platelet fraction (IPF). This study is a preliminary research to see the relationship between IPF values and serum thrombopoietin (TPO) levels in terms of the clinical severity of patients with sepsis based on SOFA scores. A cross-sectional design was performed in this study with 49 samples of patients with sepsis, collected during June-July 2019, at Dr. Wahidin Sudirohusodo Hospital in Makassar. The study was conducted in August 2019. IPF values were measured by the fluorescent flow cytometry method. Meanwhile, serum thrombopoietin levels were calculated by the enzyme-linked immunosorbent assay (ELISA) method using human Thrombopoietin ELISA (RayBioTech, Australia). The results showed that the IPF value increased along with the SOFA score, followed by a decrease in platelet ($p = 0.014$). TPO levels presented an upward along with SOFA scores with a decrease in platelet ($p = 0.008$). There was a significant correlation between IPF values and TPO levels ($r = 0.606$, $p < 0.001$) where the Immature Platelet Fraction score and thrombopoietin levels increased with SOFA scores. In addition, there was also a positive correlation between IPF values and TPO levels in sepsis patients.

***Keywords**: Sepsis, SOFA score, immature platelet fraction, thrombopoietin, platelets*

Introduction

Sepsis is a systemic inflammation as a response of the body to infection, potentially leading to organ dysfunction or death. Sepsis is one of the major causes of morbidity and mortality around the world. In 2013, the World Health Organization (WHO) reported that the number of sepsis cases worldwide reached 30 million cases with mortality rates in developing countries at 60-80%. Subroto and Loehoeri (2003) stated that the incidence of sepsis in several referral hospitals in Indonesia was around 15-37.2% with a mortality rate of 37-80%.[1-4]

Disorders of hemostasis in sepsis are caused by several things: malfunctioning of the coagulation cascade, the number of pro-inflammatory and anti-inflammatory cytokines released by mononuclear cells and endothelial cells, thrombus formation in the advanced stages, and stimulation of plasminogen and antithrombin-III activation that cause fibrinolysis. As a result, it causes clot formation and bleeding associated with disseminated intravascular coagulation (DIC). Disseminated intravascular coagulation results in increased consumption of platelets, causing thrombocytopenia in patients with sepsis.[5,6]

Consumptive thrombocytopenia in sepsis triggers a compensatory response from the body. The liver increases thrombopoietin release, stimulating the production and differentiation of megakaryocytes in the bone marrow which increases platelet production. The increased platelet production promotes an increase in the number of immature platelets in the peripheral characterized by

high RNA in the cytoplasm of platelets.[7]

Immature platelet fraction (IPF) is a recent parameter that measures immature platelets in peripheral blood by staining RNA in the cytoplasm of immature platelets and measured through laser light. IPF examination is used to distinguish thrombocytopenia due to bone marrow failure from consumptive thrombocytopenia.[8]

Many studies of organ malfunction in sepsis are still being carried out especially in the failure of hematopoiesis. This study aims to analyze the correlation of IPF values and thrombopoietin levels with clinical severity based on SOFA scores in patients with sepsis.

Method

A cross-sectional study was performed to analyze the value of IPF and thrombopoietin levels in patients with sepsis at the Inpatient Installation of Dr. Wahidin Sudirohusodo General Hospital, Makassar. This research was conducted during June-July 2019. The samples in this study were the adult patients diagnosed with sepsis based on the clinical symptoms and examinations. Excluded criteria were those with incomplete laboratory data, hematological malignancies, bone marrow failure before the diagnosis of sepsis, and those with lysis/ lipemic that could not be re-sampled. All samples were examined for IPF values by using the Sysmex XN-1000 automatic hematological analysis device and for TPO levels by the ELISA (Enzyme Linked Immunosorbant Assay) method in the research unit of the medical faculty of Universitas Hasanuddin/Hasanuddin University Hospital. The study subjects were observed during inpatient at Wahidin Sudirohusodo General Hospital to investigate the patient outcomes.

The study subjects were divided into 3 groups based on the SOFA scores: group 1 with the score at 2-6, group 2 at 7-9, and group 3 at >9. The data were statistically analyzed using the *Kruskal-Wallis* Test to assess the differences in IPF values and TPO levels based on the SOFA scores. *Spearman* correlation test was performed to assess the correlation between IPF values and TPO levels. The results of the analysis were significant with a p value at <0.05.

Results

Table 1. The characteristics of the subjects of the study

Variables	n (%)	Median (Min-Max)
Age (years)		57 (24-80)
Genders (n=49)		
Men	24 (48,9)	
Women	25 (51,1)	
SOFA Scores (n=49)		
Group I (2-6)	33 (67,3)	
Group II (7-9)	11 (22,5)	
Group III (>9)	5 (10,2)	
PLT (103/mm3)		158 (8-501)
IPF (%)		6,6 (0,6 – 23,5)
TPO (pg/mL)		792,9 (447,1-4839,5)
Mortality (n=47)	31 (66)	
Group I	21 (67)	
Group II	7 (64)	
Group III	3 (60)	

*Source: Primary data

49 subjects met the inclusion and exclusion criteria with a median of age at 57 years old. There was no difference in the category of gender. 33 subjects had SOFA scores at 2-6, while 11 subjects were at 7-9, and 5 of them were at >9. The median of platelet rates from all samples was 158,000/mm3 with the lowest platelet rates of 8,000/mm3 and the highest platelet rates of 501,000/ mm3. The median of IPF values was 6.6% with the lowest IPF value of 0.6% and the highest of 23.5%. The median of TPO levels in the study subjects was 792.9 pg/mL with the lowest levels of 447.1 pg/mL and the highest levels of 4893.5 pg/mL.

2 out of 49 patients requested termination of care at the request of the family. The number of deaths in the study population was 31 of 47 patients (66%). The mortality rate for the three groups reached more than 60%.

Table 2. The comparison of IPF rates based on the SOFA scores

Groups	SOFA scores	IPF (%)	PLT (103 /mm3)	p*
I	2-6	6,8±4,8	205,55±115,37	
II	7-9	8,3±5,7	130,09±112,39	0,014
III	>9	13,9±2,8	34,20±11,21	

Source: Primary data

* *Kruskal-Wallis* test

Table 2 shows the IPF rates in the three groups of study subjects based on SOFA scores. The Kruskal-Wallis test indicated that there were significant differences (p = 0.014) of the mean of IPF values in the three groups of the research subjects. The mean of IPF values increased along with SOFA scores, while the platelet rates decreased with an upward in SOFA scores. The increase in IPF value was inversely proportional to the platelet rates; the lower the platelet rates, the higher the mean IPF value. The results indicated a significant association of increased SOFA score with platelet rates and IPF values. The difference in IPF values based on SOFA scores is shown in Figure 1.

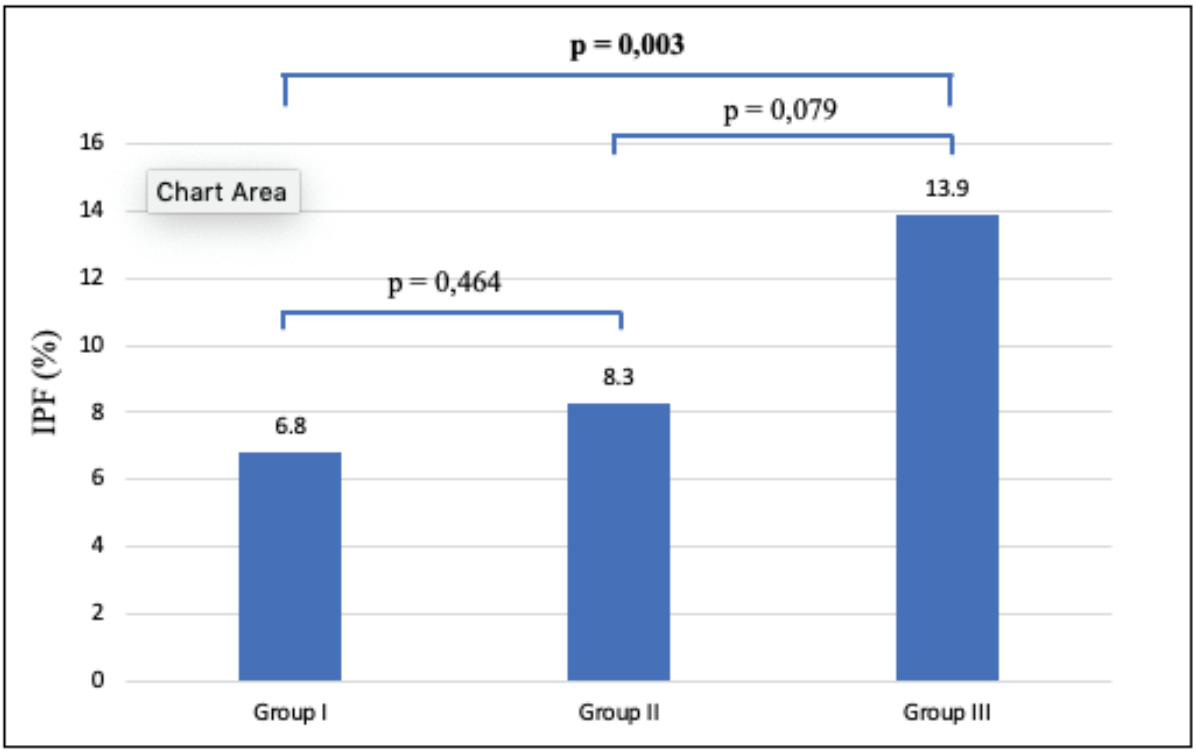


Figure 1. The comparison of IPF rates based on the groups of SOFA scores

On the post hoc test, the IPF value was significantly different between group I (mean IPF value = 6.8 ± 4.8%) and group III (mean IPF value = 13.9 ± 2.8%) with a value of p = 0.003. Meanwhile, IPF values between groups I and II and between groups II and III did not show significant differences (p = 0.464 and p = 0.079).

Table 3. The comparison of TPO levels based on the SOFA scores

Groups	SOFA scores	TPO (pg/mL)	PLT (10^3 /mm^3)	p*
I	2-6	976,4±804,1	205,55±115,37	
II	7-9	1166,1±494,8	130,09±112,39	0,008
III	>9	1638,3±94,7	34,20±11,21	

Source: Primary data

* *Kruskal-Wallis* test

Table 3 presents the levels of TPO in the three groups of study subjects based on SOFA scores. The *Kruskal-Wallis* test indicated that there were significant differences (p = 0.008) of the average TPO levels in the three groups of study subjects. The mean of TPO levels rose along with SOFA scores. The increase of TPO levels was inversely proportional to the platelet rate; the lower the platelet rate, the higher the mean of TPO levels. These results indicated an association of increased SOFA scores with platelet rate and TPO levels. The difference in TPO levels based on SOFA scores is shown in Figure 2.

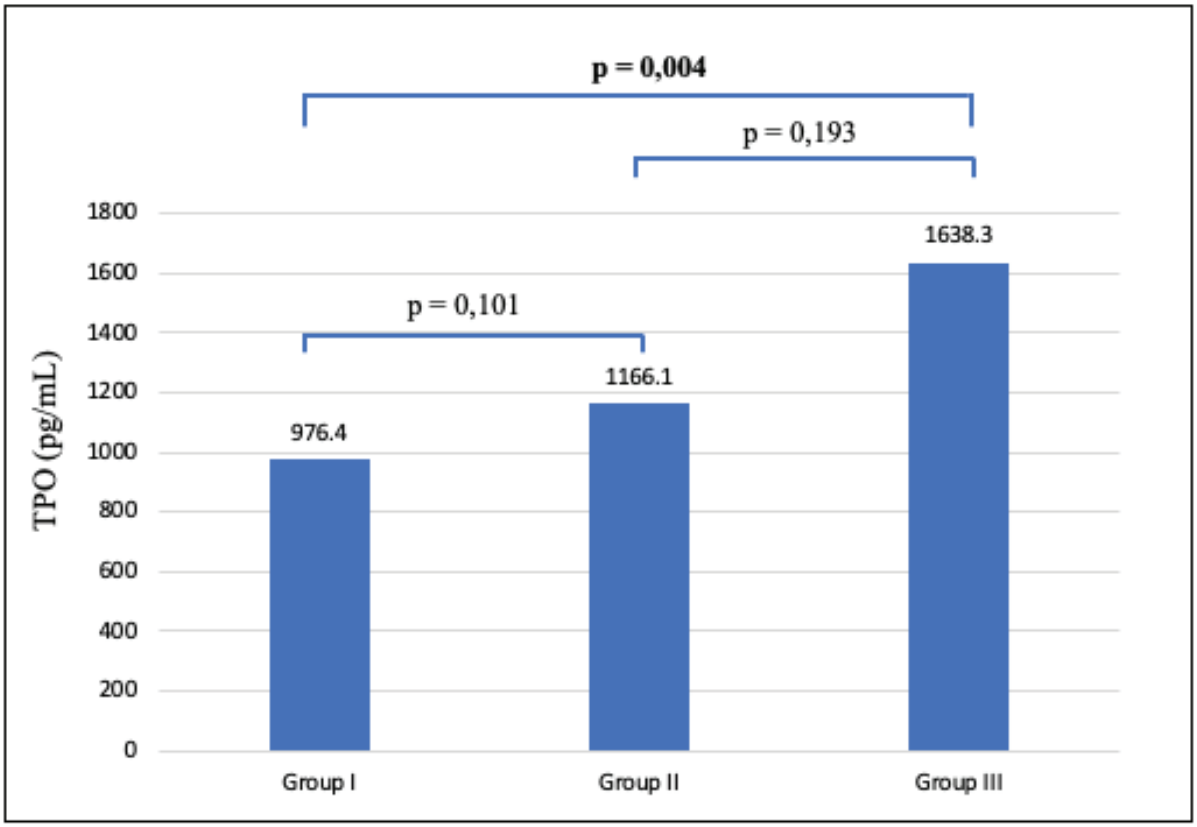


Figure 2. The comparison of TPO levels based on SOFA scores

Post hoc test showed that TPO levels were significantly different between group I (mean TPO level = 976.4 ± 804.1 pg/mL) and group III (mean TPO level = 1638.3 ± 94.7 pg/mL) with a p value = 0.004. Meanwhile, TPO levels between groups I and II and TPO levels between groups II and III did not show significant differences (p = 0.101 and p = 0.193).

Table 4. The correlation of IPF rates and TPO levels

	IPF		
	n	r	p*
TPO	49	0,606	<0,001

Source : Primary data

* Spearman Test

Measurement of correlation with IPF values and TPO levels showed a significant association. Spearman correlation test results indicated a strong positive correlation between IPF values and TPO levels (r = 0.606, p <0.001); the higher the TPO level, the higher the IPF value. The correlations of IPF values and TPO levels are shown in Table 4.

Discussion

This study showed that there was no significant difference between men (48.9%) and women (51.1%) with an average age of 54.9 years old. In 2005, an epidemiological study reported that sepsis was more frequently found in men than women with a relative risk of 1.28 in men. This difference may be caused by abnormalities of comorbid conditions in the study subjects and different lifestyles according to demographic conditions. Some comorbid conditions and lifestyle are related to sepsis in the form of immune status, heart disease, and alcohol intake.[9]

The mean of the IPF values increased with increasing SOFA scores. The mean of group I IPF was 6.8 ± 4.8%, while group II was 8.3 ± 5.7%, and group III was 13.9 ± 2.8%. The *Kruskal-Wallis* test showed that there were significant differences in the mean for the IPF of the three groups. Platelet rates are low with increasing SOFA scores. Both of these results provide a description of the condition of thrombopoiesis in the state of sepsis. Endothelial dysfunction which promotes a decrease in platelet count causes a compensatory mechanism in the body to increase thrombopoiesis characterized by an increase in IPF value. A research by Hubert et al (2015) reported the same thing as an increase in IPF values and decreased platelet rates in patients with sepsis shock compared with severe sepsis and sepsis without complications.[9]

Post hoc test showed significant differences in IPF values between group I with SOFA score 2-6 (mean IPF value = 6.8 ± 4.8%) and group III with SOFA score 9-15 (mean IPF value = 13.9 ± 2.8%). Meanwhile, the mean of group I IPF value is higher than group II, and the mean of group II IPF value is higher than group III, but there was no significant difference. These results differ from studies by Hubert et al who reported an increase in IPF values in study subjects with higher SOFA scores (SOFA ≥ 6) compared to study subjects with lower SOFA scores (SOFA <6). This difference may be due to differences in the assessment of SOFA scores and IPF scores. The assessment of SOFA scores and IPF scores in the study by Hubert et al was performed 24 hours after the subjects received intensive care while in this study the assessment of SOFA scores and IPF values was obtained when the patient was diagnosed with sepsis.[9]

The highest IPF value in this study was 23.5% in patients with congestive heart failure with complications of pulmonary edema. TPO levels in these patients were 2,291 pg / mL, platelet rates at 100,000 / mm3, and SOFA scores at 6. Despite the highest IPF values compared to other patients, TPO levels and SOFA scores in these patients were not the highest in the study sample. This might occur because thrombopoiesis was influenced by several other cytokines that were not examined in this study such as IL-3, IL-6 and IL-11.[10]

The mean of TPO levels increased along with SOFA scores and was inversely proportional to platelet rates. The mean of TPO levels in group I was 976.4 ± 804.1 pg / mL, while group II was 1166.1 ± 494.8 pg / mL, and group III was 1638.3 ± 94.7 pg / mL. The Kruskal-Wallis test showed that there were significant differences (p = 0.008) of the average TPO levels in the three groups of study subjects. This is in line with previous research by Zakynthinos et al (2004) and Segre et al (2014) who reported elevated TPO levels in sepsis shock compared with severe or uncomplicated sepsis.

Research comparing TPO levels based on SOFA scores has never been conducted.[11,12]

In line with the post hoc IPF test, differences in TPO levels were only found to be significant between group I and SOFA scores at 2-6 (the mean of TPO levels = 976.4 ± 804.1 pg / mL), and group III with SOFA scores of 9 -15 (mean TPO level = 1638.3 ± 94.7 pg / mL). There were no significant differences in TPO levels between groups I and II and between groups II and 3, but IPF values and TPO levels increased along with the SOFA score.

The correlation test results between IPF values and TPO levels in adult sepsis patients showed a positive correlation between IPF values and TPO levels (r = 0.606, p = 000). The condition of consumptive thrombocytopenia in sepsis caused the response from the body to compensate by increasing thrombopoiesis by increasing TPO production (Hitchcock IS & Kaushansky K, 2014; Larkin CM et al., 2016). The increase in TPO production promoted an increase in immature platelets in circulation with the elevation in IPF value. Significant correlation between IPF value and TPO level showed that there was no bone marrow failure in the process of thrombopoiesis in the state of sepsis.[13,14]

This research has several limitations: the lack of subjects in the study in patients with higher SOFA scores (group III) which could affect the mean of IPF values and TPO levels in this group, the assessments of IPF and TPO levels which were only performed at the beginning of diagnosis without a description of the function of thrombopoiesis in the bone marrow throughout the course of sepsis, and the absence of therapeutic analysis in research subjects that might affect the value of IPF and TPO levels.

Conclution and Suggestion

This study concludes that the value of Immature Platelet Fraction and thrombopoietin levels increases along with the SOFA scores. In addition, there is a positive correlation between the value of Immature Platelet Fraction and thrombopoietin levels in patients with sepsis. Further research is needed with better distributed research subjects in each group regarding the grades of sepsis, followed by analyses of the therapy and examinations towards the value of serial IPF and TPO following the course of sepsis.

Ethical Clearance- Taken from Health Research Ethics Commission, Medical Faculty, Hasanuddin University – RSPTN UH – RSUP Dr. Wahidin Sudirohusodo Makassar

Source of Funding- Self

Conflict of Intereset- Nil

References

1. Caserta S, Kern F, Cohen J, Drage S, Newbury SF, Llewelyn MJ. Circulating plasma microRNAs can differentiate human sepsis and systemic inflammatory response syndrome (SIRS). Scientific reports. 2016 Jun 20;6:28006.
2. Wulandari A, Martuti S, Kaswadi P. Perkembangan diagnosis sepsis pada anak. Sari Pediatri. 2018 Mar 1;19(4):237-44..
3. Subroto YW, Loehoeri S. Profil pasien yang didiagnosis dengan sepsis di bangsal penyakit dalam RS Dr. Sardjito tahun 2002. Berkala Ilmu Kedokteran. 2003;35:4.
4. Berkestedt I, Herwald H, Ljunggren L, Nelson A, Bodelsson M. Elevated plasma levels of antimicrobial polypeptides in patients with severe sepsis. Journal of innate immunity. 2010;2(5):478-82.
5. Guclu E, Durmaz Y, Karabay O. Effect of severe sepsis on platelet count and their indices. African Health Sciences. 2013;13(2):333-8.
6. Cilliers H, Whitehouse T, Tunnicliffe B. Serious complications of sepsis. ABC of Sepsis. 2009 Nov 11:15.
7. Hubert RM, Rodrigues MV, Andreguetto BD, Santos TM, Gilberti MD, De Castro V, Annichino-Bizzacchi JM, Dragosavac D, Carvalho-Filho MA, De Paula EV. Association of the immature platelet fraction with sepsis diagnosis and severity. Scientific reports. 2015 Jan 26;5:8019.
8. Bhat R, Pai S. Immature Platelet Fraction: A Platelet Parameter With Significant Clinical Utility. American Journal of Clinical Pathology. 2015 Oct 1;144(suppl_2):A142-52.
9. Moss M. Epidemiology of sepsis: race, sex, and chronic alcohol abuse. Clinical infectious diseases. 2005 Nov 15;41(Supplement_7):S490-7.
10. Park SH, Ha SO, Cho YU, Park CJ, Jang S, Hong SB. Immature platelet fraction in septic patients:

clinical relevance of immature platelet fraction is limited to the sensitive and accurate discrimination of septic patients from non-septic patients, not to the discrimination of sepsis severity. Annals of laboratory medicine. 2016 Jan 1;36(1):1-8.

11. Zakynthinos SG, Papanikolaou S, Theodoridis T, Zakynthinos EG, Christopoulou-Kokkinou V, Katsaris G, Mavrommatis AC. Sepsis severity is the major determinant of circulating thrombopoietin levels in septic patients. Critical care medicine. 2004 Apr 1;32(4):1004-10.
12. Segre E, Pigozzi L, Lison D, Pivetta E, Bosco O, Vizio B, Suppo U, Turvani F, Morello F, Battista S, Moiraghi C. May thrombopoietin be a useful marker of sepsis severity assessment in patients with SIRS entering the emergency department?. Clinical Chemistry and Laboratory Medicine (CCLM). 2014 Oct 1;52(10):1479-83.
13. Hitchcock IS, Kaushansky K. Thrombopoietin from beginning to end. British journal of haematology. 2014 Apr;165(2):259-68.
14. Larkin CM, Santos-Martinez MJ, Ryan T, Radomski MW. Sepsis-associated thrombocytopenia. Thrombosis research. 2016 May 1;141:11-6.

The Management of Oral Mucositis, Angular Cheilitis and Acute Pseudomembranous Candidiasis Induced by Radiotherapy and Chemotherapy Treatment of Nasopharyngeal Cancer Patient

Supriatno[1], Fauzi Adityawan Pritama[2], Sartari Entin Yuletnawati[3]

[1]Associated Professor at Department of Oral Medicine, Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia, [2]Student of Faculty of Dentistry, Muhammadiyah University of Surakarta, Indonesia, [3]Lecturer at Faculty of Dentistry, Muhammadiyah University of Surakarta, Indonesia

Abstract

Radio-chemotherapy of the head and neck area can cause mucositis in cases of nasopharyngeal cancer that is felt as swallowing pain, dry mouth and loss of taste. This condition is often exacerbated by the onset of candidiasis on the oral mucosa. The aim of the case report was to inform the side effects of chemotherapy and radiotherapy treatments in nasopharyngeal cancer patients that occur in the oral cavity include angular cheilitis, acute pseudomembranous candidiasis and oral mucositis type 1 and their management. Case report, a 69 year old-man, came to the dental clinic of the Sardjito hospital with complaints of pain to swallow food, and his mouth had many white spots. Complaints were felt one week after the 3rd chemotherapy and 9th radiotherapy. The patient was diagnosed with nasopharyngeal cancer (NPC) with T2N3M0 classification. Clinical examination showed the presence of a white layer on the mucosa of the tongue, cheeks, palate and lip mucosa. The entire oral mucosa was dark red, and angular cheilitis on both corners of the lips was found. Treatment of this case by eliminating the necrotic tissue and debris by 3% hydrogen peroxide solution mouth rinse and administration of drugs, including candystin droops and betadine mouth rinse for 1 week. The patient can swallow and eat a little hard without any more pain after 1 week treatment. Clinical examination found that the white spots on the tongue, palate, cheeks and lips were gone. The color of the oral mucosa appeared the same as the surrounding tissue. The oral hygiene and general conditions were good. In conclusion, oral mucositis and acute pseudomembranous candidiasis due to chemo-radiotherapy treatment in nasopharyngeal cancer patient were disappearing, and the oral condition has improved. Patients can chew and swallow food without any pain.

Keywords*: nasopharyngeal cancer, oral mucositis type 1, candidiasis, angular cheilitis, chemotherapy, radiotherapy*

Introduction

Radiotherapy and chemotherapy in the head and neck area in case of nasopharyngeal cancer involves a large portion of the oral mucosa and the parotid gland. As a result, there will be side effects on the oral mucosa in the form of radiation mucositis in acute circumstances that the patient feels as swallowing pain, dry mouth (hyposalivation) and loss of taste. This condition is often exacerbated by the emergence of candidiasis infections in the mucosa of the tongue, cheeks and palate.[1] Oral mucositis can affect a patient's quality of life, increase the risk of infection, and cause failure of cancer treatment itself. The incidence of oral mucositis is estimated at 40% in patients receiving chemotherapy, 70% -90% in patients undergoing blood transplants and bone marrow stem cells, and 80 -100% in patients undergoing radiotherapy involving the oropharynx

Corresponding Author:
Dr. Supriatno., DDS.,
M.Health., MDSc., Ph.D
Department of Oral Medicine, Faculty of Dentistry,
Universitas Gadjah Mada, Yogyakarta, 55281
Tel & Fax: +62-0274-515307
E-mail: supriatno_fkg@ugm.ac.id

region.[2] Mukositis is an ulceration and pain-causing inflammation in the mucous membrane layer caused by the effects of cancer treatment using chemotherapy and radiotherapy.[3] It was reported that 100% oral mucositis occurs in patients receiving high-dose chemotherapy and hematopoietic stem cell transplantation, while 80% occur in cancer of the head receiving radiotherapy.[4] Diagnosis of oral mucositis is based on symptoms that arise in oral tissue due to chemotherapy, spinal cord transplantation or radiotherapy. Ulceration with the appearance of red burn-like sores in the mouth is sufficient to diagnose oral mucositis.[5]

Oral candidiasis is a fungal infection that often occurs together with oral mucositis on radiotherapy treatments. Oral candidiasis is caused by Candida albicans species which can be acute or subacute, the infection is seen as a white layer on the mucosa of the cheeks, tongue, lips and palate. If the layer is lifted, the mucosa will bleed, the mouth feels dry and burning, and the taste sensitivity on the tongue decreased.[6]

In the present case, the side effects of chemotherapy and radiotherapy treatments in nasopharyngeal cancer patients that occur in the oral cavity in the form of acute pseudomembranous candidiasis (thrush), angular cheilitis and oral mucositis and their management were informed.

Case Report

A 69 year old man came to the Dental clinic in the reference from the Internal Medicine Department, Dr. Sardjito Hospital. He was complaint of pain to swallow food, and his mouth had many white spots. Complaints were felt one week ago with the mouth feeling dry and difficult to swallow food, so patients rarely consumed food. A few days later, white patches appeared on the edge of the tongue and other mouth areas (Figure 1).

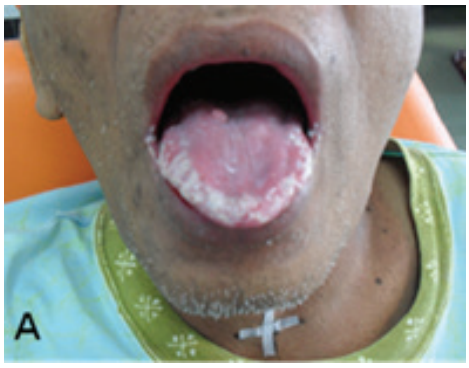


Figure 1. The oral condition of the patient at the first visit

Medical history showed the patient had nasopharyngeal cancer (NPC) with T2N3M0 classification or grade 3. The patient had received the 3rd chemotherapy treatment using carboplatin 100 mg in a 500 cc 0.9% NaCl solution in 90 minutes, and the 9th radiotherapy. During the treatment at the Internal medicine department, the patient received vomceran injection 8 mg/24 hours intravenous (i.v) and dexamethasone injection 2 ampules / 24 hours i.v. Past dental history, the patient had ever extracted and filled teeth in Dr. Sardjito hospital, 4 years ago. Clinical examination found a white layer on the lateral right and left tongue, posterior dorsum of the tongue, right and left cheek mucosa, hard and soft palate, and mucosa of the upper and lower lips. Gingivitis appeared at all oral regions, oral mucosa was dark red, and cheilitis angular at both corners of the lips (Figure 2).

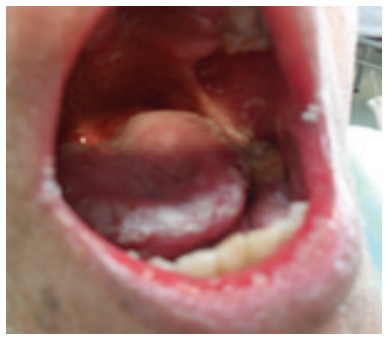


Figure 2. Patients with acute candidiasis pseudomembran, mucositis and angular cheilitis

Based on clinical examination and oral mucositis classification according to WHO,[5] patient was diagnosed with degree 1 radiation mucositis. Examination of vital signs showed blood pressure 130/80 mmHg, pulses 84 times/minute, respiration 20 times/minute, temperature 38.5^0C, and general condition: thin and weak.

Treatment was done by removing the necrotic tissue and debris using mouth rinse of 3% hydrogen peroxide solution for 1 minute 3 times a day. Medication consisted of candystin droops and betadine gargle for 1 week. Control patient at 1st visit, he can swallow and eat a little hard food, including meat, soft vegetables and side dishes that were not fried without any pain. Objective examination found a white layer on the tongue, palate, cheeks and lips had disappeared. Mild gingivitis at the anterior lower area still exists. Furthermore, the oral hygiene and general conditions were good. The color of the oral mucosa was the same as the surrounding tissue (Figure 3). Vital signs at 1st control revealed the blood pressure 120/60 mmHg, pulse 80 times/min,

respiration 20 times/min, and afebrile. Suggestions for patient included maintaining oral hygiene, continuing mouthwash, cleaning tartar and calculus, and finally making dental prostheses.

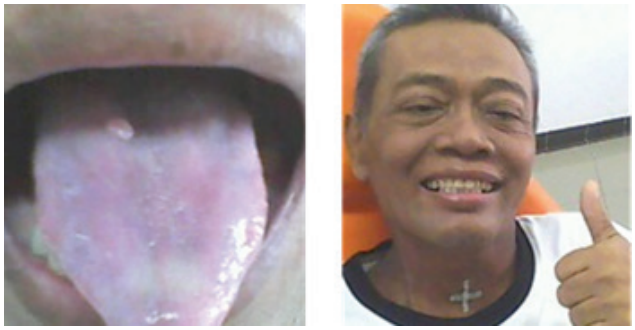


Figure 3. The oral mucositis and acute pseudomembranous candidiasis have healed, the patient did not feel pain and can swallow solid food. Finally, the patient looks happy.

Discussion

Treatment of the head and neck cancer includes nasopharyngeal cancer has a variety of problems that require careful handling by considering many factors that will affect the final outcome of treatment. Patients with smoking habits or heavy alcohol drinkers have a tendency to fail in radiation therapy followed by the lower tolerance of mucosal tissue to radiation.[7] Head and neck cancers have a type of histological anaplastic carcinoma that is sensitive to radiation. Other types such as squamous carcinoma and transitional carcinoma have lower levels of radiation sensitivity compared to anaplastic carcinoma. Nasopharyngeal cancer has the property of rapid propagation through the lymph channels to the neck lymph nodes and infiltratively to the skull base which can result in paralysis of some cranial nerves, especially the optic nerve.[8] It was reported that based on the radiation field area and radiation dose given to the neck region, the parotid gland can be ensured to have a disorder that causes hyposalivation and radiation mucositis.[7]

In this case, nasopharyngeal cancer patients had a T2N3M0 classification with complaints of pain when ingesting food. The oral mucosa was covered with fungi and angular cheilitis on both corners of the lips. Patients consumed less food so that the patient's body weight drops dramatically. This complaint was felt after receiving the 9th radiation therapy and 3rd chemotherapy. Moreover, the patient had undergone radiation mucositis with symptoms as described above,[1] namely pain due to dry mouth (xerostomia), the entire mucosa experiences erythematous, and loss of taste. According to WHO classification,[5] patient suffered from grade 1 oral mucositis, with the criteria that there was widespread erythema, and the patient cannot swallow solid food. These symptoms are compounded by the onset of candidiasis in the mucosa of the tongue, cheeks and palate. Interestingly, the patient's oral mucosa had experienced increased sensitivity due to radiation therapy in the nasopharyngeal irradiation. It was proven that radiotherapy was effective and successful because tissue sensitivity increased after chemotherapy.[1]

Oral mucositis is one of the most complications of chemotherapy and radiotherapy treatments. This result was produced from the cytotoxic effects of chemotherapy materials and the local effects of radiation on the oral mucosa. Oral mucositis is an oral mucosal inflammation with reddish-colored mucosal symptoms to severe ulceration. The mucositis symptoms are vary from pain to discomfort to the taste and mastication of food. Severe oral mucositis can cause treatment to be longer so that the secondary infection is easy to arise.[4] Patients who have the risk of developing oral mucositis need to get good and correct oral care with the aim of maintaining oral hygiene and preventing opportunistic infections through damage to the oral mucosa. Pull-out and treatment of dental caries must be done before radiation therapy, as well as education about the importance of oral hygiene and dental health.

Oral candidiasis is established based on clinical features supported by laboratory examination.[9] White patches that can be removed with the basis of erythema on the tongue, cheeks, palate and buccal mucosa show a picture of acute pseudomembranous candidiasis, while cracked lip angles describe angular cheilitis. It was reported that the most common infection in patients undergoing head and neck radiotherapy was candidiasis, and the most frequently involved candida species were Candida albican which is an opportunistic infectious agent.[10] Patients with decreased oral mucosal damage and immunity due to radiotherapy tend to occur opportunistic infection in his oral cavity. In this case, various factors that can increase susceptibility to oral candidiasis were decreased salivary production, changes in mucosal epithelium, nutritional deficiencies, and poor oral health.[11] Saliva is important in maintaining normal oral microflora. Saliva dilutes pathogenic antigens and mechanically cleanses the mucosa. Salivary antibodies (sIgA) and nonspecific antimicrobial factors are

important to reduce fungal attachment and colonization, therefore decreased salivary flow due to radiotherapy spurs candida infection in this patient. Radiation to the head-neck region can change the speed of normal epithelial replacement, causing a direct cytotoxic effect that can change the integrity of oral epithelium and promote secondary infection. Nutritional deficiencies can cause a decrease in body resistance and loss of cell integrity, which will facilitate candida invasion and infections.[2] Poor oral hygiene helps a conductive environment in increasing colonization and attachment of candida. It has been reported that oral mucositis can be aggravated by candidiasis because the infection aggravates mucosal epithelial damage.[12]

Treatment of oral mucositis, angular cheilitis and acute candidiasis as a side effect of irradiation in nasopharyngeal cancer patient was by removing necrotic tissue and debris by 3% hydrogen peroxide solution mouth rinse, and giving medication of candystin droops and betadine gargle for 1 week. Perhydrol (hydrogen peroxide) 3% solution is a strong oxidizer, used as a disinfectant, antiseptic, and includes bacterial agents that have generally recognized as safe (GRAS).[13] Nystatin is an antifungal drug that is effective and sensitive to candida infections, and safer if given orally like topical administration because of its minimal absorption through mucocutaneous membranes. The mechanism action of nystatin is by binding to ergosterol, a major component of the fungi cell membrane. Nystatin can cause membrane leakage of fungal cells which results in the release of K + ions and the death of these fungi cells.[14] Betadine gargel is a mouthwash containing 1% povidone iodine, one of the strongest antiseptics in the oral cavity. Betadine also has an antiviral and antibacterial effect that is widely used for inflammation of the oral cavity. Betadine can overcome throat and mouth problems such as itching, sore throat, phlegmon, tonsillitis, hoarseness, canker sores to bad breath.[15]

Based on the treatment that had been given it was known that patients can already swallow and eat a little hard food including meat, soft vegetables and side dishes that were not fried, without any complaints of pain. White spots on the tongue, palate, cheeks and lips were gone, angular cheilitis had disappeared, although mild gingivitis in the lower anterior area still exists. Interestingly, the general condition of the patient was good and he can eat a lot.

In conclusion, acute pseudomembranous candidiasis and oral mucositis type 1 as a result of combination of chemotherapy and radiotherapy treatments in nasopharyngeal cancer patients had disappeared and oral conditions had improved. Current clinical management of oral mucositis and acute candidiasis is largely focused on palliative measures such as pain management, nutritional support and maintenance of good oral hygiene. However, several promising therapeutic agents are in various stages of clinical development for the management of oral mucositis and acute candidiasis. In this case, the results of treatment given to patient was in accordance with the expectations of the operator.

Source of Funding: This work was supported by Grant from the Ministry of Research and Technology of Higher education, Republic of Indonesia, through BPP-UGM T.A 2018.

Conflict of Interest: The author declares no conflict of interest.

Ethical Clearance: All the clinical treatment procedure has been ethically approved by the Ethical Committee of Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia.

References

1. Susworo R. Nasopharyngeal cancer, epidemiology and current treatment. The world mirror med 2004; 144: 16-19.
2. Sufiawati I. Identification and control of oral mucositis risk factors during radiotherapy of nasopharyngeal cancer. Padjadjaran University Tesis, Bandung, 2008.
3. Ridge JA, Glisson BS, Lango MN: Head and Neck Tumors in Pazdur R, Wagman LD, Camphausen KA, Hoskins WJ (Eds) Cancer Management: A Multidisciplinary Approach. 11 ed. 2008. P. 254-78.
4. Rubenstein EB: Clinical practice guidelines for the prevention and treatment of cancer therapy-induced oral and gastrointestinal mucositis. Cancer 2004; 100 (9 Suppl):2026-2046.
5. Sonis ST, Eilers JP, & Epstein JB: Validation of a new scoring system for the assessment of clinical trial research of oral mucositis induced by radiation or chemotherapy. Mucositis Study Group. Cancer 1999; 85:2103-2113.

6. Patussi C, Sassi LM, Munhoz EC, Zanicotti RT, Schussel JL.Clinical assessment of oral mucositis and candidiasis compare to chemotherapic nadir in transplanted patients. Braz Oral Res. 2014; 28:1-7.
7. Djakaria M.Radiotherapy in several types of head and neck cancers. In Head and Neck Tumors, Diagnosis and therapy. FK UI press, 1993, Jakarta.
8. Marcial VA, Gelber R, Kramer S, Snow JB, Davis IW, & Vallecillo IA: Does preoperative irradiation increase the rate of surgical complications in carcinoma of the head and neck?. Cancer 1982; 49:1297-1302.
9. Rubenstein EB: Clinical practice guidelines for the prevention and treatment of cancer therapy-induced oral and gastrointestinal mucositis. Cancer 2004; 100 (9 Suppl):2026-46.
10. Cawley MM, Benson LM: Current Trends in Managing Oral Mucositis. Clin J Oncol Nurs 2005; 9(5):584-592.
11. Supriatno. Biocompatible inhibition of Alpinia galangal rhizome extract of rubra varieties on the growth of Candida albicans. Postgraduate Thesis Program, Airlangga University, Surabaya. 1998.
12. Ridge JA, Glisson BS, Lango MN: Head and Neck Tumors in Pazdur R, Wagman LD, Camphausen KA, Hoskins WJ (Eds). Cancers Management: A Multidisciplinary Approach. 11 ed. 2008. P. 254-78.
13. Jones CW & Clark JH: Applications of Hydrogen Peroxide and Derivatives. Royal Soc Chem, 1999.
14. Akaike N, Harata N: Nystatin perforated patch recording and its applications to analyses of intracellular mechanisms. Jpn J Physiol 1994; 44 (5): 433–73.
15. Mangano A, Albertin A, La Colla L: Povidone-iodine versus chlorhexidine in skin antisepsis before elective plastic surgery procedures: a randomized controlled trial. is statistical correctness always pursued ?. Plast Reconstr Surg. 2009; 124(3): 1014.

Correlation of *Bla*$_{shv}$ And *Bla*$_{tem}$ Genes in Extended-Spectrum Beta-Lactamase (Esbl) - Producing *Acinetobacter Baumannii* With Patient's Outcome at Dr. Wahidin Sudirohusodo Hospital, Makassar

Tenri Esa[1], Nursin Abd Kadir[1], Rahmawati[1]

[1]Department of Clinical Pathology, Faculty of Medicine, Hasanuddin University-Dr.Wahidin Sudirohusodo Hospital Makassar, Indonesia. Jl. Perintis Kemerdekaan Tamalanrea, Makassar

Abstract

Acinetobacter baumannii causes the high morbidity and mortality. *Acinetobacter baumannii* has ESBL enzyme that makes it resistant to the mostly beta-lactam antibiotics. Some ESBL – coding genes are *bla*$_{SHV}$ and *bla*$_{TEM}$. The purpose of this study was to evaluate correlation *bla*$_{SHV}$ and *bla*$_{TEM}$ genes in Extended-Spectrum Beta-Lactamase (ESBL) - producing *Acinetobacter baumannii* with outcome (length of stay and death) at Dr. Wahidin Sudirohusodo Hospital, Makassar. The study used cross-sectional method conducted on *Acinetobacter baumannii* isolates and medical record at Dr. Wahidin Sudirohusodo, Makassar. ESBL was detected with automated culture, *bla*$_{SHV}$ and *bla*$_{TEM}$ genes was detected with PCR. Statistical analysis used Chi Square, Fisher Exact, Independent-t and Pearson's Correlation tests. Significance of test if $p<0.05$. Research of 57 *Acinetobacter baumannii* isolates, ESBL was found in 20 isolates (35%). Average length of stay (LOS) in positive ESBL (26.3 days) was significantly longer than in negative ESBL (16,5 days)(p = 0,016). Mortality rate was higher in positive ESBL (55%) than negative ESBL (35,1%), but statistically not significant ($p = 0.147$). The *bla*$_{TEM}$ gene found in 53 isolates (93%) and there was no isolate bringing *bla*$_{SHV}$ gene. In positive ESBL, average length of stays (LOS) in positive *bla*$_{TEM}$ was 25.4 days while in negative *bla*$_{TEM}$ was 42 days; Mortality rate was higher in positive *bla*$_{TEM}$ compared to negative *bla*$_{TEM}$ (57.9%, 0.0%, consecutively), but statistically not significant ($p>0.05$). It was concluded that *bla*$_{TEM}$ gene was found 93% and *bla*$_{SHV}$ was not found. The LOS in positive ESBL was significantly longer.

***Keywords**: Acinetobacter baumannii, ESBL, bla$_{SHV}$, bla$_{TEM}$, Outcome*

Introduction

Acinetobacter baumannii is an opportunistic bacterial pathogen primarily associated with a high morbidity and mortality.[1,2] It is an important agent of nosocomial infections worldwide, such as urinary tract infections, septicemia, pneumonia, burns, meningitis, and wound infections in hospitals.[3-5] *Acinetobacter baumannii* infection causes duration of stay in hospital becomes longer, increases burden of cost and difficult to treat.[6] *World Health Organization* (WHO) had published list of bacterias that needed urgently new antibiotics in 2017 and placed *Acinetobacter baumannii* in the first row critical priority group. National Nosocomial Infections Surveillance (NNIS) System found that there was an significant increase *Acinetobacter* infection between 1987 and 1996 in United State of America about 54%.[7] Studies in Indonesia showed that one of pathogens in late onset Hospital Acquired Pneumonia infection was *Acinetobacter baumannii* with prevalence 23,2%.[8,9]. Data in 2019 at Wahidin Sudirohusodo Hospital Makassar showed prevalence *Acinetobacter baumannii* infection about 19,6% of all Gram-negative bacterial infections in recent last eight months. Resistance mechanism of *Acinetobacter baumannii* can be through several ways such as production enzyme that able to hydrolyze drugs component, drug *efflux*, failure to reach target or change in drug target.[10,11]

Extended-spectrum beta-lactamase (ESBL) is an enzyme that has resistance to the most beta-lactam antibiotics including penicillin, cephalosporin and

aztreonam monobactam.[12,13] *Acinetobacter baumannii* is one of pathogens that capable to produce ESBL. Genes that encodes ESBL is located in plasmid that is easily transferred to another pathogen and therefore resistence is spreading.[14,15] First publication about genes that encoding beta-lactamase was found in 1983. Some of these genes are *Temoniera* (bla_{TEM}) and *sulfhydril variable* (bla_{SHV}). Prevalence bla_{SHV} gene in China 30,7% during 1998-1999. Korea, Japan, Malaysia and Singapore reported prevalence 5-8% while Thailand, Taiwan, Filipina and Indonesia reported prevalence 12-24% with bla_{SHV} gene was the dominant gene.[14] Enzymes of ESBL that are resistant to the third generation cephalosporin antibiotics are encoded by bla_{SHV} gene 58%, bla_{TEM} gene 20% and *Cefotaxime Munich* (bla_{CTX-M}).[10] The purpose of this study was to evaluate correlation bla_{SHV} and bla_{TEM} genes in Extended-Spectrum Beta-Lactamase (ESBL) - producing *Acinetobacter baumannii* with patient's outcome at Dr. Wahidin Sudirohusodo Hospital, Makassar.

Method

This study is a cross sectional study detecting bla_{SHV} and bla_{TEM} genes in ESBL producing - *Acinetobacter baumannii* isolates and evaluating correlation these genes with outcome length of stays and mortality. The study was conducted during August 2019 at Clinical Pathology Laboratory of Dr. Wahidin Sudirohusodo Hospital and Microbiology laboratory of Hasanuddin University, Makassar, Indonesia. The study sample was all *Acinetobacter baumannii* isolates that had been confirmed using Vitek 2 Compact. Contamined samples were excluded. All isolates were tested for ESBL and Polymerase Chain Reaction for bla_{SHV} and bla_{TEM} genes.

Data were analyzed statistically by *Chi Square*, *Fisher Exact*, *Independent-T* and *Pearson's* tests using SPSS version 25. The results were considered significant if $p<0.05$.

Results

Table 1. General Characteristics

Variables		***n***	**%**	***Mean±SD***
Age (years)	<20	12	21,1	
	20-39	9	15,8	
	40-59	23	40,4	
	>=60	13	22,8	
Sex	Men	38	66,7	
	Women	19	33,3	
ESBL	Positive	20	35,1	
	Negative	37	64,9	
bla_{SHV}	Positive	0	0	
	Negative	57	100	
bla_{TEM}	Positive	53	93	
	Negative	4	7	
Death	Yes	24	42,1	
	No	33	57,9	
Length of Stay(days)				20±15

The study samples obtained were 57 isolates which met the inclusion criteria. The characteristics of study samples can be seen in Table 1 that shows male subjects were more than female. Most study subjects were found in the 40-59 year group. PCR of bla_{SHV} and bla_{TEM} of the study are shown in Figure 1.

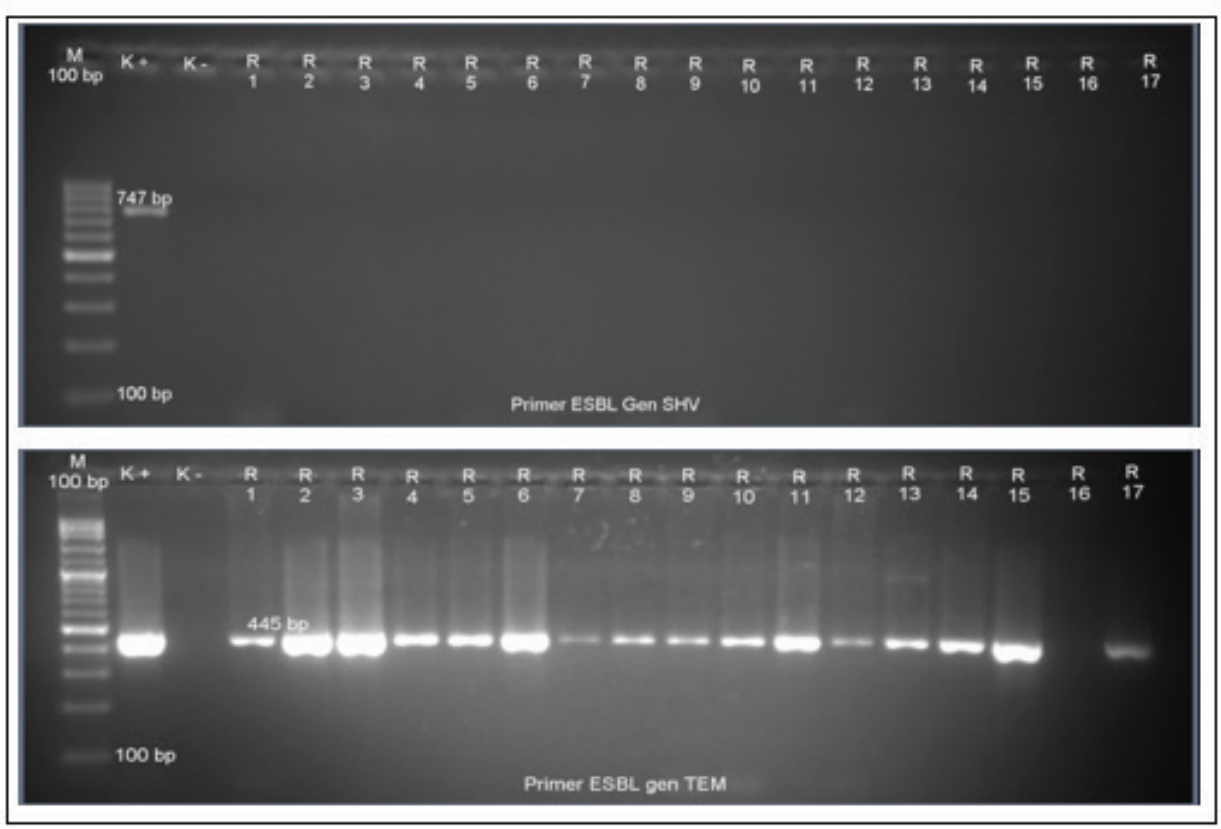


Figure 1. PCR of bla_{SHV} and bla_{TEM} of the study.

Table 2. Correlation Length Of Stay Based On ESBL

ESBL	*n*	LOS(days) *Mean±SD*	*p
Positive	20	26,3±17,5	0,016
Negative	37	16,5±11,9	

**Independent-t test*

Table 2 showed the mean length of stay in positive ESBL was higher than in negative ESBL. Statistical analysis showed significant correlation between ESBL and LOS (p = 0.016).

Table 3. Correlation Mortality Based On ESBL

ESBL		Mortality		*p
		Yes	No	
Positive	*n*(%)	11(55)	9(45)	0,147
Negative	*n*(%)	13(35,1)	24(64,9)	

**Chi Square test*

Table 3 showed that mortality rate was higher in positive ESBL (55%) than in negative ESBL (35,1%), but statistical analysis result was not significant (p>0,05).

Table 4. Comparison bla_{TEM} Based On Outcome

Group			N	Outcome				
				LOS (days)		Mortality		
				(mean±SD)	*p	Yes n(%)	No n(%)	**p
ESBL								
	bla_{TEM}	Pos	19	25,4±17,6	#	11 (57,9)	8 (42,1)	0,450
		Neg	1	42,0±17,6		0 (0)	1 (100)	
NonESBL								
	bla_{TEM}	Pos	34	17,0±12,2	0,439	12 (35,3)	22 (64,7)	1,000
		Neg	3	11,3±7,8		1(35,3)	2 (66,7)	

*Independent-t test
**Fisher Excat test
Could not be analyzed because negative bla_{TEM} was only one isolate

*Independent-t test

**Fisher Excat test

Could not be analyzed because negative bla_{TEM} was only one isolate

Table 4 showed that presentation mortality in ESBL group was found higher in positive bla_{TEM} (57,9%) than in negative bla_{TEM}, but statistical analysis was not significant (p>0,05). Presentation mortality in nonESBL group was found higher in positive bla_{TEM} (35,5%) than in negative bla_{TEM}(33,3%), but statistical analysis was not significant (p>0,05).

Discussion

Acinetobacter baumannii is an opportunistic Gram-negative pathogen that is able to produce ESBL. Extended-spectrum β-lactamases are the main cause of bacterial resistance to beta-lactam antibiotics. In this study, positive ESBL was found 35% of all *Acinetobacter baumannii* isolates. The results obtained in this study were not consistent with Abdar *et* al in Iran that found 59% of 100 *Acinetobacter baumannii* were positive.[16] Sharif *et al* also found detection rate ESBL was 51%.[17] This difference was caused by the high use of the third generation cephalosporine antibiotics in hospital and home care in that country.[16] Overuse antibiotics and *hand hygine* were factors that caused adalah higher incidence ESBL in hospital setting. Abdar *et al* and Sharif *et al* used diffusion test agar while our study used automated culture method.[16,17] Automated culture method has sensitivity 98,1% and specificity 99,7%. The method needs 6 - 13 hours (mean 8.2 hours) and therefore this method can be a choice for detecting isolates of ESBL producing- bacteria.[18]

This study found significant difference statistically between length of stay and positive ESBL and negative ESBL. *Acinetobacter baumannii* that has ESBL causes antibiotic resistance and therefore infection is difficult to treat and duration stays in hospital is longer and increase burden of hospitality costs. The results obtained in this study found that mortality in *Acinetobacter baumannii* was high (42%). Higher mortality rate was found in isolates with positive bla_{TEM} and also found higher in positive ESBL although statistical analysis is not significant. *Acinetobacter baumannii* is the most pathogen from *Acinetobacter* genus. This pathogen often causes infection in compromised subject, especially in ICU with invasive support. *Acinetobacter baumannii* causes *ventilator associated pneumonia* (VAP), meningitis, septicemia, urinary track infection, and burn infection.[17] *Acinetobacter baumannii* infection causes severe sepsis. High mortality also increases with invasive procedure such as mechanical ventilator and central venous catheter.

Acinetobacter baumannii produces ESBL through role of plasmid such as bla_{SHV} and bla_{TEM} genes. The study which we did in Wahidin Sudirohusodo Hospital revealed that there was no isolate containing bla_{SHV} gene while bla_{TEM} gene dominated most of all samples (93%). The results obtained in this study were consistent

with Abdar *et al* who did not find any bla_{SHV} gene in ESBL producing-*Acinetobacter baumannii* isolates.[16]. Koo *et al* also did not find any bla_{SHV} gene in Korea.[19] The result of this study were consistent with Chaudhary *et al* who found prevalence of bla_{TEM} in positive ESBL was 87%.[20] Adams-Haduch *et al*, also found prevalence bla_{TEM} gene about 73,5%.[21] The results obtained in this study were different with Sharif *et al* who found 56% bla_{TEM} and 63% bla_{SHV} of ESBL isolates.[17] Other studies in the world show variation result. The difference of our study and others indicates that type of ESBL genes can be variable from one place to another place. Bla_{TEM} gene that encodes ESBL is located in integron 1 of plasmid and therefore that gene is easily tobe transferred from one *Acinetobacter baumannii* to another *Acinetobacter baumannii*.[16] Genotype detection method used PCR technique that has high specificity and sensitivity therefore this technique was able to detect 93% bla_{TEM} gene in *Acinetobacter baumannii* isolates in this study. The difference between prevalence of bla_{TEM} gene and ESBL in this study could be caused by *Acinetobacter baumannii* had already had bla_{TEM} resistant gene in the plasmid but this gene was not transferred yet to the chromosome or the bla_{TEM} resistance gene had been in the chromosome but synthesis ESBL was not happened. Bla_{TEM} gene that was found in *Acinetobacter baumannii* isolates indicates that this gene can be a candidate for molecular skrining from positive ESBL samples in our hospital and can be an important concern because that *Acinetobacter baumannii* can further produce ESBL if antibiotics are not used rationally.

This study had some limitations. This study did not analyze the type and duration antibiotics that had been used by the patients and also diagnosis of the disease. These factors might cause bias for length of stay in this study.

CONCLUSION AND SUGGESTION

This study concluded that there were 35% positive ESBL of all *Acinetobacter baumannii* isolates. Bla_{SHV} gene was not found and bla_{TEM} gene was dominant 93%. Prevalence positive ESBL was higher in positive bla_{TEM} gene. Length of stay positive ESBL was significant statistically in positive ESBL. Mortality rate was high (42%) in *Acinetobacter baumannii* infection. We also recommend further study that evaluates factors related to the outcome (length of stay and mortality) in subjects with ESBL producing *Acinetobacter baumannii* infection.

Ethical Clearance – Taken from Health Study Ethical Committee of Hasanuddin University, Medical Faculty, Dr. Wahidin Sudirohusodo Hospital, Makassar

Source of Funding – Self funding.

Conflict of Interest – The authors declare that they have no conflict of interest.

References

1. Howard A, O'Donoghue M, Feeney A, *et al*. Acinetobacter Baumannii: An Emerging Opportunistic Pathogen. Virulence. 2012 May 1;3(3):243-50.
2. Perez F, Hujer AM, Hujer KM, *et al*. Global Challenge Of Multidrug-Resistant Acinetobacter Baumanni. Antimicrob Agents Chemother. 2007 Oct;51(10):3471-84.
3. Fournier PE, Richet H. The Epidemiology and Control of Acinetobacter baumannii in Health Care Facilities. Clin Infect Dis. 2006 Mar 1;42(5):692-9.
4. Albrecht MC, Griffith ME, Murray CK, *et al*. Impact of Acinetobacter Infection on the Mortality of Burn Patients. J Am Coll Surg. 2006 Oct;203(4):546-50.
5. Hidron AI, Edwards JR, Patel J, *et al*. NHSN Annual Update: Antimicrobial-Resistant Pathogens Associated With Healthcare-Associated Infections: Annual Summary Of Data Reported To The National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2006-2007. Infect Control Hosp Epidemiol. 2008 Nov;29(11):996-1011.
6. Alyamani EJ, Khiyami MA, Booq RY, *et al*. Molecular Characterization Of Extended-Spectrum Beta-Lactamases (ESBLs) Produced By Clinical Isolates Of Acinetobacter Baumannii In Saudi Arabia. Ann Clin Microbiol Antimicrob. 2015 Aug 20;14:38.
7. Wong D, Nielsen TB, Bonomo RA, *et al*. Clinical and Pathophysiological Overview of Acinetobacter Infections: a Century of Challenges. Clin Microbiol Rev. 2017 Jan;30(1):409-447.
8. Roes BA, Kartika D, Andriyoko B. (2018) 'Hospital Acquired Pneumonia Onset Dan Bakteremia', Indonesian J Clin Pathol Med Lab. 2018; 20(3):233.
9. Taslim E, Maskoen TT. The Most Bacterial Patterns as Agent Cause Infection in Intensive Care Unit at

some Hospital in Indonesia. Anesthesia Critical Care. 2016; 34:56–62.

10. Safari M, Mozaffari AS, Bahador A, *et al*. Prevalence of ESBL and MBL encoding genes in Acinetobacter baumannii strains isolated from patients of intensive care units (ICU). Saudi J Biol Sci. 2015 Jul;22(4):424-9.
11. Lolans K, Rice TW, Munoz-Price LS, *et al*. Multicity outbreak of carbapenem-resistant Acinetobacter baumannii isolates producing the carbapenemase OXA-40. Antimicrob Agents Chemother. 2006 Sep;50(9):2941-5.
12. Peleg AY, Seifert H, Paterson DL. Acinetobacter baumannii: Emergence of a successful pathogen. Clin Microbiol Rev. 2008 Jul;21(3):538-82.
13. Ben-Ami R, Rodríguez-Baño J, Arslan H, *et al*. A Multinational Survey of Risk Factors for Infection with Extended-Spectrum β-Lactamase–Producing Enterobacteriaceae in Nonhospitalized Patients. Clin Infect Dis. 2009 Sep 1;49(5):682-90.
14. Paterson DL, Bonomo RA. Extended-Spectrum Beta-Lactamases: A Clinical Update. Clin Microbiol Rev. 2005 Oct;18(4):657-86.
15. Rupp ME, Fey PD. Extended Spectrum Beta-Lactamase (ESBL)-producing Enterobacteriaceae: Considerations For Diagnosis, Prevention And Drug Treatment. Drugs. 2003;63(4):353-65.
16. Abdar MH, Taheri-Kalani M, Taheri K, *et al*. Prevalence Of Extended-Spectrum Beta-Lactamase Genes In Acinetobacter Baumannii Strains Isolated From Nosocomial Infections In Tehran, Iran. GMS Hyg Infect Control. 2019 Jan 25;14:Doc02.
17. Sharif M, Mirnejad R, Amirmozafari N. Molecular identification of TEM and SHV extended-spectrum beta-lactamase in clinical isolates of Acinetobacter baumannii from Tehran hospitals. J Genes Microb Immunity. 2014:1–9.
18. Spanu T, Sanguinetti M, Tumbarello M, *et al*. Evaluation of the New VITEK 2 Extended-Spectrum Beta-Lactamase (ESBL) Test for Rapid Detection of ESBL Production in Enterobacteriaceae Isolates. J Clin Microbiol. 2006 Sep;44(9):3257-62.
19. Koo SH, Kwon KC, Cho HH, *et al*. Genetic Basis of Multidrug-resistant Acinetobacter baumannii Clinical Isolates from Three University Hospitals in Chungcheong Province, Korea. Korean J Lab Med. 2010 Oct;30(5):498-506.
20. Chaudhary M, Payasi A. Molecular Characterization and Antimicrobial Susceptibility Study of Acinetobacter baumannii Clinical Isolates from Middle East, African and Indian Patients. J Proteomics Bioinformatics. 2012;5(11):265–269.
21. Adams-Haduch JM, Paterson DL, Sidjabat HE, *et al*. Genetic Basis of Multidrug Resistance in Acinetobacter baumannii Clinical Isolates at a Tertiary Medical Center in Pennsylvania. Antimicrob Agents Chemother. 2008 Nov;52(11):3837-43.

Two-Dimensional Projection of Relaxing Radial Retinectomy in Retinal Detachment with Severe Proliferative Vitreoretinopathy (PVR)

Waldensius Girsang[1 2]; Dwi Cahyani Ratna Sari[3]; Wahyu Srigutomo[4];
Tjahjono Darminto Gondhowiardjo[2 5]; Muhammad Bayu Sasongko[2]

[1]Jakarta Eye Center Eye Hospitals and Clinics, Jakarta, Indonesia, [2]Department of Ophthalmology, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada/ Prof. Dr. Sardjito General Hospital, Yogyakarta, Indonesia, [3]Department of Anatomy, Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada, Yogyakarta, Indonesia, [4]Faculty of Mathematics and Natural Sciences,Bandung Institute of Technology, Bandung, Indonesia, [5]Department of Ophthalmology, Faculty of Medicine Universitas Indonesia/ Cipto Mangunkusumo National Hospital, Jakarta, Indonesia

Abstract

Retinectomy has been so far the most effective method to eliminate the retinal traction caused by proliferative vitreo-retinopathy (PVR) in retinal detachment. There are several methods of retinectomy applicable to different situation on surgeons' personal preferences, cirfumferential, radial, or combined. However, there is no clear evidence explaining whether one method is superior than the other. Radial retinectomy has been less commonly performed, yet is speculated to be more effective methods in certain cases of severe PVR. Whilst there is no scientific and geometrical analysis or formula for radial retinal cutting (retinectomy of radial relaxation) in retinal detachment with severe PVR, the authors proposed to developed a two-dimensional projection of the retina following Cartesian rules and apply geometrical projection to analyze the optimal radial cutting assuming retinal detachment with severe PVR is present.

***Keywords**: Two-dimension, Radial retinectomy, Retinal Detachment*

Introduction

Proliferative Vitreo-retinopathy (PVR) has been classified by The Retinal Society into grade A, B, C1, C2, C3, D1, D2, and D3 based on the level of severity and its extension in the retina.[1] Grade A PVR is the most minimal and grade D is the most severe form of PVR. In previous years, the surgery done in rhegmatogenous retinal detachment (RRD) with severe PVR (grade C or worse) involves vitrectomy with retinectomy and silicon oil tamponade.[2-6] The method of retinectomy applied in most cases of RRD with higher degree of PVR was circumferential. Unfortunately, this technique demonstrated considerable rate of re-detachment because of the traction of the remaining tissues.[7]

Previous report has suggested that radial retinectomy might also be useful in cases of RRD with severe PVR, as an alternative to circumferential retinectomy.[8] Our empirical data of all radial retinectomy for RRD patients with PVR of at least grade C indicated a considerably high rate of anatomical success with less post-surgical complication without the need of silicon oil tamponade (unpublished data). However, there has been no precise method or formula (geometrical formula) on how to perform optimal radial retinectomy.

In this paper, we presented the two-dimensional analysis of the retina and extend this in the context of radial retinectomy for RRD.

Method

The Cartesian coordinate system with x and y-coordinates are used to define the exact position of a point in a plane. It is also employed to describe a curve line as well as two-dimensional (2D) surfaces.[9]

The horizontal axis is labeled x, and the vertical axis is labeled y. In the three-dimensional (3D) coordinate system, another axis is added and often labeled by z-axis. The axis is orthogonal to one another and all are appendicular to each other. The intersection of the points is as the origin and labeled 0. Each axis has a unit length and each length is marked then forms a grid. To describe a particular point in 2D spaces, the x-value is written (abscissa), followed by y-value (ordinate). Thus, it is always (x,y). Since two axes are perpendicular to each other, the xy plane is divided into four regions called quadrants as in Figure 2.46 which often numbered with Roman numeral I, II, III, and IV. According to the common convention, the four quadrants are ordered starting from the top right (quadrant I), circling counter-clockwise. In quadrant I, both coordinates (x and y) are positive. In quadrant III, both coordinates are negative and in quadrant IV, the x coordinate is positive while the y-value negative (Figure 1).

In contrast to the Cartesian coordinates which denote the points on x and y coordinate, the polar coordinates determine the position of a point based on an angle on positive x-axis and a distance from a reference point.[10]

On the chart above, the P-point is delineated in two coordinates, the Cartesian coordinates (x, y) which indicate its relative position to x and y-axis, and the polar coordinates showing a distance to the 0 reference point and α angle formed by OP line segment to the positive x-axis (Figure 2).

Results

Geometrically, 2D Cartesian and polar coordinates can be applied to the eyeball depicted by following fundus photograph. Figure 3 illustrates polar coordinates projected on a fundus photograph of a detach retina. To find the linear equation of the blue and green lines, we assume that the two points of the end line are determined. The general linear equation for both points is as follow.

$$\frac{y-y_n}{y_{n+1}-y_n}=\frac{x-x_n}{x_{n+1}-x_n} \quad (1)$$

where for quadrant I

$$x_n=r\cos\theta_n;\ y_n=r\sin\theta_n \quad (2)$$

$$x_{n+1}=r\cos\theta_n;\ y_{n+1}=R\sin\theta_n \quad (3)$$

For Quadrant II: $\theta_n=180^\circ-\alpha_n$ (4)

For quadrant III: $\theta_n=180^\circ+\alpha_n$ (5)

For Quadrant IV: $\theta_n=360^\circ-\alpha_n$ (6)

$$\frac{y-r\sin\theta_n}{R\sin\theta_n-r\sin\theta_n}=\frac{x-r\cos\theta_n}{R\cos\theta_n-r\cos\theta_n} \quad (7)$$

$$\frac{y-r\sin\theta_n}{(R-r)\sin\theta_n}=\frac{x-r\cos\theta_n}{(R-r)\cos\theta_n} \quad (8)$$

$$y-r\sin\theta_n=\frac{(R-r)\sin\theta_n}{(R-r)\cos\theta_n}(x-r\cos\theta_n) \quad (9)$$

$$y-r\sin\theta_n=\frac{\sin\theta_n}{\cos\theta_n}(x-r\cos\theta_n) \quad (10)$$

$$y=\tan\theta_n(x-r\cos\theta_n)+r\sin\theta_n \quad (11)$$

$$y=x\tan\theta_n-r\cos\theta_n\tan\theta_n+r\sin\theta_n \quad (12)$$

when equation (12) is simplified, it becomes

$$y=x\tan\theta_n-r\cos\theta_n\frac{\sin\theta_n}{\cos\theta_n}+r\sin\theta_n \quad (13)$$

$$y=x\tan\theta_n \quad (14)$$

So, the equation of the line is a straight line with a gradient (m) of $\tan\theta_n$.

By the trigonometric identity formulas that $\tan(n\pi-\beta)=-\tan\beta$ *(even quadrants)* and $\tan\theta=\tan(\theta+n\pi)$ *(odd quadrants)* with= 0,1,2,...

Then if it is defined $\theta_1=45^\circ$; $\theta_2=60^\circ$; $\theta_2=120^\circ(\alpha_2=60^\circ);\theta_4=135^\circ(\alpha_4=45^\circ);\theta_3=150^\circ($ $\alpha_3=30^\circ$) the equation of the line will be

Line 1: $y=x$ (15)

Line 2: $y=\sqrt{3}x$ (16)

Line 3: $y=-\sqrt{3}x$ (17)

Line 4: $y=-x$ (18)

Line 5: $y=-\frac{\sqrt{3}}{3}x$ (19)

We considered the rule that it is forbidden to draw a line crossing two red circles with some radius (r) due to its vital function, defining and determining the line must be started from quadrant I, II, III, and last IV respectively. Then, if the equation (2) and (3) are substituted into equation (1), we will get equation as follow.

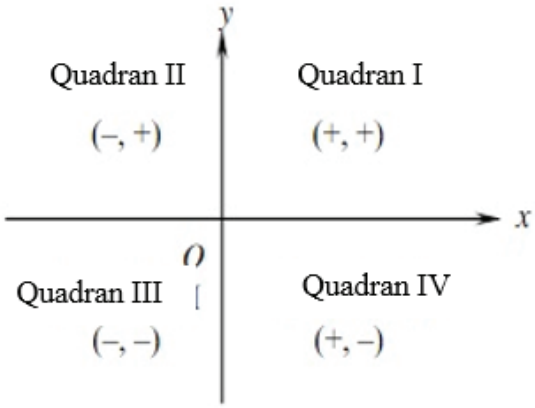


Figure 1. The Cartesian Coordinate System (Paul Ryclear *et al.*, 1977)

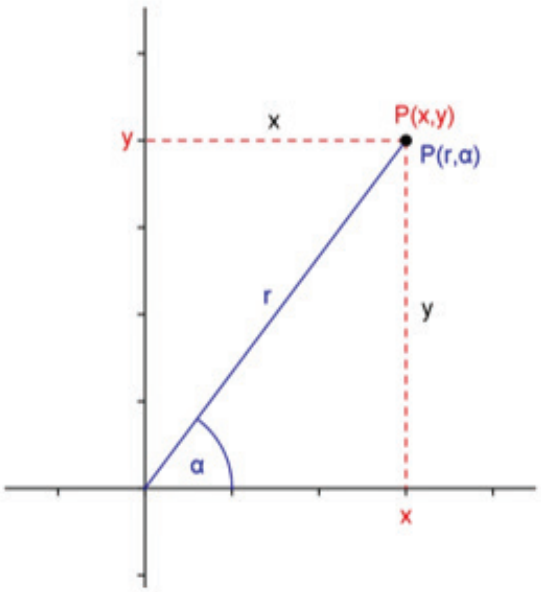


Figure 2. Delineation of polar coordinates

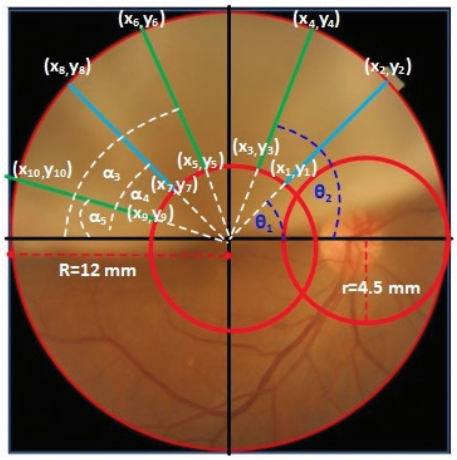


Figure 3. The application of polar coordinates (2D) on a fundus photo.

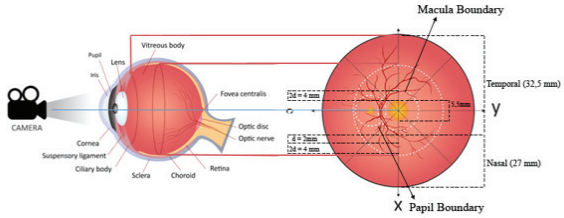


Figure 4. Cutting boundaries in the retina

Discussion

Two-dimensional projection of a three-dimensional object may dissolve the accuracy of information related to the actual distance and direction between two points. However in this paper, we provide a geometric analysis of radial retinectomy when applied on two-dimensional retinal photograph of a detached retina, which may possibily help to guide the application of radial cutting on the detached retina during the surgery.

With the advancement of retinal photography, the retina can be accurately portayed and thus offer retinal surgeon significant advantages. Assuming that the two-dimensional plane of the retina is projected from a microscope or camera, detached and PVR portion of the retina can be depicted easily from the retinal images and potential retinal cutting can be constructed considering the the border and angle of retinal cutting prior to the surgery. Figure 4 below is the example of two-dimensional projection of the retina with cutting border. In the future, further application of this two-dimensional projection may allow automatic detection of PVR lesion on detached retina and generate the outline of the cutting boundaries automatically using computer generated software.

In conclusion, the two-dimensional projection of radial relaxation retinectomy has been made possible with the advancement of retinal photography, allowing retinal surgeons to precisely plan the radial cutting of the retina prior to the surgery. This two-dimensional analysis is a significant basis to make a general formulation which is further will be completed by the physical condition of eyeballs (elasticity and crimp) as well as a 3D model of radial retinectomy relaxation.

Acknowledgement:

Conflict of Interest: None of these authors has any conflict of interest

Source of Funding: Self-funding

Ethical Clearance: Obtained from Medical and Health Research Ethics Committee (MHREC), Faculty of Medicine, Universitas Gadjah Mada – Dr. Sardjito General Hospital (EC Approval No KE/FK/1067/EC/2018)

References

1. Hilton G, Machemer R, Michels R, Okun E, Schepens C, Schwartz A. The classification of retinal detachment with proliferative vitreoretinopathy. Ophthalmology. 1983;90(2):121-5.
2. Han DP, Lewis MT, Kuhn EM, Abrams GW, Mieler WF, Williams GA, et al. Relaxing retinotomies and retinectomies: surgical results and predictors of visual outcome. Archives of Ophthalmology. 1990;108(5):694-7.
3. Han DP, Rychwalski PJ, Mieler WF, Abrams GW. Management of complex retinal detachment with combined relaxing retinotomy and intravitreal perfluoro-n-octane injection. American journal of ophthalmology. 1994;118(1):24-32.
4. Shalaby KA. Relaxing retinotomies and retinectomies in the management of retinal detachment with severe proliferative vitreoretinopathy (PVR). Clinical ophthalmology (Auckland, NZ). 2010;4:1107.
5. Sharma A, Grigoropoulos V, Williamson T. Management of primary rhegmatogenous retinal detachment with inferior breaks. British journal of ophthalmology. 2004;88(11):1372-5.
6. Sodhi A, Leung L-S, Do DV, Gower EW, Schein OD, Handa JT. Recent trends in the management of rhegmatogenous retinal detachment. Survey of ophthalmology. 2008;53(1):50-67.
7. Mendes TS, Gomes AMV, Rocha BS, Junior HVP, Abujamra S. Evaluation of retinectomy in the treatment of severe proliferative vitreoretinopathy. International journal of retina and vitreous. 2015;1(1):17.
8. Hocaoglu M, Karacorlu M, Muslubas IS, Ozdemir H, Arf S, Uysal O. Peripheral 360 degree retinotomy, anterior flap retinectomy, and radial retinotomy in the management of complex retinal detachment. American journal of ophthalmology. 2016;163:115-21. e1.
9. Ryckaert J-P, Ciccotti G, Berendsen HJ. Numerical integration of the cartesian equations of motion of a system with constraints: molecular dynamics of n-alkanes. Journal of computational physics. 1977;23(3):327-41.
10. Peak D, Inomata A. Summation over Feynman histories in polar coordinates. Journal of Mathematical Physics. 1969;10(8):1422-8.

Identification of Acute Rotavirus Diarrhea and Analysis of its Risk Factors in Children Under-5 Years in Surabaya, Indonesia

Yunita Ratri Adhiningsih[1], Alpha Fardah Athiyyah[2], Juniastuti[3]

[1]Undergraduate Program for Medical Doctor, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, [2]Department of Pediatrics, Faculty of Medicine, Universitas Airlangga/ Dr. Soetomo General Hospital, Surabaya, Indonesia, [3]Department of Microbiology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia.

Abstract

Background: Diarrhea is the most common disease among children and still a major cause of morbidity and mortality. Among the various causes of acute diarrhea in children, rotavirus is the most frequent one, especially in developing countries where universal rotavirus vaccination has not been introduced, including Indonesia.

Objectives: This study aimed to determine the percentage of acute rotavirus diarrhea in children and analyze its risk factors in Tanah Kali Kedinding Primary Health Care, Surabaya, Indonesia.

Method: Stool specimens were collected from a total 116 children under-5 years visiting Tanah Kali Kedinding Primary Health Care in Surabaya, Indonesia due to acute diarrhea during September 2018 – January 2019. Rapid stool antigen immunochromatograhic test was used to identify group A rotavirus antigen. Some potential risk factors were analyzed.

Results*:* Among 116 samples from children with acute diarrhea, 67 (57.8%) were identified group A rotavirus positive. Samples with rotavirus positive were obtained mostly form male (p=0.008). Malnutrition was associated with an increased risk of rotavirus infection (p=0.025). Male and malnutrition were about 3 times more likely to have rotavirus infection. Other risk factors including children' age, history of exclusive breastfeeding, mothers' education and the amount of income were not statistically associated with rotavirus diarrhea.

Conclusion: The occurence of children with acute rotavirus diarrhea in this study was 57.8%. Some risk factors for rotavirus infection were gender and malnutrition. Control measures such as anticipating its risk factors need to be adapted, according to the further epidemiology investigation.

***Keywords** : rotavirus, acute diarrhea, risk factors, children under-5 years*

Introduction

Diarrhea is the most common disease among children with approximately nearly 1.7 billion cases and kills around 525,000 children every year worldwide.[1] In Indonesia, the incidence of diarrhea was very high, with 270 new cases per 1,000 persons and its prevalence in children under-5 years was 12.3% in 2018.[2]

Acute diarrhea is an inflammatory disease on intestine caused by various agents like viruses, bacteria and parasites. Among the causative agents, rotavirus is the most frequent one in children. Rotavirus is primarily spread via the fecal-oral route, either by person-to-person contact or through ingestion of food or water that has been contaminated with the stool of infected

Corresponding author:
Juniastuti
Department of Microbiology, Faculty of Medicine, Universitas Airlangga, Jl. Mayjen. Prof. Dr. Moestopo 47, Surabaya 60131, East Java, Indonesia
Telephone: +6231-5030252, Facsimile: +6231-5022472
E-mail: junsf@fk.unair.ac.id

persons.[1] Rotavirus is a viral infection that depends on seasonal changes, with the highest its prevalence occurs in cooler months.[3] Symptomatic presentations of rotavirus infection which are more visible at the age of 6- 24 months include fever, vomiting, and acute watery diarrhea.[4,5] There is no specific treatment for rotavirus other than fluid and electrolyte replacement to prevent several complication such as dehydration, sepsis, gastrointestinal (GI) bleeding, respiratory infections, myocarditis, hepatic abscess, hepatitis, seizures and meningoencephalitis.[6,7]

Studies of rotavirus infection in children under-5 years previously have been conducted in some cities in Indonesia. In Jakarta, rotavirus infection was detected in 42%, twice more than norwalk like viruses (prototype of norovirus) infection in 1997-1999.[8] In Bali, rotavirus infection was reported 49.8% in 2009-2011.[9] Nirwati et al reported the prevalence of rotavirus in Yogyakarta was 57% in 2009 and in Mataram was 65.47% in 2015.[10,11] The prevalence of rotavirus infection among hospitalized pediatric patients in Surabaya during 2015-2018 was 31.7%.[12] Proportion of rotavirus infection in the community (primary health care) in Bandar Lampung was 74.3%, and no potential risk factor was found to be associated with the disease.[13] Many studies showed the high prevalence of rotavirus infection in Indonesia, however rotavirus vaccination has not been included in a national immunization program (still included in an optional immunization).[14]

In East Java province, the prevalence of diarrhea in children under-5 years increased from 6.6% in 2013 to 10.7% in 2018.[15] Surabaya is a capital of East Java province, and Tanah Kali Kedinding Primary Health Care was ranked fourth for the highest case number of diarrhea (1,460 cases) in Surabaya in 2018.[16]

Only a few studies have reported acute rotavirus diarrhea in cities in Indonesia including its risk factors. This study aimed to determine the proportion of acute rotavirus diarrhea in children and analyze its risk factors in Tanah Kali Kedinding Primary Health Care, Surabaya.

Materials and Method

Stool specimens were collected from children under-5 years visiting Tanah Kali Kedinding Primary Health Care in Surabaya due to acute diarrhea during September 2018 – January 2019. Acute diarrhea is defined as passage of ≥3 of abnormally loose or watery stools in the preceding 24 hours or as a new onset of diarrhea in a patient without a history of diarrhea in the previous 14 days. Rapid stool antigen immunochromatograhic testing by using SD rotavirus BIO LINE (SD Bioline Rotavirus Rapid; Standard Diagnostics, Inc, Yongin, Korea) was performed to identify VP6 antigen of group A rotavirus according to the manufacturer's instructions. The sensitivity and the specificity of this test were 100% and 92.4%, respectively. Data of socio-economic and history of breastfeeding was collected using a standard questionnaire by interview. Nutritional status was collected from raw data (medical record) which then analyzed using cut off Z-Score WHO 2006 and recommendation of Indonesian Pediatric Society.[17] All data were analyzed using SPSS 20 with chi-square or fisher's exact test for categorical variables.

Ethical clearance for this study was obtained from the Ethics Committee of Faculty of Medicine, Universitas Airlangga, Surabaya. Informed consent for participation in this study was obtained from parents of each individual.

Results

Among a total of 116 enrolled children, most of them (57.8%) were rotavirus-positive and the rest (42.2%) were rotavirus-negative. More boys (59.7%) were infected with rotavirus infection than girls. Most of both children with and without rotavirus infection were 1-2 years old, had mothers with tertiary education and parents who earned income under city minimum wage (Table 1). All children have not been vaccinated with rotavirus vaccination.

Some potential risk factors of rotavirus infections were analyzed in this study, including age, gender, history of exclusive breastfeeding, nutritional status, maternal education, parents' income. Among those factors, only gender and nutritional status were statistically significant. Male and malnutrition were about 3 times more likely to have rotavirus infection (OR=2.789, CI=1.298-5.989, p=0.008 and OR=3.05, CI=1.120-8.304, p=0.025, respectively).

Table 1. Socio-economic distribution

Variable	Total sample (N=116)	
	Rotavirus (+) N=67	**Rotavirus (-) N=49**
Gender		
Male	40 (59.7%)	17 (34.7%)
Female	27 (40.3%)	32 (65.3%)
Age		
1 - 2 years	37 (55.3%)	27 (55.1%)
>2 - 3 years	14 (20.9%)	9 (18.4%)
>3 - 4 years	6 (8.9%)	7 (14.3%)
>4 - 5 years	10 (14.9%)	6 (12.2%)
Maternal Educational Level		
No formal education	0	0
Primary level	12 (17.9%)	6 (12.3%)
Secondary level	20 (29.9%)	18 (36.7%)
Tertiary level	35 (52.2%)	25 (51%)
Wage		
Under city minimum of wage	47 (70.1%)	33 (67.3%)
Above city minimum of wage	20 (29.9%)	16 (32.7%)

Table 2. Risk factors for rotavirus infection

Variable	Total sample (N=116)		p value	OR (95% CI)
	Rotavirus (+) N=67	**Rotavirus (-) N=49**		
Gender				
Male	40 (59.7%)	17 (34.7%)	0.008	2.789
Female	27 (40.3%)	32 (65.3%)		(1.298-5.989)
Age				
1-2 years	37 (55.3%)	27 (55.1%)	0.990	1.005
>2-5 years	30 (44.7%)	22 (44.9%)		(0.479-2.108)
Exclusive Breastfeeding				
Yes	52 (77.6%)	41 (83.7%)	0.419	0.676
No	15 (22.4%)	8 (16.3%)		(0.261-1.750)
Nutritional Status				
Malnourish	20 (29.9%)	6 (12.2%)	0.025	3.050
Well-nourish	47 (70.1%)	43 (87.8%)		(1.120-8.304)

***Cont.*.** **Table 2. Risk factors for rotavirus infection**

Maternal Educational Level Primary Level Above Primary Level	 12 (17.9%) 55 (82.1%)	 6 (12.3%) 43 (87.7%)	0.405	1.564 (0.543-4.505)
Wage Under city minimum of wage Above city minimum of wage	 47 (70.1%) 20 (29.9%)	 33 (67.3%) 16 (32.7%)	0.747	1.139 (0.515-2.520)

Discussion

One hundred and sixteen children with acute diarrhea in a community (a primary health care) in Surabaya were enrolled in this study. Sixty seven (57.8%) children were infected with rotavirus. This result was in agreement with previous studies in hospitalized children in other cities in Indonesia, ranged 31.7%-65.5% of rotavirus infections, however it was less from the prevalence reported in a primary health care in Bandar Lampung (74.3%).[8-13] All of those studies presented high number of rotavirus infection, however a rotavirus vaccination has not been included in a national immunization program yet. [14] Compared with the result of the previous study in a referral hospital (31.7%) in the same city (Surabaya), our study in the community found the higher number of rotavirus infection. Hospitalized patients at tertiary health care tend to have more severe disease. It looks like that the number of milder rotavirus infection in community was more than that in hospital. Salim et al (2014) reported among 327 cases with rotavirus infection, 91.4% (299) presented mild dehydration and 11 (3.4%) presented severe dehydration.[9]

In our study, children with male gender were about 3 times more likely to have rotavirus infection (*p<0.05*). It confirmed the previous report that ratio of male and female with rotavirus infection was 1.6 : 1.[9] However, Fidhow et al (2017) reported that gender was not a significant factor associated with rotavirus infection.[18]

Although age was not a significant factor, most children under-2 years (55.3%) were infected with rotavirus. This result was supported by previous studies in other cities in Indonesia and also in India.[8,12,19,20] The incidence of rotavirus infection rarely occurs in children less than 6 months and more than 2 years. It might due to passively mother's anti-rotavirus antibodies through exclusive breastfeeding, while after 2 years of age the children have already developed antibodies against repeated infection.[21]

A previous study showed that clinical infants who were breastfed presented milder symptoms of shorter duration than infants who were bottle-fed.[22] Breastfeeding reduces gastrointestinal infections as breast milk contains lactadherin that is protective against symptomatic rotavirus infection. Human milk also contains anti-rotavirus antibodies that seem to play a smaller role against pathogens.[23] In our study, children with history of exclusive breastfeeding were less likely to have rotavirus infection (OR 0.67), although the history of exclusive breastfeeding was not statistically significant as its risk factor ($p>0.05$). This result was in line with the Shen et al' finding.[24]

Malnutrition was associated rotavirus infection ($p<0.05$). Children with malnutrion had a 3 times increased risk of rotavirus diarrhea. Epidemiological studies suggested a strong association between childhood malnutrition and increased risk of infectious diarrhea. The increased incidence and severity of infections in malnourished children is largely due to the deterioration of immune function; limited production and/or diminished functional capacity of all cellular components of the immune system have been reported in malnutrition.[25] However, certain infectious diseases, including rotavirus infection also cause malnutrition, which can result in a vicious cycle. Among all causes of childhood diarrhea, rotavirus is one of the most significant attributable one[26] and cellular attachment with healthy cells in the brush border of the intestine is fundamental in the pathophysiology of the rotavirus infection.[27-29] Malnutrition with the possibility of shortening of villi in malnourished infants may inhibit rotavirus entry and replication.[30]

Children with rotavirus diarrhea whose mothers had tertiary education were predominant (52.2%). It was suggested that mothers with higher education were more likely to be aware of health condition of their children. Unfortunately, in this study, most of them had a low household income. Parashar et al (2003) showed from the median 2.1 million deaths due to diarrhea, 85% occurred in children from low-income countries. The proportion of deaths in infants with diarrhea shows a declining trend with increasing income levels.[31]

The finding of high number of acute rotavirus diarrhea needs a great attention and anticipation. The earlier detection of the infection could prevent the greater severity in those children. Improving nutritional status and implementation of rotavirus vaccination as a national immunization program might be considered to lower the incidence of acute rotavirus diarrhea.

Conclusion

The occurence of children with acute rotavirus diarrhea in Tanah Kali Kedinding Primary Health Care, Surabaya was 57.8%. Interestingly, it was higher than that in hospital reported previously in Surabaya. Some risk factors associated with rotavirus infections were gender and malnutrition. Control measures such as anticipating its risk factors need to be adapted, according to the further epidemiology investigation.

Conflict of Interest: There was no conflict of interest in this study.

Ethical Clearance: The ethical clearance was obtained from KEPK, Faculty of Medicine, Universitas Airlangga No. 84/EC/KEPK/FKUA/2019.

Source of Funding: This study was supported by the authors.

References

1. World Health Organization (WHO). Diarrhoeal disease. WHO.int. 2016 [accessed 19 Apr. 2018]. Available from: https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease.
2. Ministry of Health, Republic of Indonesia: Report on National Basic Health Research, 2018 [Internet]. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019 [accessed 3 Feb 2019]. Available from: http://labmandat.litbang.depkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
3. Patel M, Glass R, Jiang B, Santosham M, Lopman B, and Parashar U. A Systematic Review of Anti-Rotavirus Serum IgA Antibody Titer as a Potential Correlate of Rotavirus Vaccine Efficacy. The Journal of Infectious Diseases. 2013; 208(2):284-294.
4. Mulyani N, Prasetyo D, Karyana I, Sukardi W, Damayanti W, Anggraini D, et al. Diarrhea Among Hospitalized Children Under Five: A Call For Inclusion of Rotavirus Vaccine to The National Immunization Program in Indonesia. Vaccine. 2018;36(51):7826-7831.
5. Koukou D, Chatzichristou P, Trimis G, Siahanidou T, Skiathitou A, Koutouzis E, et al. Rotavirus Gastroenteritis in a Neonatal Unit of a Greek Tertiary Hospital: Clinical Characteristics and Genotypes. Plos One. 2015; 10(7), p.e0133891.
6. Hattori F, Kawamura Y, Kawada J, Kojima S, Natsume J, Ito K, et al. Survey of Rotavirus-Associated Severe Complications in Aichi Prefecture. Pediatrics International. 2018;60(3):259-263.
7. Aldemir-Kocabaş B, Karbuz A, Özdemir H, Tural-Kara T, Tapısız A, Belet N, et al. Complications with Rotavirus: A Single Center Experiences. The Turkish Journal of Pediatrics. 2016;58(6):602.
8. Subekti D, Lesmana M, Tjaniadi P, Safari N, Frazier E, Simanjuntak C, et al. Incidence of Norwalk-like Viruses, Rotavirus and Adenovirus Infection in Patients With Acute Gastroenteritis in Jakarta, Indonesia. FEMS Immunologic Medical Microbiology. 2002; 33(1):27-33.
9. Salim H, Karyana I, Sanjaya-Putra I, Budiarsa S, and Soenarto Y. Risk Factors of Rotavirus Diarrhea in Hospitalized Children in Sanglah Hospital, Denpasar: A Prospective Cohort Study. BMC Gastroenterology. 2014; 14(1).
10. Nirwati H, Hakim M, Aminah S, Dwija I, Pan Q, and Aman A. Identification of Rotavirus Strains Causing Diarrhoea in Children under Five Years of Age in Yogyakarta, Indonesian. Malaysian Journal of Medical Sciences. 2017;24(2):68-77.
11. Nirwati H, Donato, C, Mawarti, Y, Mulyani, N, Ikram, A, Aman, A, et al. Norovirus and Rotavirus Infections in Children Less Than Five Years of Age Hospitalized with Acute Gastroenteritis in

Indonesia. Archives of Virology. 2019;164(6):1515-1525.

12. Utsumi T, Athiyyah A, Wahyuni R, Dinana Z, Yamani L, Soetjipto, et al. Molecular Epidemiology and Clinical Features of Rotavirus Infection among Pediatric Patients in East Java, Indonesia During 2015–2018: Dynamic Changes in Rotavirus Genotypes from Equine-Like G3 to Typical Human G1/G3. Frontiers in Microbiology. 2019;10.
13. Ana EF, Wahyuni RM, Yamani LN, Dinana Z, Oktafiani D, et al. Identification of Rotavirus Infection During Diarrhoea Outbreaks among Children Under Five Years of Age in Lampung, Indonesia. Pediatria Croatia. 2019;63:100-4.
14. Ministry of Health, Republic of Indonesia, Regulation of the Minister of Health No. 12 Concerning the Implementation of Immunizations. Jakarta : Ministry of Health, Republic of Indonesia; 2017 [cited 7 December 2019]. Available from: http://hukor.kemkes.go.id/uploads/produk_hukum/PMK_No._12_ttg_Penyelenggaraan_Imunisasi_.pdf
15. Ministry of Health, Republic of Indonesia: Report on National Basic Health Research East Java Province, 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019 [cited 22 Dec. 2019]. Available from: http://www.dinkes.kedirikab.go.id/konten/uu/22033-hasil-riskesdas-jatim-2018.pdf
16. Ministry of Health, Republic of Indonesia: National Health Profile 2018. Jakarta : Ministry of Health, Republic of Indonesia [cited 22 Dec. 2019]. Available from: http://dinkes.surabaya.go.id/portal/profilkesehatan2018.pdf
17. Indonesian Pediatric Society. Recommendations: Pediatric Nutrition Care. Jakarta: Indonesian Pediatric Society; 2011. pp. 4-9.
18. Fidhow AM, Samwel A, Ng'ang'a Z, Oundo J, Nyangao J, Wences A. Molecular Epidemiology and Associated Risk Factors of Infection among Children < 5 Yrs Hospitalized for Acute Gastroenteritis in North Eastern, Kenya, 2012. Pan African Medical Journal. 2017 Nov 3;28(Suppl 1):3.
19. Sowmyanarayanan T, Ramani S, Sarkar R, Arumugam R, Warier J, Moses P, et al. Severity of Rotavirus Gastroenteritis in Indian Children Requiring Hospitalization. Vaccine. 2012;30:A167-A172.
20. Gupta S, Krishnan A, Sharma S, Kumar P, Aneja S, and Ray P. Changing pattern of Prevalence, Genetic Diversity, and Mixed Infections of Viruses Associated with Acute Gastroenteritis in Pediatric Patients in New Delhi, India. Journal of Medical Virology. 2018;90:469–476.
21. Junaid SA, Umeh C, Olabode AO, Banda JM. Incidence of Rotavirus Infection in Children with Gastroenteritis Attending Jos University Teaching Hospital, Nigeria. Virology Journal. 2011;8:233.
22. Duffy LC, Byers TE, Riepenhoff-Talty M, La Scolea LJ, Zielezny M, Ogra PL. The Effects of Infant Feeding on Rotavirus-Induced Gastroenteritis: A Prospective Study. American Journal of Public Health. 1986;76(3):259-63.
23. Wobudeya E, Hanifa B, Karamagi CK, Kalyango JN, Mutebi E, Wamani H. Breastfeeding and the Risk of Rotavirus Diarrhea in Hospitalized Infants in Uganda: A Matched Case Control Study. BMC Pediatri. 2011;11:1–7.
24. Shen J, Zhang B, Zhu S, and Chen J. No Direct Correlation Between Rotavirus Diarrhea and Breastfeeding: A Meta-Analysis. Pediatrics & Neonatology. 2018;59(2):129-135.
25. Rodriguez L, Cervantes E, Ortiz R. Malnutrition and Gastrointestinal and Respiratory Infections in Children: A Public Health Problem. International Journal of Environment Research and Public Health. 2011;8:1174–1205
26. Kotloff KL, Nataro JP, Blackwelder WC, Nasrin D, Farag TH, Panchalingam S, et al. Burden and Aetiology of Diarrhoeal Disease in Infants and Young Children in Developing Countries (the Global Enteric Multicenter Study, GEMS): a prospective, case-control study. Lancet. 2013;382:209–222.
27. Guiraldes E, Hamilton JR. Effect of Chronic Malnutrition on Intestinal Structure, Epithelial Renewal, and Enzymes in Suckling Rats. Pediatric Research. 1981;15: 930–934.
28. Hu L, Crawford SE, Czako R, Cortes-Penfield NW, Smith DF, Le Pendu J, et al. Cell Attachment Protein VP8 of A Human Rotavirus Specifically Interacts with A-Type Histo-Blood Group Antigen. Nature. 2012;485:256–259.
29. Ramig RF. Pathogenesis of Intestinal and Systemic Rotavirus Infection. Journal of Virology. 2004;78(19):10213–10220.

30. Verkerke H, Sobuz S, Ma JZ, Petri SE, Reichman D, Qadri, F, et al. Malnutrition Is Associated with Protection from Rotavirus Diarrhea: Evidence from a Longitudinal Birth Cohort Study in Bangladesh. Journal Clinical Microbiology. 2016;54(10):2568-74.

31. Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global Illness and Deaths Caused by Rotavirus Disease in Children. Emerging Infectious Diseases. 2003;9(5):565–572.

Analysis of Patient Safety and Occupational Health Safety in Surabaya Haji Hospital

Rusmina

Faculty of Public Health, Airlangga University, Indonesia

Abstract

Introduction: Safety standards are one of the important indicators of hospital services. But so far there have been no studies that discuss safety efforts in the Surabaya Haji Hospital. This study aims to study and understand the management in the Intensive Care, Central Surgery and Inpatient Installation of the Surabaya Hajj Hospital, especially the standards of patient safety and occupational health safety in the hospital. **Method:** The study used primary data from observation, in-depth interviews, and secondary data from each unit. Study location were in Intensive Care Unit, Central Surgery Installation and Inpatient Installation. **Results:** This study shows the efforts of the Surabaya Haji Hospital in ensuring patient safety and work safety in the hospital environment. In general, the steps of hospital management were right. Patient safety procedures referred to service quality standards at JCI hospitals. While work safety efforts in hospitals have also received attention because a special team has been formed that regulates hospital health and safety. **Conclusion:** To ensure patient safety and occupational health safety in the hospital runs according to established procedures, hospital management needs to conduct regular supervision.

Keywords: *patient safety, occupational health, hospital, services quality*

Introduction

Hospital is the center of specialist and subspecialist medical referral services, with the main function of providing and organizing healing (curative) and recovery (rehabilitative) as the health efforts for the patients[1,2]. According to those main functions, it needs an arrangement so the hospital can utilize its resources more efficiently and effectively.

The future hospital should be prepared by following the new paradigm where people start to perceive hospital as the center of excellence, hence hospital cannot perform unprofessional and underperform quality of services, considering the constant increase of people awareness for the satisfying health service needs, not merely focus on medical services system alone, but also doing an improvement in managerial system. The improvement effort of hospital managerial needs innovation, creativity, development, and a broaden mind to be able to compete fairly and give an optimal advantage for the external customer (the health service user) as well as the internal customer (the hospital workers).

A quality health service was one of the basic needs of all people. It has been realized long time ago, therefore every policy of health development by the government always aimed to increase the health quality services to the people. A lot of efforts have been made to increase the quality of health service through accreditation or institution specification of health service provider. The hospital growth as the center of the health service was rapid because of the role and function of the hospital in giving the complete health service to the people either promotion, prevention, medication and rehabilitation[3,4,5]. The hospital should compete fairly, its service should follow the current demands. Hospital should improve itself in technological development, quality of human resources, including the health services provider resources and administrative resources.

This study aimed to learn and understand the management in Intensive Care Unit, Central Surgery Installation, and Inpatient Installation of Surabaya Haji Hospital especially on patient safety standard and occupational health safety in hospital[6,7].

Method

This study used direct observation in Intensive Care Unit, Central Surgery Installation, and Inpatient Installation in Surabaya Haji Hospital. The data obtained by direct interviews and the existed data in Intensive Care Unit, Central Surgery Installation, and Inpatient Installation in Surabaya Haji Hospital.

Result and Discussion

Patient Safety

Hospital patient safety standard referred to "*Hospital Patient Safety Standards*" which published by *Joint Commission on Accreditation of Health Organization*, Illinois, USA, in 2002 which was adopted to the hospital situation and condition in Indonesia. Those patient safety standards consisted of seven points, i.e: patient rights, educate the patient and their family, patient safety and service balance, the use of performance improvement methods to do evaluation and safety improvement programs, leadership role in patient safety improvement, communication is a key for the staffs to achieve the patient safety.

According to patient safety standard, therefore Surabaya Haji Hospital designed a new process or fixed the existing process, monitored and evaluated the performance through data collection, intensively analyzed the Unexpected Event, and did a change to improve quality performance and patient safety. The designed process should refer to the Surabaya Haji Hospital visions, missions, and goals, patient needs, health service providers, actual clinical principle, healthy business practice, and other factors which potentially risking the patient[8,9,10].

The Seven Steps of Hospital Patient Safety are: (1) raise the awareness of patient safety value, (2) lead and support your staff,

(3) integrate risk management activity,

(4) develop reporting system,

(5) involve and communicate with patient,

(6) learn and share the patient safety experience, (7) prevent injury through the implementation of patient safety system.

Related with the attempts to increase the patient safety specifically. These targets highlighted the troubled area in health service and elaborate the solutions of a consensus based on proof and skill towards the problem. With the recognition that a good system design was intrinsic/merge in delivering of a safe and high-quality care, generally the goal targets focused on systemic solution, if possible[11].

The 6 patient safety targets are:

1. Accuracy of patient identification

2. Enhancement of effective communication

3. Enhancement the drug safety of high alert medication

4. Certainty of precise-location, precise -procedure, precise-operated patient

5. Reduction the infection risk related to health service

6. Reduction of fall risk

To support the patient safety achievement, thus Surabaya Haji Hospital will do the patient safety monitoring and evaluation program. The monitoring and evaluation steps which will be done are [12,13]:

1. All management staffs of Surabaya Haji Hospital will periodically be doing the patient safety monitoring and evaluation program which conducted by the Surabaya Haji Hospital Safety and Quality Committee.

2. Surabaya Haji Hospital Patient Safety Committee periodically (maximum in 3 years) do the patient safety guidelines, policy, and procedure which used in the hospital.

3. Surabaya Haji Hospital Patient Safety Committee do the monitoring (supervised the services unit) once in a month. Surabaya Haji Hospital Patient Safety Team do the activities evaluation every three months and make the follow-up.

Occupational Safety

Occupational health and safety were the effort to give a safety assurance and increase the workers health degree by preventing work related disease, workplace

hazard control, health promotion, medication, and rehabilitation.

The hospital occupational health and safety programs were:

1. Occupational health and safety service standard

2. Do the health check before work for the worker

3. Conduct the occupational health and safety education and promotion/workshop and provide help to the hospital workers in self adaptation either physically or mentally with their job

4. Do health examination periodically at minimum once in a year

5. Improve worker's body health, mental condition, and physical ability (additional nutrition, exercise, recreation and mental/spiritual coaching)

6. Provide medication and rehabilitation for the workers which suffer from illness (free basic medication, provide medication and bear the medication expenses for the workers with work related disease)

7. Conduct work environment monitoring and ergonomic which related to occupational health (physical, chemical, biological, psychosocial, and ergonomic monitoring/measurement)

8. Occupational health and safety standard for infrastructure, facilities, and work tools

9. Coaching and supervision for the infrastructure, facilities, and health equipment (operational permit, calibration, operational SOP)

10. Coaching and supervision or adjustment of work equipment to the workers (identification and risk measurement)

11. Coaching and supervision of the working environment (working environment meet the physical, chemical, biological, ergonomic, and psychosocial requirements)

12. Coaching and supervision of the sanitation (food, beverage, water, laundry, waste and rubbish, insect and rat control, sterilization/disinfection, radiation protection)

13. Coaching and supervision of work safety equipment (safety sign, provision of work safety equipment)

14. Occupational safety promotion/workshop

15. Coaching and supervision of fire countermeasure system management (fire prevention and countermeasure infrastructure and facilities, SOP, socialization, and fire drill)

16. Reporting and follow up system

17. Evaluation, recording, and reporting occupational safety activities.

Through their activities Surabaya Haji Hospital provided secure, functional, and supportive facilities for the families, staffs, and visitors. In the book of Hospital Occupational Health and Safety, Surabaya Haji Hospital determined to conduct hospital occupational health and safety as follow [11,12]

1. Reducing and controlling hazard and risk

2. Preventing accident and injuries

3. Maintain the safety condition

As for the facilities provided by Surabaya Haji Hospital for the staffs in Inpatient Installation were:

1. Workshop and refreshment on disaster and fire management

2. Provide a proper work safety equipment

3. Provide the health examination facilities

4. Provide the fire extinguishers facilities in each policlinic waiting room

5. Provide written evacuation sign facilities for the fire/disaster incident.

6. Do the calibration for the health equipment

Conclusion

This study showed Surabaya Haji Hospital efforts to ensure the patient safety and occupational safety in hospital environment. In general, hospital management steps have been done properly. The patient safety procedure has referred to the JCI standard quality of services [12,13]. While the hospital work safety has been a concern which proved by the establishment of a special

team which organize the hospital health and safety. In order to ensure the patient safety and hospital work safety could be functionate according to the established procedure, the hospital management should routinely perform supervision.

Ethical Clearance: This research has been approved by Health Research Ethics Committee of Faculty of Nursing Universitas Airlangga Number 1777-KEPK in 2019.

Source of Funding: Self

Conflict of Interest

There is no conflict of interest.

References

[1] Gibson J., Ivancevich J., Konopasche R.. Organization: Behaviour Structure,2011

[2] Kementrian Kesehatan RI, , Pedoman Teknis Bangunan Kamar Operasi Rumah Sakit, Jakarta. 2012

[3] Kementrian Kesehatan RI, Pedoman Teknis Bangunan Ruang Rawat Inap Rumah Sakit, Jakarta, 2012

[4] Kementrian Kesehatan RI, Pedoman Teknis Bangunan Rumah Sakit Kelas B, 2012

[5] Kementrian Kesehatan RI, Pedoman Teknis Bangunan Rumah Sakit Ruang Perawatan Intensif, 2012

[6] Peraturan Menteri Kesehatan no.1045, Pedoman Organisasi Rumah Sakit di Lingkungan Departemen Kesehatan, Jakarta,2006

[7] Peraturan Menteri Kesehatan no.129, Standart Pelayanan Minimal Rumah Sakit, Jakarta, 2008

[8] Peraturan Menteri Kesehatan no.1438, Standart Pelayanan Kedokteran, Jakarta. , 2010

[9] Peraturan Menteri Kesehatan no.56, Klasifikasi dan Perizinan Rumah Sakit, Jakarta , 2014

[10] Robbins, Stephen P. Judge, Timothy A. Perilaku Organisasi Buku 2. Jakarta: Salemba, 2007

[11] UU RI No.44, Rumah Sakit, Jakarta. 2009

[12] Peraturan Menteri Kesehatan no.1691, Keselamatan Pasien Rumah Sakit, 2011

[13] Joint Commission International Accreditation Standards for Hospitals,6th edision, 2017

Correlation between Helicobacter Pylori Infection with Gastroesophageal Reflux Disease Degree

Safriadi Musa[1], Fardah Akil[2], Nu'man As Daud[2], Syakib Bakri[1] Haerani Rasyid[1], Faridin HP[1], Risna Halim[1]

[1]Internal Medicine Department, Faculty of Medicine, Hasanuddin University, [2]Gastroenterohepatology Division, Internal Medicine Department, Faculty of Medicine, Hasanuddin University, Makassar, South Sulawesi, Indonesia

Abstract

Background: Gastroesophageal reflux disease (GERD) is a pathological condition as a result of gastric contents reflux into the esophagus. Acid reflux is the major irritant for the esophagus in the development and progression of GERD. A number of theories have developed regarding the correlation of gastric acid secretion and the development of GERD, one of which has attracted attention and controversy is the effect of *Helicobacter pylori* (H. Pylori) infection on acid secretion. This study aims to look at the correlation of the GERD degree with H Pylori infection.

Methods: This was an observational study with a cross-sectional approach in GERD patients who were diagnosed based on endoscopic examination at the Gastro Center of Wahidin Sudirohusodo Hospital and histopathology examination was performed to determine the presence of H. pylori infection from July 2017 to December 2018. Statistical analysis was performed by descriptive and frequency distribution with Chi Square test statistics using SPSS 25

Results: There were 151 subjects, 85 male subjects (56.3%) and 66 female subjects (43.7%), 20 subjects (13.2%) of whom had H. pylori infection. In this study the GERD degree was more mild with H. pylori infection than with negative H. pylori infection, but the correlation was not statistically significant.

Conclusion: The degree of GERD in H. pylori infection is more mild though there is no significant correlation.

Keywords: *Gastroesophageal reflux disease, Helicobacter pylori, degree*

Background

Gastroesophageal reflux disease (GERD) is a pathological condition as a result of gastric contents reflux into the esophagus with a variety of symptoms that arise due to involvement of the esophagus, pharynx, larynx and airway.[1] GERD is a condition that occurs due to reflux of gastric contents that cause disturbing symptoms or complications caused.[2,3] Based on Los Angeles (LA) classification of endoscopy examination, eGERD is divided into 4 degrees, A to D with degrees of C-D as complications in the form of Barret's oesophageal and strictures.

The prevalence of population-based GERD worldwide is 13%. The prevalence of GERD was previously found to be highest in South Asia and Southeast Europe (> 25%), and lowest in Southeast Asia, Canada, and France (<10%), but since the mid-1990, the prevalence of GERD symptoms in North America, Europe and Asia southeast increased 50% from the previous prevalence.[4]

Pathophysiology of GERD is multifactorial and often associated with the cause of *Helicobacter pylori* (H. pylori) infection.[5] Population prevalence in developed countries is around 30-40%, while in developing countries it reaches 80-90%.[6] The prevalence of H.

Corresponding Author *:*
Safriadi Musa, Internal Medicine Department, Faculty of Medicine, Hasanuddin University, Perintis Kemerdekaan St, Makassar, South Sulawesi, Indonesia

pylori infection from 5 major tribe groups in Indonesia is around 22.1%, with the Bugis tribe found in 11 of 30 dyspeptic patients infected with H. pylori. Ethnic Papuans, Bataks and Bugis have a higher risk for H. pylori infection than Javanese, Dayaks and Chinese with risk factors are age, religion, and water source.[7]

Polat FR et al, provides significant evidence of the role of H. pylori infection in the development of GERD. The effect of infection on acid secretion is determined by several factors including the location and extent of the infection, inflammation severity, which is partly determined by the strain of H. pylori, and gastric atrophy severity.[8]

Several reports on the correlation between the severity of reflux esophagitis and H. pylori have been widely reported.[9] In Indonesia research on the correlation betweeen H. pylori infection with GERD degree has not been widely reported. Therefore, this study was conducted.

Method

This is an observational study with a cross-sectional approach. Study was conducted at Gastroenterohepatology Center Wahidin Sudirohusodo Hospital Makassar from June 2019 to August 2019. Study population was obtained from the medical record data of GERD patients who underwent treatment at the Gastroenterohepatology Section of Wahidin Sudirohusodo Hospital. The sample was taken from populations that met the study criteria. Inclusion criteria consisted of patients diagnosed with GERD and had endoscopy, age ≥ 18 years, complete medical record data, nonpregnant patients. Exclusion Criteria consisted of upper gastrointestinal malignancy, Hiatus Hernia. Statistical analysis was performed by descriptive and frequency distribution with Chi Square test statistics using SPSS 25.

Results

In this study, 151 subjects with GERD were identified through endoscopy, 20 subjects (13.2%) of whom had H. pylori infection, age between 18-83 years with mean 46.0 ± 14.5 years, where male 85 subjects (56.3%) and women 66 subjects (43.7%).

Table 1. Baseline Characteristics of The Study Subjects (n=151)

Variable		H. Pylori (+) n (%)	H. Pylori(-) n (%)	Total n
Gender	Male	11(12,9)	74(87,1)	85
	Female	9(13,6)	57(86,4)	66
Age	<30 years old	3(11,5%)	23(88,5)	26
	30-39 years old	3(16,7)	15(83,3)	18
	40-49 years old	9(17,0)	44(83,0)	53
	50-59 years old	0(0)	23(100)	23
	>=60 years old	5(16,1)	26(83,9)	31
Tribe	Bugis	12(17,1)	58(82,9)	70
	Makassar	0(0)	21(100)	21
	Toraja	6(24,0)	19(76,0)	25
	Mandar	0(0)	8(100)	8
	Others	2(7,4)	25(92,59)	27
GERD Q score	<8	4(12,5)	28(87,5)	32
	≥8	16(13,4)	103(86,2)	119
GERD Degree	NERD	3(12,5)	21(87,5)	24
	GERD A	16(14,5)	94(85,5)	110
	GERD B	1(5,9)	16(94,1)	17
NSAID	No history	18(20,2)	71(79,8)	89
	Present	2(3,2)	60(96,8)	62
Smoking	No history	13(11,0)	105(89,0)	118
	Present	7(21,2)	26(78,8)	33
BMI	Underweight	1(4,3)	22(95,7)	23
	Normal	15(9,7)	61(80,3)	76
	Overweight	3(13,0)	20(87,0)	23
	Obese	1(3,4)	28(96,6)	29

The age range of 40-49 years is the most research subjects, 53 subjects (35.1%) and the age range 30-39 years is 18 subjects (11.9%) as the fewest, with the majority of Bugis 70 subjects (46.4%). H. pylori infections were 20 subjects (13.2%). Based on the GERD score, the GERD score ≥8 is the most, 119 subjects (78.8%) and for the GERD score <8, 32 subjects (21.2%). For the positive H. pylori infections found in the Bugis tribe mostly 12 subjects (60%).

Table 2. Correlation Between H. pylori Infection with GERD Degree Based On Endoscopic Results

H. pylori Infection			GERD Degree			Total	P
			NERD	GERD A	GERD B		
	Positive	N	3	16	1	20	0,614
		%	15,0%	80,0%	5,0%	100,0%	
	Negative	N	21	94	16	131	
		%	16,0%	71,8%	12,2%	100,0%	
Total		N	24	110	17	151	
		%	15,9%	72,8%	11,3%	100,0%	

Chi Square test

Table 2 shows that the percentage of GERD A was found to be higher in positive H. pylori (80.0%) than in negative H. pylori (71.8%) infection, whereas GERD B was found to be higher in negative H. pylori (12.2%) compared to H pylori positive (5.0%) infection, but statistically not significant (p> 0.05).

Table 3. Correlation Between GERD Q Score with GERD Degrees

GERD Q score			GERD Degree			Total
			NERD	GERD A	GERD B	
	<8	n	4	26	2	32
		%	12,5%	81,3%	6,3%	100,0%
	>=8	n	20	84	15	119
		%	16,8%	70,6%	12,6%	100,0%
Total		n	24	110	17	151
		%	15,9%	72,8%	11,3%	100,0%

P = 0,451

P = 0,451

Table 3 shows the percentage of GERD A was found to be highest at a score of <8 (81.3%) while the percentage of GERD B was found to be highest at a score of ≥8 (12.6%) but statistically not significant (p> 0.05).

Table 4 shows that the percentage of GERD A was found to be highest in normal BMI (78.9%) and lowest in obese 2 (25.0%), while GERD B was found highest in obese 1 (28.0%) and lowest in normal BMI (5.2%).

Table 4. Correlation Between BMI with GERD Degrees

BMI			GERD Degree NERD	GERD A	GERD B	Total	P
	Underweight	N	4	16	3	23	
		%	17,4%	69,6%	13,0%	100,0%	
	Normal	N	12	60	4	76	
		%	15,8%	78,9%	5,3%	100,0%	
	Overweight	N	4	17	2	23	
		%	17,4%	73,9%	8,7%	100,0%	0,051
	Obese 1	N	2	16	7	25	
		%	8,0%	64,0%	28,0%	100,0%	
	Obese 2	N	2	1	1	4	
		%	50,0%	25,0%	25,0%	100,0%	
Total		N	24	110	17	151	
		%	15,9%	72,8%	11,3%	100,0%	

Table 5 shows that the percentage of GERD A was found to be higher in the nonsmoking group (72.9%) than in those who smoked (72.7%), likewise GERD B was found higher in nonsmokers (11, 9%) compared to smoking (9.1%), but not statistically significant (p> 0.05).

Table 5. Correlation Between Smoking with GERD Degrees

Smoking			GERD Degree NERD	GERD A	GERD B	Total	P
	No	n	18	86	14	118	
		%	15,3%	72,9%	11,9%	100,0%	
	Yes	n	6	24	3	33	0,854
		%	18,2%	72,7%	9,1%	100,0%	
Total		N	24	110	17	151	
		%	15,9%	72,8%	11,3%	100,0%	

Table 6 shows that the percentage of GERD A was found to be higher in subjects with a history of NSAID use (79.0%) compared to subjects without NSAID users (68.5%), whereas GERD B was found to be almost the same between those with history and those without history (about 11%), but not statistically significant (p> 0.05).

Table 6. Correlation between NSAIDs with GERD Degrees

NSAID			GERD Degree NERD	GERD A	GERD B	Total	P
	No	N	18	61	10	89	
		%	20,2%	68,5%	11,2%	100,0%	
	Yes	N	6	49	7	62	0,211
		%	9,7%	79,0%	11,3%	100,0%	
Total		N	24	110	17	151	
		%	15,9%	72,8%	11,3%	100,0%	

Discussion

Increased prevalence of GERD may be caused by several factors such as older age, male gender, race, analgetic intake, consumption of certain types of food and drinks, decreased prevalence of *Helicobacter pylori* infection, smoking, family history of GERD, high Body Mass Index (BMI), and limited physical activity. These risk factors are mostly related to the patient's lifestyle.[10]

In Indonesia, several studies also found that the percentage of GERD incidence was higher in males than females. Arif et al found a higher prevalence in males than females.[11] Man Wang et al, reported a higher proportion of GERD in males compared to non-erosive.[12]

This study found that the percentage of GERD A was found to be highest at the age of 40-49 years (77.4%) and the lowest at the age of 30-39 years (66.7%), while GERD B was found to be highest at the age of 50-59 years (21.7%) and the lowest at age <30 years (3.8%), but not statistically significant (p> 0.05).

Huang et al in found that in elderly patients the degree of gastroesophageal reflux and esophageal lesions was more severe, compared with younger patients.[13] Gastric dysmotility with delayed gastric emptying and duodenogastric bile reflux play an important role in the pathogenesis of GERD in elderly patients.[14]

This study found the most prevalent in the Bugis tribe were 12 subjects (60%). Syam AF et al found that ethnic Papuans, Bataks and Bugis had a higher risk for H. pylori infection than Javanese, Dayaks and Chinese. It is still unclear why there is a difference in the prevalence of H. pylori infection in Sulawesi. The possibility of differences in prevalence is due to differences in the phenotype of H. pylori.[7]

The percentage of GERD A was found to be higher in positive H. pylori (80.0%) than in negative H. pylori (71.8%), whereas GERD B was found to be higher in negative H. pylori (12.2%) than in Positive H. pylori (5.0%) Although there was no significant correlation, this study illustrates that the tendency of patients with positive H. pylori has more mild GERD degree compared to patients with negative H. pylori.

Fatin Polat et al found significant evidence of the role of H. pylori infection in the development of GERD.[15] Aswathy et al found an association of H. pylori infection in endoscopy and histological features of GERD where the prevalence of GERD severity increased, found positive H. pylori decreased.[16] Chaurasia et al found that H. pylori infection was associated with a reduction in gastric acidity and a less severe GERD degree. Mohameed S et al found there was no statistically significant correlation between H. pylori infection and oesophagitis reflux.[17] Manes et al concluded that the presence of H. pylori had no effect on esophageal motility, lower esophageal sphincter pressure, or gastro-esophageal reflux.[18] Kuipers et al concluded eradication of H. pylori using a proton pump inhibitor did not show a significant correlation with GERD severity.[19]

This study found that a greater GERD Q score did not reflect the degree of damage to the esophageal mucosa. Wang et al, found the higher GERD Q score, the more severe the erosion of the esophageal mucosa.[12] Pace et al reported no correlation between GERD Q score and the erosive degree. In NERD patients where the pathogenesis underlying the complaint arises not only because of mucosal damage, but is caused by 3 mechanisms: the incidence of reflux itself, esophageal hyperalgesia, and psychological disorders.[20]

Obesity is associated with a significant 1.5 to 2-fold increase in the risk of symptoms of GERD and erosive esophagitis, compared to individuals with a normal BMI.[21] This study also showed a higher percentage of patients with Obesity compared to patients with normal BMI which was found in patients with GERD B, where the highest percentage was found in obese 1 (28.0%) and lowest in normal BMI (5.2%). While the percentage of GERD A was found to be highest in normal BMI (78.9%) and lowest in obese 2 (25.0%).

Ruzniweski et al shows that GERD symptoms are significantly more common in GERD patients who use NSAIDs and the same results are found in those who take aspirin. Medicaid Study in the United States on 163,000 patients, the risk of GERD was twice as high in NSAID patients, as well as community-based studies in the United Kingdom finding common GERD symptoms in those with NSAIDs.[22] Markku V et al found that the use of NSAIDs is a risk factor for GERD. However, the effect of prostaglandins on the use of NSAIDs on oesophageal motility remains controversial so that the mechanism of damage to the esophageal mucosa due to the use of NSAIDS is unknown.[23]

This study also found no significant correlation between GERD degree and NSAIDs use. The percentage of GERD A and GERD B was found to be almost the same in existing patients with no history of NSAID use. The results of this study have not specifically differentiated groups of patients based on the type of NSAID used or the length of use of NSAID.

Conclusion

The degree of GERD in H. pylori infection is more mild though there is no significant correlation.

Conflict of Interest: No Potential conflict of interest relevant to be declared

Source of Funding: This study was conducted with self funding , no external funding sources for this study

Ethical Clearance: The study protocol was approved by the Ethics Committee in Research of our instituion (Hasanuddin University), following the ethical reccomendations from the Helsinki Declaration of 1975.

References

1. Makmun D. Penyakit Refluks Gastrointestinal. In: Buku ajar ilmu penyakit dalam. Jakarta: Pusat Penerbitan Departemen Ilmu Penyakit Dalam FKUI; 2014. p. 1748–56.
2. Vakil N. A global evidence-based consensus definition and classification of gastroesophageal reflux disease. Ther Res. 2006;27(5):805–12.
3. Fock KM, Talley NJ, Fass R, et al. Asia-Pacific consensus on the management of gastroesophageal reflux disease: Update. J Gastroenterol Hepatol. 2008;23(1):8–22.
4. Richter JE, Rubenstein JH. Presentation and Epidemiology of Gastroesophageal Reflux Disease. Gastroenterology [Internet]. 2018;154(2):267–76. Available from: https://doi.org/10.1053/j.gastro.2017.07.045
5. Hong SJ, Kim SW. Helicobacter pylori infection in gastroesophageal reflux disease in the Asian countries. Gastroenterol Res Pract. 2015;2015.
6. Rani AA. Infeksi Helicobacter Pylori dan Penyakit Gastroduodenal. Jakarta: Pusat Penerbitan Departemen Ilmu Penyakit Dalam FKUI; 2014. 1772–1776 p.
7. Syam AF, Miftahussurur M, Makmun D, et al. Risk factors and prevalence of Helicobacter pylori in five largest islands of Indonesia: A preliminary study. PLoS One. 2015;10(11):1–14.
8. Diamant N. Pathophysiology of Gastroesofagheal Reflux Disease. GI Motil Online [Internet]. 2006;
9. Nam SY. Helicobacter pylori has an inverse relationship with severity of reflux esophagitis. J Neurogastroenterol Motil. 2011;17(3):209–10.
10. Yamasaki T, Hemond C, Eisa M, et al. The changing epidemiology of gastroesophageal reflux disease: Are patients getting younger? J Neurogastroenterol Motil. 2018;24(4):559–69.
11. Syam AF, Hapsari PF, Makmun D. The Prevalence and Risk Factors of GERD among Indonesian Medical Doctors. Makara J Heal Res. 2016;20(2).
12. Wang M, Zhang JZ, Kang XJ, et al. Relevance between GerdQ score and the severity of reflux esophagitis in Uygur and Han Chinese. Oncotarget. 2017;8(43):74371–7.
13. Huang X, Zhu HM, Pace F et al. Gastroesophageal reflux: The features in elderly patients. World J Gastroenterol. 1999;5(5):421–3.
14. Chait MM. Gastroesophageal reflux disease: Important considerations for the older patients. World J Gastrointest Endosc. 2010;2(12):388.
15. Polat FR, Polat S. The Effect of Helicobacter Pylori on Gastroesophageal Reflux Disease. JSLS J Soc Laparoendosc Surg [Internet]. 2012;16(2):260–3.
16. Chandramohan A, Ramadevi AV, Shenoy K. Association of Helicobacter pylori infection with gastroesophageal reflux disease. J Int Med Res. 2016;47(2):748–53.
17. Gooma M, M M. Correlation Between Helicobacter Pylori Infection and Reflux Oesophagitis : still ongoing debate. Egypt J Intern Med. 2017;7(1):24.
18. Manes G, Esposito P, Lioniello M, et al. Manometric and pH-metric features in gastro-oesophageal reflux disease patients with and without helicobacter pylori infection. Dig Liver Dis. 2000;32(5):372–7.
19. Kuipers EJ, Nelis GF, Klinkenberg-Knol EC, et al. Cure of Helicobacter pylori infection in patients with reflux oesophagitis treated with long term omeprazole reverses gastritis without exacerbation of reflux disease: Results of a randomised controlled trial. Gut. 2004;53(1):12–20.
20. Pace F, Porro GB. Gastroesophageal reflux disease: A typical spectrum disease (A new conceptual framework is not needed). Am J Gastroenterol.

2004;99(5):946–9.

21. El-Serag H. The association between obesity and GERD: A review of the epidemiological evidence. Dig Dis Sci. 2008;53(9):2307–12.
22. Ruszniewski P, Soufflet C, Barthélémy P. Nonsteroidal anti-inflammatory drug use as a risk factor for gastro-oesophageal reflux disease: An observational study. Aliment Pharmacol Ther. 2008;28(9):1134–9.
23. Voutilainen M, Sipponen P, Mecklin JP, et al. Gastroesophageal reflux disease: Prevalence, clinical, endoscopic and histopathological findings in 1128 consecutive patients referred for endoscopy due to dyspeptic and reflux symptoms. Digestion. 2000;61(1):6–13.

Original Article

Analysis of Dengue Infection Severity among Ethnics in Surabaya, Indonesia

Sulistiawati, Suharto[2], Harianto Notopuro[3], Abyan Irzaldi[4], Adikara Pagan Pratama[5]

[1]Senior Lecture / Associate Professor, Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Airlangga, [2]Professor of Tropical Disease, Department of Internal Medicine, Dr. Soetomo Teaching Hospital-Faculty of Medicine, Universitas Airlangga, [3]Professor of Biochemistry Medicine, Department of Biochemical Medicine, Faculty of Medicine, Universitas Airlangga, [4]Staff Internship, [5]Junior Lecturer, Faculty of Medicine Universitas Airlangga

Abstract

Background: Dengue infection prevalence remains high in tropical countries, including Indonesia, whereas the government had struggled to overcome the disease. Indonesia has very diverse ethnicities living across the archipelago, there might be a wide variety of susceptibility and severity.

Objective: This research was aimed to analyse ethnicity as a risk factor for dengue infection severity in Surabaya, Indonesia.

Design and Methods: This research observed Dengue Hemorrhage Fever (DHF) or Dengue Fever (DF) patients aged over 12 years, who were hospitalized in three private hospitals in Surabaya. Data collection was conducted from March 20, 2013 to May 20, 2013 with a sample size of 95 patients. Ethnicity, dengue infection severity, clinical findings, and relevant laboratory information data were obtained. This was a cross-sectional study design with consecutive sampling. All data were analysed using SPSS 17.00 software. The statistical analysis was performed at a significance level of p-value <0.005 using the chi-square test.

Results: The majority of patients who suffered from severe dengue infection based on WHO classification and bleeding symptoms were Chinese patients (82.1%). The laboratory results pointed out Chinese patients had the highest hemoglobin concentration (15.62 ± 1.70 %), highest PCV (44.90 ± 4.23 g/dl), and the lowest platelets (31.42 ± 22.05 x 103µl). There were significant dengue infection severity difference (p=0.015), hemoglobin increase (p=0.004), PCV (0.024), and platelets (p=0.006) between Chinese, Javanese, and other ethnicities.

Conclusion: Chinese ethnic had the highest risk of suffering severe dengue infection in Surabaya.

Keywords: *dengue infection severity; ethnicity; Indonesia; Chinese; Javanese*

Introduction

Dengue Hemorrhagic Fever (DHF) and Dengue Fever (DF) prevalence remain high in the tropical countries, include Indonesia. By 2008, the spread of DHF reached ± 69 countries in Southeast Asia, Western Pacific and the USA. The number of cases increases from 479,848 in 1990-1999 to 1,656,870 in 2000-2008 worldwide.[1] In Indonesia the incidents of DHF and DF in Indonesia reached 51 per 100,000 in 2007 with the Case Fatatily Rate (CFR) 1.8% and in 2009 reached 66.48 per 100,000 with the CFR 0.89%.[2] All sub-districts in Surabaya have become dengue endemic areas, the data from 2007 to 2011 are 113; 75.6; 78.43; 116; 36.22 per 100,000 while CFR are 0.7%; 0.46%; 0.26%; 0.4% and

Corresponding Author:
Sulistiawati
Department of Public Health and Preventive Medicine, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia, Jalan Mayjen Prof. Dr. Moestopo 47, Surabaya 60285, Indonesia, Phone numbers: +6281 2307 6528, E-mail: sulitwt@hotmail.com

0.69% respectively.[3]

Interaction of host-agent-environment affects the disease. Previous studies showed that the factors from host that could affect the manifestation of the disease are race/ethnic, sex, age, nutrition status, secondary infection and immune response.[4]

Ethnic or race might determine the manifestation of dengue. The Chinese who live in Singapore were found higher in attack rate of DHF than the Malay and the Indian.5 A study in Brazil showed that African people are more protective than the whites toward dengue virus. Indonesia is a country with diverse ethnicities and cultures, there might be a wide variety of susceptibility to dengue infection.6 In Indonesia, the Javanese is the largest ethnic group, the second is the Sundanese (15.51%), the third is the Malay, Batak and Madurese contribute 3.70%, 3.58% and 3.03%, respectively. There are another 10 ethnic groups, each contributing between 1.2% and 3.0%, with the Chinese as the lowest (1.20%) in this group.[7]

Manifestation of dengue infection varies which is characterized by bleeding symptoms and leakage of plasma, measured by Hematocrit (Hct) or Packed Cell Volume (PCV), hemoglobin and trobocytes depletion. DHF according to WHO (2011) is classified into 4 grades and added with expanded dengue syndrome.[1]

Finding out the description of the dengue infection severity based on the ethnicity could be used as a basis to create an effective model of prevention and management of the dengue infection. The model is created based on the ethnicity as its approach, thus the result is expected to be more effective and could indirectly help reducing the number of patients and death rate due to dengue infection in Indonesia, especially in Surabaya.

This study aims at analyzing the severity of dengue infection based on the ethnicity in Surabaya; Javanese, Chinese and other group ethnics.

Methods

The study was analytic observational with a cross sectional design. The sample was IgM and/or IgG dengue positive DHF/DF patients. With inclusion criterias were: not in a state of suffering from other severe infections and aged above 12 years old. Patients were hospitalised at 3 private hospitals in Surabaya between March 20th until May 20th 2013. Total sample was 95. Independent variable was ethnicity, while dependent variable was DHF severity based on WHO criteria in 2011.

Immnochromatography dengue strip test, PanBio™ duo cassete, was used to confirm the diagnosis with dengue IgM and IgG. Data of Hb, PCV and platelets were analyzed by the hospitals using hematology analyzer tool, products from Sysmex™ and Celltac™.

Results

Based on the ethnicity, most of patients identified themselves as Javanese (42.1%), while Chinese and other ethnic groups occupy almost the same (Table 1). Majority of patient suffered from severe category of DHF (62.1%). Laboratory data showed that Hb increase, platelets and leucocyte count decrease were severe in the most patients, 51.6%, 61.1%, 58.9%, respectively (Table 2).

Based on the bleeding symptoms that, in this study, are categorized into 3: severe (hematemesis, melena, epistaxis), moderate (*echimose*, spontaneous *petechia*) and mild (positive RL without bleedings), the study showed that severe and moderate bleedings are more commonly found among Chinese patients than Javanese and other group ethnics. The symptoms of mild bleedings are mostly found in among Javanese patients.

Table 3 showed that Chinese patients had highest mean of Hb and PVC and lowest mean of platelets compared to others. While other ethnic groups category showed lowest mean of leucocytes compared to Javanese and Chinese.

Chi-square statistical test shows that there are differences in the severity of dengue infection based on those indicators, except for leucocytes decrease, between Chinese, Javanese and other ethnic groups. (Table 4)

Table 1. Characteristic of patients

Variable	N (%)
Sex	
- Male	52 (54.7)
- Female	43 (45.3)
Age	
- Adolescence (12-16 years)	21 (22.1)
- Young adult (17-25 years)	32 (33.7)
- Midle age (26-45 years)	36 (37.9)
- Older adult (>45 years)	6 (6.3)
Ethnic	
- Chinese	28 (29.5)
- Javanese	40 (42.1)
- Others / mixed	27 (28.4)

Table 2. The diagnosis of dengue infection severity

The diagnosis of dengue infection severity	N (%)
• WHO criteria for DHF (2011)	
- Mild (DF & DHF grade I)	36 (37.9)
- Severe (DHF grade II, III, IV and DHF exp.)	59 (62.1)
• bleeding symptoms	
- Mild	36 (37.9)
- Moderate	46 (48.4)
- Severe	13 (13.7)
• PCV/haematocrite increase	
- Mild	49 (51.6)
- Severe	46 (48.4)
• Hb increase	
- Mild	46 (48.4)
- Severe	49 (51.6)
• Platelet decrease	
- Mild	37 (38.9)
- Severe	58 (61.1)
• Leucocytes decrease	
- Mild	39 (41.1)
- Severe	56 (58.9)

Laboratory (PCV, Hb, platelets, and leucocyte) were classified into two categories, mild and severe. Mild was when the laboratorial result is below the mean of all patients' results while severe was when the result is higher than the overall patients' results.

Table 3. Laboratory examination

Laboratory examination	**Mean ± SD**
• Highest PCV - Chinese - Javanese - other ethnics	44.06 ± 4.87 % 44.90 ± 4.23 % 43.27 ± 4.17 % 44.37 ± 6.28 %
• Highest Hemoglobin (Hb) - Chinese - Javanese - Other ethnics	15.14 ± 1.75 g/dl 15.62 ± 1.70 g/dl 14.62 ± 1.45 g/dl 15.44 ± 2.05g/dl
• Lowest Platelets - Chinese - Javanese - other ethnics	41,540 ± 27,940 /µl 31,420 ± 22,050 /µl 52,980 ± 29,790 /µl 35,110 ± 25,120 /µl
• Lowest Leucocytes - Chinese - Javanese - other ethnics	2,930 ± 1,360 /µl 2,810 ± 1,490 /µl 2,890 ± 1,150 /µl 2,120 ± 1,540 /µl

Table 4. Comparison of dengue infection severity based on ethnicity

Comparison of dengue infection severity based on ethnicity	**P value**
Severity based on WHO dengue classification and ethnicity	0.015
Severity based on hemoconcentration of Hb increase and ethnicity	0.004
Severity based on PCV/haematocrite increase and ethnicity	0.024
Severity based on platelets decrease and ethnicity	0.006
Severity based on leucocyte decrease and ethnicity	0.493

Discussion

Characteristics of Patients with Dengue Fever

Sex

Ratio of DHF/DF patients over the age of 12 years between male and female was slightly higher in male (54.7%). The finding also similiar with another research on dengue infections at Hasan Sadikin Hospital, Bandung, where the percentage of male patients was 50.7%.8 Another study conducted in Singapore showed that the ratio of male:female was 1.9:1, whereas in India was 1:0.57, respectively.5 These conditions might indicate that the proportion of DHF/DF incidents between men and women were almost equal.

Age

Group of 26-45 years old (37.9%) was higher than any other groups. Some studies in Latin America and Southeast Asia in the early 1980 showed that many dengue cases were suffered in older adult. In Singapore, the mortality alteration of dengue infection occurred at the older age, proved by the case of death in 1982 which 50% higher among > 15 years old (the age group of 15-34). In Bangladesh, the proportion of hospitalized dengue infection patients aged 18-33 years old was higher than any other age groups (82%).5 In Malaysia, dengue cases were suffered more in 13-35 years old people since 1982.9

Diagnosis of Dengue Infection Severity

According to WHO criteria for DHF, the most hospitalized patients were categorized as DHF grade II rather than DHF grade I, Dengue Fever or Dengue Shock Syndrome.1 This facts happened due to spontaneous bleeding symptoms on DHF grade II, which were not shown on grade I or dengue fever. Many of dengue fever patients usually not to go to hospitals because the symptoms are milder than DHF. This situation is also similar to a study in Iran that showed the highest inpatient case was DHF II (92%).10

The study of prognostic indicators of dengue infection severity showed a significant relationship between the value of PCV, platelets and leukocytes to the severity of dengue infection.11 In addition, a meta-analysis study showed that thrombocytopenia and PVC hemoconcentration were strongly associated with DSS.12 Moreover, another study found a significant relationship between dengue severity with thrombocytopenia (p: 0.002) and leukocytes (p: 0.067). The results of this study indicate that the severity of Hb, PCV, platelets and leukocytes is almost the same as shown by the percentage data from mild, moderate to severe.13

Based on the severity of bleeding symptoms, Chinese were suffered more serious bleeding symptoms compared to other ethnic groups. Based on the severity of Hb, PCV hemoconcentration and trombositopenia, Chinese have more severe symptoms as well. This condition showed that Chinese were more susceptible to severe clinical symptoms when they are infected by dengue compared to Javanese or other ethnics. The results of this study are similar to study conducted in Cuba showed the DHF/DSS ratio risk for the whites:blacks:mixed-race = 5.5:1:1.8, and also there was a tendency that a certain ethnicity become more susceptible than other ethnic groups.14 Chinese genetically have lighter skin color compared to Javanese, consequently they have more severe clinical symptoms. In addition, study in Singapore found the attack rate of Chinese was higher than Malay and Indian ethnic.5

The Differences of Dengue Infection Severity Based on Ethnicity

The ethnicity was mostly Javanese, eventhough the study was conducted in hospitals near Chinatown and area where the Arabian or Madurese live together. It happens as the larger number of Javanese descent (83.68%) lives in Surabaya compared to other ethnics, 7.5% Madurese, 7.25% Chinese, 2.04% Arabian and the rest is for other ethnic groups.

Based on Chi-square analysis, there was a significant difference of dengue infection severity between those 3 ethnic groups. Therefore, the difference of ethnicity can lead to the difference of infection response, which means there is a tendency of greater genetic difference in controlling the immune response in different ethnic groups compared to the same ethnic groups.

There were several studies discussing about the relation between genetic and the response to dengue infection; including HLA, HPA, vitamin D receptor,

etc. According to HL. Blum, someone's health status is influenced by the environment, genetic (heredity), and lifestyle as well as health services. The theory stated that the genetic is one factor contributing to health status.

This study showed different severity of dengue infection in different ethnicity. Ethnicity is a unique human population that differ from another due to frequency of particular gene and in its development are some variations in both genetic and phenotypic variation. There were some previous studies that showed differences of dengue infection severity between phenotypes whites, blacks or mixed-races. One of them showed that the whites have more risk than the colored ones. Those researches had same results with this study which is suggesting that Chinese is clinically more affected than Javanese or other ethnic.14 Another research conducted in Cuba showed that the percentage of DHF II and III in adults patients were 81% whites, 13% Caucasians-mixed and 6% blacks respectively. The mortality case was found in whites 77%, colored 14% and blacks 9%. These conditions happened due to a stronger specific immune response of whites to dengue virus, hence cytokine increased that led to more severe clinical manifestation.15

Study in Cuba showed that factor of varying severity of dengue infection in different ethnics due to the personalized immunological reaction, more specifically T-lymphocytes activation and cytokines. On the other hand, the polymorphism of human leukocyte antigene (HLA) region which encode specific protein roled in immune response. The variation of HLA has been known in several viral diseases, such as delayed progression of HIV and Hepatitis B carriage. Furthermore, T cell receptor which is directly response to dengue virus antigen might be vary in number distributed between different ethnics. The last is the role of monocytes expressing FCγ receptor which is main target of dengue infection antigen forming dengue virus-dengue antibodies immune complex.16 Beside the serotype of dengue virus also determine the severity of the disease.17

Conclusion

Chinese suffered the most severe dengue infection compared to Javanese and other ethnic groups. It is essential, when health professionals deal with dengue infected patients, to obtain information regarding the exact origin and ethnicity of the patient. Previous studies revealed that each ethnicity has different susceptibility on dengue virus. Thus, on this point forward doctor are going to treat Chinese patients of DHF / DF more intensively and to arrange a new procedure that increases the doctors' awareness in dealing with Chinese patients with dengue infections.

This paper also underlines the importance of preventing dengue infection by giving environmental intervention to reduce mosquito breeding sites, especially in Chinatowns.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this article.

Source of Funding: This study was privately funded by the authors.

Ethical Clearance: This study received approval from the Ethics Committee, Dr. Soetomo Hospital, Surabaya, no. 33/Panke.KKE/B/2013.

References

1. WHO. *Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Haemorrhagic Fever*.; 2011. doi:10.1017/CBO9781107415324.004
2. Kemenkes. *Demam Berdarah Dengue*. Vol 2.; 2010.
3. Dinkes Surabaya. *Profil Kesehatan Kota Surabaya Tahun 2012*.; 2012.
4. Hadinegoro SRS. The revised WHO dengue case classification: Does the system need to be modified? *Paediatr Int Child Health*. 2012;32(SUPP1):33-38. doi:10.1179/2046904712Z.00000000052
5. Guha-Sapir D, Schimmer B. Dengue fever: New paradigms for a changing epidemiology. *Emerg Themes Epidemiol*. 2005;2:1-10. doi:10.1186/1742-7622-2-1
6. Blanton RE, Silva LK, Morato VG, et al. *Genetic Ancestry and Income Are Associated with Dengue Hemorrhagic Fever in a Highly Admixed Population*. Vol 16.; 2008. doi:10.1038/ejhg.2008.4
7. Arifin EN, Ananta A, Wilujeng Wahyu Utami DR, Budi Handayani N, Pramono A. Quantifying Indonesia's Ethnic Diversity: Statistics at National,

Provincial, and District levels. *Asian Popul Stud*. 2015;11(3):233-256. doi:10.1080/17441730.2015.1090692

8. Prasetya DI, Hadisaputro S, Sofro MAU, Lukmono DT, Martini M. Faktor Karakteristik Klinis Host dan Sosiodemografik yang Berpengaruh Terhadap Kejadian Dengue Shock Syndrome. *J Epidemiol Kesehat Komunitas*. 2017;2(2):99. doi:10.14710/jekk.v2i2.4002
9. Sam SS, Omar SFS, Teoh BT, Abd-Jamil J, AbuBakar S. Review of Dengue Hemorrhagic Fever Fatal Cases Seen Among Adults: A Retrospective Study. *PLoS Negl Trop Dis*. 2013;7(5):1-7. doi:10.1371/journal.pntd.0002194
10. Dhooria GS, Bhat D, Bains HS. Clinical profile and outcome in children of dengue hemorrhagic fever in north India. *Iran J Pediatr*. 2008;18(3):222-228.
11. Pongpan. Prognostic Indicators for Dengue Infection Severity. *Int J Clin Pediatr*. 2013;2(1):12-18. doi:10.4021/ijcp73w
12. Huy NT, Van Giang T, Thuy DHD, et al. Factors Associated with Dengue Shock Syndrome: A Systematic Review and Meta-Analysis. *PLoS Negl Trop Dis*. 2013;7(9). doi:10.1371/journal.pntd.0002412
13. Jayaratne SD, Atukorale V, Gomes L, et al. Evaluation of the WHO revised criteria for classification of clinical disease severity in acute adult dengue infection. *BMC Res Notes*. 2012;5(1):1. doi:10.1186/1756-0500-5-645
14. Coffey LL, Mertens E, Brehin AC, et al. Human genetic determinants of dengue virus susceptibility. *Microbes Infect*. 2009;11(2):143-156. doi:10.1016/j.micinf.2008.12.006
15. Sierra BDLC, Kourí G, Guzmán MG. Race: A risk factor for dengue hemorrhagic fever. *Arch Virol*. 2007;152(3):533-542. doi:10.1007/s00705-006-0869-x
16. Sierra B, Alegre R, Pérez AB, et al. HLA-A, -B, -C, and -DRB1 allele frequencies in Cuban individuals with antecedents of dengue 2 disease: Advantages of the Cuban population for HLA studies of dengue virus infection. *Hum Immunol*. 2007;68(6):531-540. doi:10.1016/j.humimm.2007.03.001
17. Xu C, Pang J, Hsu JP, Leo YS, Lye DCB. Differences in clinical features and dengue severity between local and migrant Chinese with dengue infection in Singapore. *PLoS One*. 2018;13(8):1-10. doi:10.1371/journal.pone.0201441.

Research Article

Determinant Factors Related Word Fatigue in Workers at PT. Makassar Indonesian Ship Industry

Suharni A Fachrin[1], Alfina Baharuddin[2], Samsualam[3]

[1]Assistant Professor in Departement Public Health (OSH), University Muslim of Indonesia, Makassar, [2]Research Scholar in Departement Environmetal Health, University Muslim of Indonesia, Makassar, [3]Research scholar in Public health, University Muslim of Indonesia, Makassar

Abstract

Work fatigue is one of the occupational health and safety issues that can be a risk factor for accidents at work. fatigue can be caused by several factors both internal and external factors, including body work attitude, neck work attitude, leg work attitude, upper arm work attitude, forearm work attitude, wrist work attitude. This type of research is observational analytic with cross sectional study design. the target population in this study all workers who work in the hull, engine and shaft, dock and pipe at PT. Makassar's Indonesian ship industry with a total of 61 people. the method of taking samples in this study uses total sampling. Data analysis method uses the chi-square test. The results showed that there was a significant relationship between the variable work attitude (body) with p value = 0.01, while there was no relationship in the variable work attitude (neck) with a value of p value = 0.898 while the variable work attitude (feet) with a p value value = 0.002 has a relationship with work fatigue and work attitude (upper arm) p value = 0.030, and work attitude (forearm) p value = 0.424 has no relationship with work fatigue, work attitude (wrist) with a value of p value = 0,000 , has a relationship with work fatigue in workers in the hull, engine and shaft, dock and pipe at PT. Makassar Indonesian ship industry. Further research is suggested to be able to examine other factors suspected to be related to work fatigue and not examined in this study, and is expected to use better and more accurate measurement tools for further research so that the results of the research can be more accurate and better.

Key word: *Engine, Saft, Dock And Pipe, work fatique, workers.*

Introduction

According to the International Labor Organization (ILO) every year as many as two million workers die due to work accidents caused by changing factors. In this study excluded from 58,115 samples, 32.8% in coverage was better, while problematic workers were related to an increase factor, so it would increase directly at the level of income increase[1,2]. PT. ArwanaAnugrah Ceramics with the Chi-Square statistical test results obtained a p-value = 0,0001, which means related to work relationships by increasing work for employees of the production department of PT. Arwana Anugrah Keramik, Tbk. As many as 41 employees of PT. Arwana Anugrah Keramik, Tbk has a risky work attitude[3,4,8.]

Based on this background, the researcher is interested in conducting research "Effect of Work Attitude (Body, Neck, Legs, Upper Arm, Forearm, Wrist) on factors related to work effort at PT. Makassar Indonesian Ship Industry in the Hull, Engine and Shaft, Dock and Pipe sections[5,6]. Occupational Safety and Health (K3) is a program created by a company to prevent work-related accidents and occupational diseases, analyze work that causes accidents and illnesses caused by work caused by disasters and occupational diseases[7,10]. The work accident data is based on preliminary data collection at PT. The Indonesian Ship Industry (Persero) Makassar number of work accidents in 2014 were 3 people, in 2015 there were 8 people, in 2016 1 person, in 2017 there were 6 people and in 2018 1 people and in 2019

Corresponding author:
Alfina Baharuddin
E-mail: alfina.baharuddin@umi.ac.id

(March) 1 person[8,11].

Based on work accident data at PT. During the period of 2014 to 2019, the Indonesian Ship Industry experiences work accident incidents in every unit, namely in the Hull, Engine and Axle, Dock and Pipe sections. Work accidents show a number that is not too large but needs to be evaluated for PT. Makassar Indonesian Ship Industry in order to achieve Zero Accident[12]. Based on the results of preliminary data obtained at PT. The Indonesian Ship Industry in the Machinery and Axle section has 12 workers, 22 in the Hull section, 12 in the Dock section and 15 in the Pipe section. In addition, working time at PT. Makassar Indonesian Ship Industry starts at 07.00 am to 17.00[13,18]. The average age of workers there ranges between 30-60 years, where as said Tarwaka (2014) that physical strength from the age of 25 years will begin to decline. And their tenure is 10 to 20 years. While the level of education of workers there starting from elementary, middle, and high schoo[l4,20]. From the results of observations in the hull, machinery and shaft in PT. The Indonesian Ship Industry level of fatigue of workers there is quite high, because workers there work for 8 hours minus 1 hour of rest, praying, and eating[15,16,17]. It is said to be quite high because, the workers work nonstop because of the hull section. Therefore, workers when they want to take a break to eat, or pray must be carried out alternately.

Method

This type of research is observational analytic with cross sectional study design. the target population in this study all workers who work in the hull, engine and shaft, dock and pipe at PT. Makassar's Indonesian ship industry with a total of 61 people. the method of taking samples in this study uses total sampling. In this study the measurement of work fatigue is done by measuring the feeling of fatigue using the Fatigue Measurement Tool Quizzer (KAUPK2)[4.8,11]Data analysis method uses the chi-square test.

Result

Table 1: Relationship between Work Attitude and Work Fatigue in Workers at PT. Makassar Indonesian Ship Industry 2019

Work Attitude of the Agency	Work Fatigue				Total		p Value
	Not Tired		Tired				
	N	%	N	%	N	%	
No Risk	14	70,0	6	30,0	20	100	
At Risk	13	31,7	28	68,3	41	100	0,011
Total	27	44,3	34	55,7	61	100	

According Table 1, shows that 61 workers with no risky body work attitude who are not tired as many as 14 workers (70.0%) and tired as many as 6 workers (30.0)%, while for work attitude risky bodies are not tired 13 workers (31.7%), and tired of 28 workers (68.3%).

Table 2 : Relationship between Neck Work Attitude and Work Fatigue in Workers at the at PT. Makassar Indonesian Ship Industry 2019

Neck work attitude	Work Fatigue				Total		*p Value*
	Not Tired		Tired				
	n	%	N	%	N	%	
No Risk	9	40,9	13	59,1	22	100	
At Risk	18	46,2	21	53,8	39	100	**0.898**
Total	**27**	**44,3**	**34**	**55,7**	**61**	**100**	

Table 3: Relationship between Working Legs and Work Fatigue in Workers at PT. Makassar Indonesian Ship Industry 2019

foot work attitude	Work Fatigue				Total		p Value
	Not Tired		Tired				
	N	%	N	%	n	%	
No Risk	19	67,9	9	32,1	28	100	
At Risk	8	24,2	25	75,8	33	100	0.002
Total	27	44,3	34	55,7	61	100	

According table 3 about the relationship between working attitude of the feet with work fatigue in workers in the Hull, Machine and Axle, Dock and Pipes at PT. Makassar Indonesian Ship Industry, shows that 61 workers with no risk foot work attitude who are not tired as many as 19 workers (67.9%) and tired as many as 9 workers (32.1)%, while for the attitude of working leg legs who are not tired as much as 8 workers (24.2%) and tired as many as 25 workers (75.8)%.

Table 4: Relationship of Forearm Work Attitude with Work Fatigue in Workers at PT. Makassar Indonesian Ship Industry 2019

Forearm Work Attitude	Work Fatigue				Total		*p Value*
	Not Tired		Tired				
	n	%	n	%	n	%	
No Risk	8	57,1	6	42,9	14	100	
At Risk	19	40,4	28	59,6	47	100	**0.424**
Total	**27**	**44,3**	**34**	**55,7**	61	100	

According Table 4 about the relationship between forearm work attitude with work fatigue in workers in the hull, machinery and shaft, dock and pipe at PT.

Table 5 : Relationship of Upper Arm Work Attitude with Work Fatigue in Workers

at PT. Makassar Indonesian Ship Industri 2019

Upper Arm Work Attitude	Work Fatigue				Total		p value
	Not Tired		Tired				
	N	%	N	%	n	%	
No Risk	23	54,8	19	45,2	42	100	
At Risk	4	21,1	15	78,9	19	100	0.030
Total	27	44,3	34	55,7	61	100	

Table 5 shows that 61 workers with an upper arm work pose no risk who are not tired as many as 23 workers (54.8%)

Table 6 : Relationship between Wrist Hand Attitude and Work Fatigue in Pipes at PT. Makassar Indonesian Ship Industry 2019

Wrist Attitude	Work Fatigue				Total		p value
	Not Tired		Tired				
	N	%	N	%	n	%	
No Risk	19	76,0	6	24,0	25	100	
At Risk	8	22,2	28	77,8	36	100	0.000
Total	27	44,3	34	55,7	61	100	

Table 6 shows that 61 workers with no risky wrist work attitude who are not tired as many as 19 workers (76.0%) and tired as many as 6 workers (24.0%), while for the wrist work attitude are at risk who are not tired as many as 8 workers (22.2%) and tired as many as 28 workers (77.8%).

Discussion

Work fatigue is a process of decreasing efficiency, work performance and reduced strength or physical endurance of the body to continue the activities that must be carried out[18,19,22]. In this study the measurement of work fatigue is done by measuring the feeling of fatigue using the Fatigue Measurement Tool Quizzer (KAUPK2)[4.8,11]. Based on bivariate analysis, it can be described as follows: Relationship between Work Attitude and Work Fatigue: Work attitude on the part of the body is measured using the REBA method.

Relationship between Neck Work Attitude and Work Fatigue With the statistical test results using the chi-square obtained p value = 0.898 because the value> 0.05 then Ha is rejected and H0 is accepted, which means there is no influence between Neck Work Attitudes towards work fatigue in workers in the Stomach, Machine and Axle, Dock and Pipe at PT. Makassar Indonesian Ship Industry.Relationship between Leg

Work Attitudes and Work Fatigue With the results of statistical tests using the chi-square obtained p = 0.002 because the value <0.05 then Ha is accepted and Ho is rejected, which means there is a relationship between working attitude of the feet to work fatigue in workers in the hull, machine and shaft, dock and Pipe at PT. Makassar Indonesian Ship Industry[23].

Relationship between Upper Arm Work Attitude and Work Fatigue Statistical test results using chi-square obtained p value = 0.030 because the value <0.05 then Ha is accepted and Ho is rejected, which means there is a relationship between the Upper Arm Work Attitude towards Work Fatigue in workers in the Stomach, Machine and Axle, Dock and Pipe at PT. Makassar Indonesian Ship Industry.

Relationship between Forearm Work Attitude and Work Fatigue Next is the assessment of the position of the forearm. Forearm positions that have the lowest risk at a flexion position of 60 ° -100 ° are given a value of 1 and a risky position at a flexion position <60 ° or flexion> 100 ° are given a value of 2. This is evidenced by the greater score for each risky posture. With the statistical test results using chi-square obtained p value = 0.424 because the value <0.05 then Ha is rejected and Ho is accepted, which means there is no relationship between the Forearm Work Attitudes towards work fatigue in workers in the Stomach, Machine and Shaft, Dock and Pipe at PT. Makassar Indonesian Ship Industry. Relationship between Wrist Attitude and Work Fatigue. The final working attitude on the use of the REBA method is the wrist. The position of the wrist that has the smallest risk is in the position of flexion or extension at an angle of 0-150 that gets a score of 1. The position at risk is the position of the wrist flexion or extension at an angle of> 150.

The results of the study using the chi-square test found that the value of p value = 0,000 (p <0.05) showed that there was a significant relationship between wrist work attitude and work fatigue.The results of this study are in line with research conducted by Ekawati (2014), which states that there is a significant relationship between work attitude (wrist) with work fatigue, with a p value in the study of 0.043 (p value <0.05).

Conclusions

1. There is a significant relationship to work (body) attitude with work fatigue =p value = 0.011 (<0.05).

2. There is no significant relationship to the work attitude of the neck with work fatigue as seen from 61 workers, p value = 0.898 (<0.05).

3. There is a significant relationship to the work attitude of the feet with work fatigue as seen from 61 workers, p value = 0.002 (<0.05).

4. There is a significant relationship to upper arm work attitude with work fatigue p value = 0.030 (<0.05).

5. There is no significant relationship to the forearm work attitude with work fatigue p value = 0.424 (<0.05).

6. There is a significant relationship to wrist work attitude with work fatigue as seen p value = 0,000 (<0.05).

Ethical Clearance: taken from Comitee ethical Universitas Muslim of Indonesia Makssar

Source of Funding - Self-funding

Conflict of Interest - The author declares no conflict interest regard

References

1. Nyky, Asriani et al.Factors Related to the Occurrence of Work Fatigue in PT. KallaKakaoIndustri. Student Scientific Journal of Public Health. Faculty of Public Health, Halu Oleo University. No. 6 Vo. 2. ISSN 2502-731X. Makassar city. 2017.
2. Permatasari et al. Factors related to work fatigue in employees at Matahari Department Store, Lippo Plaza Kendari Branch. Public Health Student Scientific Journal. Vol.2. No.5. ISSN 250-731IX.2017
3. Atiqoh et al, Factors Related to Work Fatigue in Convection Workers in the Tailoring Division at CV. Various Gunungpati Garment Semarang. Journal of Public Health, Diponegoro University. No 2 Vol. 2. Semarang. (On line). http: // ejournal-s1.undip. ac.id/index.php/jkm. 2014.
4. Andi, Bayu. Relationship of Nutrition Status with Work Fatigue in the Weaving Workers Section

at Pt. Iskandar Indah Printing Textile Surakarta. Thesis, Faculty of Health Sciences, Muhammadiyah University, Surakarta. (On line).2014. Https: // Core.Ac.Uk / Download / Pdf / 148604951,2014

5. Department of Manpower and Transmigration in 2004 concerning Work Accident Data in Indonesia Jakarta 2004.
6. Deyulmar et al., Analysis of Factors Related to Work Fatigue in Opak Crackers Makers Workers in Ngadikerso Village, Semarang Regency. Journal of Public Health, Diponegoro University. No. 6. Vol. 6. Semarang. 2018.
7. Diana Samara, Factors Related to Work Fatigue of Workers at the SPBU Operators Section in Ciputat District in Thesis of the Faculty of Medicine and Health Science, SyarifHidayatullah State Islamic University. Jakarta. (On line). http: // repository .uinjkt .ac.id / dspace / bitstream.2014
8. Mahardika, Putri. Factors Related to Work Fatigue in LPG Depot Tube Filling Workers PT. Pertamina (PERSERO) Mor VII Makassar in 2017. Thesis Faculty of Public Health, Hasanuddin University Makassar. (On line). http: //digilib.unhas. ac.id/
9. Fadila, N, et al.. Factors Related to Work Fatigue Cleaning Service Officers. Journal of the Hasanuddin University Faculty. I Vol. I. (Online) 2016
10. Factors in 1,355 Young Adults: A Cross-Sectional Study. Asian Spine Journal
11. Anjar B et al., 2016. Factors Related to Work Fatigue in Employees at Matahari Department Store Store, Lippo Plaza Branch in 2016. Scientific Journal of Public Health Students. No.5. Vol.2. ISSN 250-731X. 2016.
12. Hartatik,. Relationship of Work Posture with Musculoskeletal Complaints in Workers at PT. Maruki Internasional Indonesia Makassar. FK. Hasanuddin University. 2014
13. Hasriyanti. Relationship of Work Posture with Musculoskeletal Complaints in Workers at PT. MarukiInternasional Indonesia Makassar. FK. Hasanuddin University. 2016.
14. International Labor Organization (ILO). Safety and Health at Work. http://www.ilo.org/global/topics/safety-and-health-at-work/lang--en/index.htm.2010/
15. International Labor Organization. Occupational Safety and Health at Work (Means for Productivity). Module 5. Language Edition., 2013.
16. J. Phys. TherSci,. A Study of the Relationship BetweenStrees and Fatigue and Musculoskretal Symptoms Experienced by Korean Radiation Workers. International Journal of the Department of International Radiological Science, Hllym University of Graduate Studies.2015
17. Juliana et al, Analysis of Risk Factors of Work Fatigue in Employees of the Production Section Pt. ArwanaAnugrahKeramik, Tbk. Journal of Public Health Sciences. Faculty of public health, Sriwijaya University. No. 9. Vol. 1. ISSN 2086-6380. 2018
18. Medianto, Dewi. Factors Related to Work Fatigue in Loading and Unloading Workers (TBKM) at the Port of TanjungEmas Semarang. Thesis Faculty of Public Health, University of Muhammadiyah Semarang. (On line). 2017
19. HafidAndi Abdul, Analysis of Work Posture with REBA (Rapid Entire Body Assessment) Method on Pottery Craftsmen in Pallantikang Village, Pattalassang District, Takalar Regency. FIK Alauddin Makassar UIN. 2014
20. Muizuddin A, The Relationship Between Work Fatigue and Work Productivity in the Weaving Section Workers at PT. AlkatexTegal. Thesis Faculty of Sport Sciences Department of Public Health, Semarang State University. (On line). https: // lib. unnes.ac.id / 1879 3/1 /6450408095. 2013
21. Nugraheni AnniesBanita, Relationship between Physical Workload and Work Fatigue in Concrete Reinforcement Production Workers at PT Wijaya Karya BetonTbk. PPB Majalengka. Thesis, Faculty of Health Sciences, Muhammadiyah University, Surakarta. (On line). 2015
22. Nurjannah, Relationship between Work Attitude and Work Fatigue in Employees of Cutting Section Pt. And lyrical BanaranSukoharjo Regency. Thesis, Faculty of Health Sciences, Muhammadiyah University, Surakarta. 2014.
23. Riky, Retno, Relationship Between Work Attitudes and Work Fatigue in Construction Workers Pt. AdhiKaryaTbk (Persero) Semarang Grand Dhika Commercial Estate Project. Thesis Department of Public Health. Faculty of Sport Science. Semarang State University. (On line). 2015

The Effects of PNF Exercises by a Special Device of Develop the Hip Joint Flexibility and Perform some Kicking Skills of Young Taekwondo Players

Ali Jasim Kareem[1], Hamid Abdul Shaheed Hadi[2], Abbas Mahdi Saleh[3], lman Okab Sarhan[3]

[1]Assist. Prof. University of Basra / College of Physical Education and Sport Sciences, [2]Lecturer, Ministry of education/Najaf Education Directorate /IRAQ, [3]Prof., University of Kufa/College of Physical Education/ Theoretical Science Branch

Abstract

The problem of research focused on increasing the flexibility of the hip joint and measuring it according to advanced scientific standards is important for Taekwondo, which most of the workers in this game did not care, because its skills depend on the opening the legs and any weakness has effects on the motor extent of skills and then be difficult to reach the goal, the research objectives is prepare PNF exercises by using a special device to develop and measure the flexibility of the hip joint, to identify on the effect of these exercises by the device in the development of hip joint flexibility and kicking skills of young Taekwondo players, the researchers hypothesized that there are significant differences in post measurements in the development of hip joint flexibility and kicking skills. The researchers used the experimental method by designing (the two equal groups) and the research population was determined as the young players of Al Furat Al Awsat, number of (45) players and the sample was chosen randomly and number of (16) players, the results in post and pre –measurement were significant differences in the hip joint and motor skills of the experimental group, The post measurement was significant differences in all the studied variables, the researchers concluded that PNF exercises on the used device had a large effect on the development of working muscles of the hip joint, PNF exercises use according to the device which was close from the performance similar to the skills performance under study which helps to develop these skills, the most important recommendations use these exercises in accordance to the used device to develop the hip joint flexibility and the skill performance, diversification and change in exercise performance leads to the development the level.

Keywords*: PNF Exercises, Flexibility, Joints, Health.*

Introduction

The development of any field of sports science contributes in one way or another to the development of physical education and sports through use of ways, methods and modern scientific techniques in various fields of knowledge as effective means in the process of training, measurement and evaluation to reach the development of the planning and skill aspects of sports [(1)]. Taekwondo game has abundant share of research, analysis and development at the game level and the player, and it is characterized by the performance nature of the changing and rapid positions, which depends on the motor extent of the joints and this requires effective measurement and this helps to give a clear picture of the players levels, especially when it is based on codified objective tests by new devices[(2).] Hence the importance of research of PNF exercises by using a measuring device to develop the hip joint flexibility and perform some kicking skills that contain in its performance on the joints flexibility.

Corresponding author:
Ali Jasim Kareem
email: adsport102@yahoo.com

The Research Problem:

One of the important things in the Taekwondo game

is to increase the flexibility of the hip joint and measure it according to advanced scientific standards, which most workers did not care about this game, because a lot of game skills depends on the opening the legs and any weakness effects on the motor extent of skills [3]. It is also possible to measure this joint through a device that measures the angle of flexibility of the hip joint, so researchers tried to study the effect of exercise PNF by a special device to measure the angle and joint flexibility in the development of some skills that are characterized by opening during motor performance[4].

Research Objectives:

1. Preparation of PNF exercises by a special device to develop and measure the hip joint flexibility.

2 - Identify the effect of exercise by the device in the development of hip joint flexibility of young Taekwondo players.

3 - Identify the effect of exercise in the development of some kicking skills among the young Taekwondo players.

Research hypotheses:

1 - There is a significant difference between the pre and post measurements in the development of hip joint flexibility and kicking skills of young Taekwondo players and in favor of post measurements.

2 - There is a significant difference in the post measurements in the development of the hip joint flexibility of and kicking skills of young Taekwondo players between the two research groups and in favor of the experimental group.

1Research Fields:

1-4-1 **Human field:** Al Fruat Al Awsat Taekwondo players for 2019 season.

1-4-2**Time Field**: 10/2/2019 to 25/8/2019

1-4-3 **Spatial Field**: Taekwondo hall in NajafAlAhraf.

Research methodology and field procedures:

Research Methodology

The researchers used the experimental method to suit the nature of the research problem.

Research population and sample

The research population determined as Al Furat Al Awsat players (total of 45 players),the sample was chosen by simple random number (16) players and the percentage (35%),the parity and homogeneity in the variables(length, mass, age of training, and skills under study) as in tables (1):

Table (1) shows the homogeneity of the variables under study

variables	Measurement unit	S-	Mean	A	Sprains	Significance
Length	CM	165.12	164.3	6.45	0.38	homogeneous
weight	KG	64.67	63.2	5.51	0.80	homogeneous
Age of training	Month	26	25	3.36	0.89	homogeneous

Table 1 shows that the two homogeneous research groups in all variables, the results showed that the sprains coefficient values are between (1±)

Table (2) shows the equivalence of the variables under study

variables	measuring unit	Experimental		Control		Calculated (T) value	Significance level	Type of significance
		S	A	S	A			
Angle of hip flexibility	CM	122.53	11.67	121.07	11.49	1.54	0.09	Non - moral
Apollo Jacky (Vocal solo kick)	Degree	6.14	2.43	12.6	1.23	2.13	0.14	Non - moral
Jikojki (Kick Hammer Front)	Degree	6.47	1.09	6.21	1.16	2.21	0.24	Non - moral
Higujki (Round Kick)	Degree	6.34	1.59	6.13	1.36	1.23	0.17	Non - moral

Tools and Means:

-Test and measurement.

- Statistical means.

- (hip) Joint Flexible device.

-Medical balance.

-stopwatch.

- Unloading and data collection form.

- Computer brand (DEEL).

Main research procedures:

Skills under study:

Some of attacking skills of legs adopted by the researchers because the importance of these skills in the Taekwondo sport, Hapatolyogki (single-kick Alotawip), Jikojki (front hammer kick), Hijojki (round kick).

Evaluation skills under study:

The researchers evaluate the skills by showing the skills to three arbitrators, the score (10) degrees and extracted the arithmetic mean of the scores for each skill.

Measurement Test of hip joint flexibility on the device :

- Name of the test: measurement test the extent of the angle of the hip joint.

- **Objective of the test:** to measure the angle of the hip joint.

- **Performance method**: The player lying on his back so that the hip at the end of the mastaba and his back base on the device and the legs are stretched on the device arms and when the player stabilizes on the device is lifting one of the legs through the lifting machine, which is close to the upper side of the arm to the maximum and pain in the back thigh muscles[4]. The angle is measured by the angle measure on the device.

- **Recording method**: is done by the angle measurefixed on the device, recording the measurement of the hip joint angle[5].

- **Number of attempts**: the player has one attempt.

Exploratory Experience

The researchers conducted the Exploratory Experience on Monday 15/3/2019 on the sample of (5) players:

- Knowing the required time for tests when applied to take advantage of this when conducting the main experiment.

- Check the accuracy and safety of the devices and used tools and how to record the results.

- Inform the assistant team on how to conduct the tests.

- Extract the scientific standers of the tests and the method of measurement on the device[6].

Scientific standers for the tests:

Validity of the test:

The apparent validity of the test was result from showing the designed device on a group of experts and specialists and confirmed the validity of the device to measure the hip joint angle

Test stability:

The test method was used and re-tested, the test was re-applied after seven days and processing results of two tests by using Correlation coefficient (Pearson) reached (0.88) and its represents high correlation value which indicates to the stability of the test

Objectivity of the test:

The correlation coefficient was extracted from the results of the exploratory experimental sample by testing the elasticity of the hip joint at the same time and the correlation coefficient was evaluated (0.89) which indicates too objective the test.

Pre-testing:

The pre-test tests were conducted on 25/3/2019, where the hip joint flexibility measured and PNF exercises were applied to the research sample and all the conditions which performed of these tests[7].

Preparation and implementation of PNF exercises:

PNF exercises were prepared by the researchers using the hip joint flexibility device[8,9] and were implemented on the experimental group which included (16) training units at rate of two units per week. the duration of the educational unit lasts 120 minutes and the application of educational units lasted for (8) weeks from 18/4/2019 until 20/6 / 2019.

post -tests:

The post-measurement of kicking skills applied after perform the PNF exercises by using the hip joint flexibility device prepared by the researchers on 27/6/2019 and on the same conditions as the pre-test.

Statistical Methods: The researchers used the statistical bag (SPSS) in analyzing the data

• Arithmetic mean.

• Mediator.

• Standard deviation.

• Torsion coefficient

• T-test for associated samples.

• T-test for independent samples.

• Pearson.

- show, analyze and discuss the results.

-show the results of kicking skills and hip flexibility:

Table 3: Shows the arithmetic means and the standard deviations of kicking skills and hip joint flexibility in the pre- and post-test of the two groups

Groups	variables	measuring unit	Pre-test		Post-test		Calculated (T) value	Significance level	Type of significance
			S	A	S	A			
	Angle of hip flexibility	CM	122.53	11.67	127.25	12.14	2.75	0.01	moral
	Apollo Jacky (Vocal solo kick)	Degree	6.14	2.43	8.45	2.76	2.28	0,01	moral

Cont... **Table 3: Shows the arithmetic means and the standard deviations of kicking skills and hip joint flexibility in the pre- and post-test of the two groups**

	Jikojki (Kick Hammer Front)	Degree	6.47	1.09	8.76	2.45	2.67	0,02	moral
	Higujki (Round Kick)	Degree	6.34	1.59	8.64	2. 34	3.54	0,00	moral
	Angle of hip flexibility	CM	121.07	11.49	122.12	11.89	1.98	0.14	No- moral
	ApolloJacky (Vocal solo kick)	Degree	12،6	1.23	7.25	2.11	1.87	0.01	moral
	Jikojki (Kick Hammer Front)	Degree	6.21	1.16	7.32	1.89	2.21	0.00	moral
	Higujki (Round Kick)	Degree	6.13	1.36	7.54	1.87	2.43	0.02	moral

Table (4): Shows the arithmetic means and the standard deviations of kicking skills and hip joint flexibility in the pre- and post-test of the two groups

Groups	**variables**	**measuring unit**	**Pre-test**		**Post-test**		**Calculated (T) value**	**Significance level**	**Type of significance**
			S	**A**	**S**	**A**			
	Angle of hip flexibility	CM	127.25	12.14	122.12	11.98	1.98	0.01	moral
	ApolloJacky (Vocal solo kick)	Degree	8.45	2.76	7.25	2.11	2.67	0,01	moral
	Jikojki (Kick Hammer Front)	Degree	8.76	2.45	7.32	1.89	2.54	0,00	moral
	Higujki (Round Kick)	Degree	8.64	2.34	7.54	1.87	2.28	0,01	moral

Discuss the tests results of kicking skills and the hip joint flexibility

Through what show in the table (4) shows the significant differences in the angle of hip joint flexibility, the researchers know the reason for the device which used for exercise by clearly effect on the performance and hip joint flexibility by increasing the efficiency of muscles and ligaments surrounding the joint and according to performance requirements which requires presence of perfect motor control when performing to score a point on the opponent and requires from the player a good knowledge of the mechanical laws to the extent of movement and development. The lower limbs are at best to maintain the edition of some physical abilities when the player extends his leg during the direction of a certain kick and the participation of all joints of the body must be the maximum speed and then achieve control through the contraction of muscles working on the joints at the end of the movement to reach the goal and this is confirmed by (Nawal Obeidi and Fatima al-Maliki), as the more flexible the appropriate degree the faster the rotation. This is confirmed by the device, which measures the angle of flexibility of the hip joint (1),

and on this basis has been divided skills kicking Taekwondo and hip joint into its parts according to mechanical foundations and the increase of the extent of the hip joint in the corner is through the first two stages is to accelerate the ground strike man and this is from During the dynamics of the movement and the second is the dynamic relationship between the end of the movement and score points ie it is to reach the goal and achieve a point by pushing the man strongly and speed within the required range requires a large mechanical force useful in the control to perform skills properly and this requires high flexibility Count on the expansion of the motor range of the joint, which is reflected positively in the development of muscles involved in the performance, as the device designed to measure the flexibility of the joint under the influence of an external factor, the device and this is called negative lengthening (1) and this is what researchers used for the exercises prepared on the device in order to Increase the angle of the hip joint and focal point easily.

Also, the following table shows the presence of significant differences in the performance of motor skills and the researchers attribute this reason to the fact that the members of this group has been trained in these exercises (PNF) and through the device that was used and given time and linking them to performance led to the emergence of significant differences as these exercises It works to stretch the muscles and ligaments surrounding the knee and hip led to the development of the skills under discussion in addition to it helped to improve the overall shape of the movement and basic positions. The researchers also believe that these exercises and their compatibility with the requirements of the effectiveness of Taekwondo determine the level of motor performance and this is confirmed (Mehdi 2008) (must be integrated exercises (PNF) with the form of motor skill on the device as well as these exercises positively affected the performance of kicking skills, especially working muscles However, this is related to the development of the flexibility of the hip joint, which helps freedom of movement in various directions without feeling any particular pain (2), and this is what tests were done through the device and considered the starting line for the beginning as well as the angle gauge Connect the hip and then do the exercises that were prepared in the correct scientific form.

Conclusions and Recommendations

Conclusions

1- The researchers concluded that PNF exercises on the system used have a significant impact on the development of working muscles of the hip joint.

2 - Diversification and change through the device helped to develop the skill performance of kicking skills.

3- The use of exercises (PNF) according to the device was close to the performance similar to the performance of the skills in question helped in developed these skills.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

Funding: Self-funding

References

1. Russell Razak and others: Designing a device

to use PNF exercises and measuring the angle of flexibility of the hip joint among athletes. Patent, Ministry of Planning / Standardization and Quality Control Division, No. 5668, 10/2/2019.

2. Abbas Mahdi Salih Al-Ghurery: The effect of strength exercises according to the ranges of working joints in the development of some physical characteristics, motor and skill capabilities of Karate youth players, PhD thesis, University of Baghdad, College of Physical Education, 2008.
3. Nawal Mahdi Al-Obaidi and Fatima Abdul-Maliki: Sports Training Science, Books and Documentation House in Baghdad, Dar Al-Arqam Office for Printing and Reproduction Baghdad - Bab Al-Mo'azam Complex, 2008.
4. 4- Fadel Kamel Mazkour, and Amer Fakher Shaghati: modern trends in training, endurance, strength, prolongation, comforting, 1st edition, Amman, Arab Society Library for Publishing and Distribution, 2011.
5. Laila El-Sayed Farhat: Measurement and Testing in Physical Education, Cairo, Center of Book and Publishing, 2001.
6. Laila El-Sayed Farhat: Measurement and Testing in Physical Education, second Edition, Helwan University, Book Center for Publishing, 2003.
7. Mohamed Sobhy Hassanein: Measurement and Evaluation in Physical Education, Fourth Edition, Cairo, Dar Al-Fikr Al-Arabi
8. Adel Abdel Basir. Physical Training and Integration between Theory and Practice, First Edition, Cairo, The Book Center for Publishing, 1999.
9. Abbas Mahdi Saleh: moto response speed of some offensive skills in the level of technical performance of karate players using the proposed kinetic response speed measurement device. Master Thesis, University of Baghdad, 2005.

Psychometric Properties of the Pain Self-Efficacy Questionnaire Using Nigerian University Students with Chronic Pain

Christian S. Ugwuanyi[1], Chinedu I.O. Okeke[2]

[1]Postdoctoral fellow, [2]Host, Professor and Head, School of Education Studies, Faculty of Education, University of the Free State, Bloemfontein, 9300, South Africa

Abstract

This study was set to determine the psychometric properties of the pain self-efficacy questionnaire among Nigerian university students with chronic pain. A sample size of 256 Nigerian university students with chronic pains was used. The construct validation of the PSEQ was done using exploratory factor analysis while the internal consistency and stability reliability indices were estimated using Cronbach Alpha method. The study found that the items of the PSEQ correlated positively with each other (r = 0.72) and PSEQ is a unidimensional instrument with good internal consistency reliability. By implication, the Nigerian version of PSEQ demonstrated good psychometric properties as already indicated in English language, Portuguese and Dutch versions. Thus, usage of the PSEQ on Nigerian university students with chronic pain will help then to find out the level of adjust in their academic pursuit.

Keywords: *Psychometric, Properties, Pain, Self-efficacy, Chronic, Validation.*

Introduction

Pain, also known as a musculoskeletal disorder, is common among undergraduate students, particularly those with chronic cases and has remained a major concern of public health professionals and researchers worldwide.[1-3] Pain can restrict daily activities, decrease appetite, impair sleep and lead to depression, anxiety[4]. Pain is a common and major public health problem which impact an individual's quality of life from different aspects including physical, psychological and social negatively.[5-8] The ability of a patient to manage the painful condition is usually based on his/her pain self-efficacy level. As a psychological construct, pain self-efficacy is seen as one's confidence regarding his/ her ability to function effectively while in pain.[9] Available research has shown that pain self-efficacy is linked to positive pain-related outcomes in children with chronic pain.[1]

Corresponding author:
Dr. Christian S. Ugwuanyi
Email:ugwuanyics@ufs.ac.za

Self-efficacy beliefs are defined as convictions that one can successfully execute behaviours that are required to produce outcomes[10]. According to a previous study[11], efficacy beliefs determine whether coping behaviour will be initiated, how much effort will be expended, and how long this behaviour will be sustained in the face of obstacles and aversive experiences. Bandura proposed that efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and aversive experiences. This concept has been applied to chronic pain patients and several reviews[12] have concluded that self-efficacy beliefs, along with other psychological constructs, are related to adjustment to chronic pain. Self-efficacy beliefs have been found to explain a range of behaviours and aspects of pain experience in chronic pain situation.

Self-efficacy beliefs play an important role in functioning and coping with chronic pain.[12, 13] Converging lines of evidence support the importance of self-efficacy beliefs in adopting coping strategies[14], reducing avoidance behaviour[15], and predicting pain-induced fear.[16] Moreover, self-efficacy belief is a more

important determinant of disability than pain intensity, pain duration and anxiety.[17] Studies show that increases in functional self-efficacy are strongly related to positive treatment outcome.[18, 19] Self-efficacy beliefs are therefore important psychosocial determinants of pain behaviour and treatment outcomes. Several questionnaires have been employed to measure self-efficacy in chronic pain patients.[20-22]

Despite the prevailing/continuous pain experiences in many patients, only two questionnaires validated using English language speaking countries, Portuguese and Dutch patients had specifically investigated patients' confidence in performing general or more specific tasks in the presence of pain.[2,21] Thus, the study determined the psychometric properties of PSEQ using Nigerian university students with chronic pain.

Methodology

Participants

Chronic pain patients in different medical centres in Southeast universities in Nigeria were purposively selected for the study. A sample of 256 University students with chronic pain patients of different age cohorts were selected from 72 hospitals in the South-Eastern part of Nigeria. 43 of the participants are of ages within 15-25 years; 167 of the participants are of ages within 26-45 years, while 46 participants are of ages within 46-70 years.

Instrument

Pain Self-efficacy Questionnaire (PSEQ).[2] The PSEQ consists of 10 items. Each item is scored on a 7-point scale ranging from 0 "not at all confident" to 6 "completely confident". Higher scores on the PSEQ imply stronger self-efficacy beliefs while lower scores imply weaker SEB.

Procedure

At the first instance, copies of the informed consent letter were sent to 324 undergraduate students in the 5 medical centres in Southeast universities but 256 of them with chronic pain responded positively to the request. After that, copies of the PSEQ were administered to the chronic pain patients who responded positively to the request.

Construct Validation

The instrument was construct validated by subjecting it to confirmatory factor analysis using the principal component matrix. This was done after the completion of the questionnaire items by the chronic pain patients. After that, the data collected were coded and factor analysis was done. A criterion factor loading of 0.50 was used in the selection of pure items. That was based on the recommendation[23] that any item that loads 0.5 or above in only one of the factors should be considered a pure item.

Table 1:Correlation matrix of the items of PSEQ

		item1	item2	item3	item4	item5	item6	item7	item8	item9	item10
	item1	1.000									
	item2	.577	1.000								
	item3	.360	.493	1.000							
	item4	.104	.194	.328	1.000						
	item5	.273	.168	.113	.385	1.000					
	item6	.157	.285	.340	.289	.546	1.000				
	item7	.026	.153	.214	.263	.346	.525	1.000			
	item8	.093	.209	.277	.369	.261	.487	.720	1.000		
	item9	.109	.112	.152	.115	.166	.264	.434	.396	1.000	
	item10	.098	.190	.100	-.066	.130	.194	.312	.192	.471	1.000
a. Determinant = .034											

Table 1 shows that the items of the PSEQ correlated very positively with each other. This means that the items are related to a particular construct.

Table 2: KMO and Bartlett's Test for the Adequacy of the sample for the factor analysis of PSEQ

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.693**
Bartlett's Test of Sphericity	Approx. Chi-Square	845.141
	Df	45
	Sig.	.000

Table 2 shows that the KMO measure is 0.693 which shows that the sample for the factor analysis of the PSEQ was very adequate. From the same Table 2, the **Bartlett's test** of sphericity is significant. That is, its associated probability (0.000) is less than 0.05, and is small enough to reject the null hypothesis. This means that the correlation matrix for the PSEQ is not an identity matrix

Table 3: Communality values for the items of PSEQ

Item Statement		**Initial**	**Extraction**
1.	I can enjoy things	1.000	.696
2.	I can do most of the household chores	1.000	.751
3.	I can socialise with my friends or family members as often as I used to do	1.000	.537
4.	I can cope with my pain in most situations	1.000	.585
5.	I can do some form of work	1.000	.470
6.	I can still do many things I enjoy doing	1.000	.608
7.	I can cope with my pain without medication	1.000	.450
8.	I can accomplish most of my goals in life	1.000	.662
9.	I can live a normal lifestyle	1.000	.646
10.	I can gradually become more active	1.000	.773

Table of communalities (Table 3) shows how much of the variance in the variables have been accounted for by the extracted factors. It shows that item 1 which says "I can enjoy things" had communality value of 0.696 meaning that over 69% of the variance in *I can enjoy things* is accounted for. Also, item 2 with communality value of 0.75 means that 75% of the variance in *I can do most of the household chores* is accounted for. This follows of other items in Table 3. However, item 7 had the smallest communality value of 0.45 meaning that 45% of the variance in *I can cope with my pain without medication* is accounted for while the highest in communality value is 10 with communality value of 0.77 meaning that 77% of the variance in *I can gradually*

become more active is accounted for.

Table 4: Component Matrix for the items of PSEQ

Item Statement	Component		
	1	2	3
I can enjoy things		.682	
I can do most of the household chores	.535	.634	
I can socialise with my friends or family members as often as I used to do	.558		
I can cope with my pain in most situations	.513		
I can do some form of work	.588		
I can still do many things I enjoy doing	.743	.657	
I can cope with my pain without medication	.739	.567	
I can accomplish most of my goals in life	.739		
I can live a normal lifestyle	.543		
I can gradually become more active			.682

Extraction Method: Principal Component Analysis.
a. 3 components extracted.

Table 4 above shows the loadings of the ten variables on the three factors extracted. The higher the absolute value of the loading, the more the factor contributes to the variable. The gap on the table represents loadings that are less than 0.5. In order words, the benchmark for the selection of the items was 0.5 and we suppressed all loadings less than 0.5. Table 4 also shows that items 2, 3, 4, 5, 6, 7, 8 and 9 loaded more than 0.5 on factor 1, items 1, 2, 6, 7 loaded more than 0.5 on factor 2 while only item 10 loaded more than 0.5 on factor 3. This implies that items 2, 3, 4, 5, 6, 7, 8 and 9 are more related to factor 1, item 1 is more related to factor 2 while item 10 is more related to factor 3. This result shows that items 1, 3, 4, 5, 8, 9 and 10 are factorially pure items out of the items of PSEQ because they loaded above 0.5 in only one factor. Items 2, 6 and 7 are factorially complex items because they loaded above 0.5 in more than one factor. Thus, 7 out of the 10 items of PSEQ were found to be pure items after the confirmatory factor analysis.

Internal Consistency Reliability of PSEQ

Table 5: Reliability analysis of the PSEQ

Cronbach's Alpha	N of Items
.838	7

Table 5 shows the internal consistency reliability of the 7 items of PSEQ was estimated as 0.838 using Cronbach alpha method. This value confirmed that PSEQ is a reliable instrument for the management of pains by patients.

Stability Reliability of PSEQ

The stability of PSEQ was estimated through test re-test method. Pearson correlation between the first and second administration of PSEQ is 0.866, $p<.001$. This shows a high correlation of the first administration and second administration of PSEQ after two weeks interval. This indicates that PSEQ is stable

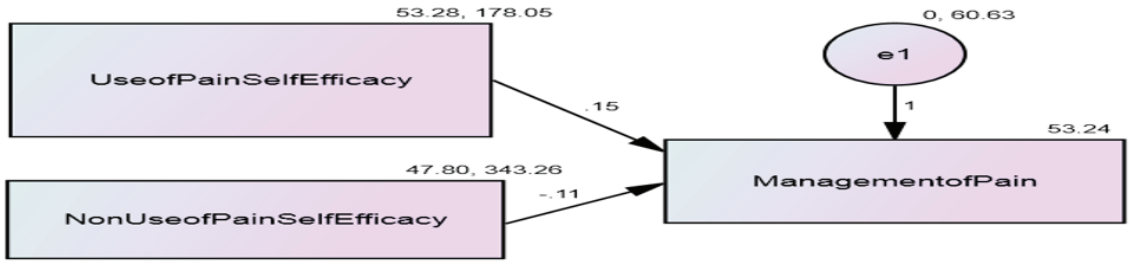


Figure 1: Path diagram of the use of PSEQ in the management of pains

The figure 1 represents the model diagram for the impact of the use of PSEQ in the management of pains. It reveals that the use of PSEQ has a positive impact on the management of pains among Nigerian university students. The model fit for the recursive model developed was tested using Chi-Square goodness of fit test and Root Mean Square Error of Approximation (RMSEA). The developed model had a Chi-square value of 28.34 with a probability value of 0.72. The Chi-square value of 28.34 and RMSEA value of 0.00 showed that the data used for the study fitted the model.

Discussion

This study has been able to establish the psychometric properties of PSEQ using Nigerian university students. The PSEQ had good psychometric properties in the sense that the items of the PSEQ correlated highly with each other and as well loaded above 0.50 majorly in one factor. This implies that the PSEQ is a unidimensional instrument with good internal consistency reliability as well as stability reliability for determining the self-efficacy of patients with chronic pain. These findings are similar to the findings.[2, 21, 11] Study[11] found that the exploratory factor analysis demonstrated that the Dutch version of the PSEQ is a unidimensional instrument with adequate internal consistency which is also in accordance with the original English language version[2] and the Portuguese version.[21] This by implication shows that the Nigerian version of PSEQ demonstrated good psychometric properties as already indicated in English language, Portuguese and Dutch versions.

However, the 10-item English version of PSEQ developed by Nicholas in 1989 was reduced to 7 items through the exploratory factor analysis. The variation in the number of items may have been because of the difference in the area of the study. Thus, further validation of the instrument is recommended for future research in Nigeria or any of the African countries.

In conclusion, the Nigerian version of the PSEQ is a unidimensional instrument with good internal consistency and stability reliabilities. This implies that the Nigerian version also demonstrated good psychometric properties just like those of the English language, Portuguese and Dutch versions. The implication of this finding lies in the fact that Nigerian university students with chronic pain can be diagnosed from time to time ascertain their level of management of their pains for optimal academic performance.

Ethical clearance- Taken from Faculty of Education Research Ethics Committee at the University of Nigeria, Nsukka which is the main institution of the first author.

Source of Funding- Self

Conflict of Interest – Nil

References

1. Nicholas, M.K. The Pain Self-Efficacy Questionnaire: Taking pain into account. European Journal of Pain 2007, 11(2), 153-163.
2. Yajie L & Mimi M. Y. T. Pain situations among working adults and the educational needs identified: an exploratory survey via WeChat. BMC Public Health 2019, 19:1149 https://doi.org/10.1186/s12889-019-7503-9
3. Hayes S, Hogan M, Dowd H, Doherty E, O'Higgins S, Nic Gabhainn S. Comparing the clinical-

effectiveness and cost-effectiveness of an internet-delivered acceptance and commitment therapy (ACT) intervention with a waiting list control among adults with chronic pain: study protocol for a randomised controlled trial. BMJ Open 2014. 4:e005092.

4. Berman RLH, Iris MA, Bode R, Drengenberg C. The effectiveness of an online mind-body intervention for older adults with chronic pain. J Pain 2009, 10: 68–79. https://doi.org/10.1016/j.jpain.2008.07.006.
5. Butow P, Sharpe L. The impact of communication on adherence in pain management. In: Pain2013.
6. Hanssen DJC, Naarding P, Collard RM, Comijs HC, Oude Voshaar RC. Physical, lifestyle, psychological, and social determinants of pain intensity, pain disability, and the number of pain locations in depressed older adults. Pain 2014, 155:2088.
7. Bandura, A. Self-efficacy - Toward a unifying theory of behavioural change. Psychological Review 1977, 84(2), 191-215.
8. Van der Maas, L.C.C., Vet, de, H.C.W., Köke, A., Bosscher, R.J. & Peters, M.L. Psychometric properties of the Pain Self-Efficacy Questionnaire (PSEQ): Validation, prediction, and discrimination quality of the Dutch version. European Journal of Psychological Assessment 2012, 28(1), 68-75.
9. Gatchel, R.J., et al. The biopsychosocial approach to chronic pain: scientific advances and future directions. Psychological Bulletin 2007, 133(4), 581-624.
10. Turk, D.C. &Okifuji, A. Psychological factors in chronic pain: evolution and revolution. Journal of Consulting and Clinical Psychology 2002, 70(3), 678-690.
11. Jensen, M.P., Turner, J.A. & Romano, J.M. Self-efficacy and outcome expectancies: relationship to chronic pain coping strategies and adjustment. Pain 1991, 44, 263-269.
12. Asghari, A. & Nicholas, M.K. Pain self-efficacy beliefs and pain behaviour. A prospective study. Pain 2001, 94, 85-100.
13. Karoly, P., et al. The impact of goal cognition and pain severity on disability and depression in adults with chronic pain: an examination of direct effects and mediated effects via pain-induced fear. Cognitive Therapy and Research 2008, 32,418-433.
14. Denison, E., Åsenlöf, P. &Linberg, P. Self-efficacy, fear-avoidance, and pain intensity as predictors of disability in subacute and chronic musculoskeletal pain patients in primary health care. Pain 2004, 111, 245-252.
15. Meredith, P., Strong, J & Feeney, J.A. Adult attachment, anxiety, and pain self-efficacy as predictors of pain and disability. Pain 2006, 123, 146-154.
16. Woby, S.R., et al. Outcome following a physiotherapist-led intervention for chronic low back pain: the important role of cognitive processes. Physiotherapy 2008, 94, 115-124.
17. Anderson, K.O., et al. Development and initial validation of a scale to measure self-efficacy beliefs in patients with chronic pain. Pain 1995, 63, 77-84.
18. Altmaier, E.M., et al. Role of self-efficacy in rehabilitation outcome among chronic low back pain patients. Journal of Counseling Psychology 1993, 40(3), 335-339.
19. Lackner, J.M., Carosella, A.M. & Feuerstein, M. Pain expectancies, pain, and functional self-efficacy expectancies as determinants of disability in patients with chronic low back disorders. Journal of Consulting and Clinical Psychology 1996, 64(1), 212-220.
20. Rudy, T.E., et al. Psychosocial predictors of physical performance in disabled individuals with chronic pain. The Clinical Journal of Pain 2003, 19, 18-30.
21. Sardà, J., et al. Pain-related self-efficacy beliefs in a Brazilian chronic pain patient sample: a psychometric analysis. Stress and Health 2007, **23,** 185-190.
22. Vong, S.K., et al. Measurement structure of the Pain Self-Efficacy Questionnaire in a sample of Chinese patients with chronic pain. Clinical Rehabilitation 2009, **23**(11), 1034-1043.
23. Field, A. Discovering Statistics using SPSS for Windows. London – Thousand Oaks – New Delhi: Sage publications 2007.

Call for Papers / Article Submission

The editor invites scholarly articles that contribute to the development and understanding of all aspects of Public Health and all medical specialities. All manuscripts are double blind peer reviewed. If there is a requirement, medical statistician review statistical content. Invitation to submit paper: A general invitation is extended to authors to submit papers papers for publication in IJPHRD.

The following guidelines should be noted:

- The article must be submitted by e-mail only. Hard copy not needed. Send article as attachment in e-mail.
- The article should be accompanied by a declaration from all authors that it is an original work and has not been sent to any other journal for publication.
- As a policy matter, journal encourages articles regarding new concepts and new information.
- Article should have a Title
- Names of authors
- Your Affiliation (designations with college address)
- Abstract
- Key words
- Introduction or back ground
- Material and Methods
- Findings
- Conclusion
- Acknowledgements
- Interest of conflict
- References in Vancouver style.
- Please quote references in text by superscripting
- Word limit 2500-3000 words, MSWORD Format, single file

All articles should be sent to: **editor.ijphrd@gmail.com**

Send all payment to :

Institute of Medico-Legal Publications

Logix Office Tower, Unit No. 1704, Logix City Centre Mall

Sector- 32, Noida - 201 301 (Uttar Pradesh)

Mob: 09971888542, 0120- 429 4015

E-mail: editor.ijphrd@gmail.com, Website: www.ijphrd.com

Indian Journal of Public Health Research & Development

CALL FOR SUBSCRIPTIONS

About the Journal

Print-ISSN: 0976-0245 **Electronic - ISSN:** 0976-5506, **Frequency:** Quarterly

Indian Journal of Public Health Research & Development is a double blind peer reviewed international Journal. The frequency is half yearly. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, Public Health Laws and covers all medical specialities concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and south east Asia.

The journal has been assigned international standards (ISSN) serial number and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases.

Journal Title	Print Only
Indian Journal of Public Health Research & Development	**INR 9000**

NOTE FOR SUBSCRIBERS

- Advance payment required by cheque/demand draft in the name of **"Institute of Medico-Legal Publications"** payable at New Delhi.
- Cancellation not allowed except for duplicate payment.
- Claim must be made within six months from issue date.
- A free copy can be forwarded on request.

Bank Details

Name of account :	**Institute of Medico-Legal Publications Pvt Ltd**
Bank:	**HDFC Bank**
Branch	Sector-50, Noida-201 301
Account number:	**09307630000146**
Type of Account:	**Current Account**
MICR Code:	110240113
RTGS/NEFT/IFSC Code:	HDFC0000728

Please quote reference number.

Send all payment to :

Institute of Medico-Legal Publications
Logix Office Tower, Unit No. 1704, Logix City Centre Mall
Sector- 32, Noida - 201 301 (Uttar Pradesh)
Mob: 09971888542, 0120- 429 4015
E-mail: editor.ijphrd@gmail.com, Website: www.ijphrd.com

Published, Printed and Owned : Dr. R.K. Sharma
Printed : Printpack Electrostat G-2, Eros Apartment, 56, Nehru Place, New Delhi-110019
Published at: Institute of Medico Legal Publications Pvt. Ltd., Logix Office Tower, Unit No. 1704, Logix City Centre Mall Sector- 32, Noida - 201 301 (Uttar Pradesh) Editor : Dr. R.K. Sharma, Mobile: + 91 9971888542, Ph. No: +91 120- 429 4015