Journal of Nursing & Allied Health

JNAH

Volume 01
Issue 03
July - September

OFFICIAL JOURNAL OF RAWALPINDI MEDICAL UNIVERSITY

JNAH

JOURNAL OF NURSING AND ALLIED HEALTH

JNAH

JOURNAL OF NURSING AND ALLIED HEALTH

ABOUT JNAH

Journal of Nursing and Allied Health (JNAH) is an official journal of Rawalpindi Medical University. It is an open-access, peer-reviewed scientific journal. It is published quarterly and follows the Committee on Publication Ethics (COPE), and International Committee of Medical Journal Editors (ICMJE) guidelines.

EDITORIAL POLICIES

JNAH publishes original research in the field of Nursing and Allied Health Sciences especially; Physical Therapy, Imaging Technology, Laboratory Technology, Orthotics & Prosthetics, Optometry & Orthoptics, Nursing and many more which provides sufficient contribution to Medical knowledge.
Incomplete studies are discouraged.

OBJECTIVES

1. To publish original, well documented, peer-reviewed manuscripts related to the field of Allied Health Sciences and Nursing
2. To provide a distinguished platform that bridges the realms of Allied Health Sciences and Nursing, promoting interdisciplinary collaboration, knowledge dissemination, and scholarly discourse.
3. To accelerate the progression of these fields by showcasing pioneering research, evidence-based practices, and transformative ideas.
4. To achieve a high level of ethical medical & allied health sciences journalism.
5. To produce credible & authentic publication.

EDITORIAL FREEDOM & INDEPENDENCE

The editor has full authority over the editorial content of the journal & timing of publication of its content. The editorial team makes decisions on the authenticity & validity of the submitted manuscripts in light of the journal's aims & scopes. We are of the vision that the editorial decision decision-making process should be independent of all commercial concerns.

MANUSCRIPT WITHDRAWAL BY THE AUTHOR

Once the article is submitted, the author grants the editorial board full publishing rights & it is the absolute right of the editorial board to decide on article withdrawals.

PEER REVIEW PROCESS

Peer review is the unbiased critical assessment of manuscripts by experts who are not part of the editorial team. Each article submitted to JNAH for publication is reviewed by at least two specialists of concerned specialty as a double-blinded process.

ETHICAL COMMITTEE

The journal requires a certificate from the respective Institutional review board/Ethical committee for the research encompassed in the submitted manuscript.

All clinical investigations must be conducted according to the declaration of Helsinki Principles.

PLAGIARISM PREVENTION

Manuscripts are screened for plagiarism using turnitin software. After checking the plagiarism in the content submitted and the journal has the right to inform the author and reject the manuscript based on set limits.

CITATIONS

Research articles and non-research articles must cite appropriate and relevant literature in support of the claims made.

CONFIDENTIALITY

Editors will treat all manuscripts submitted to Journal of Nursing & Allied Health in confidentiality. Our journal adheres to ICMJE Ethical Guidelines for peer reviewers.

JOURNAL OWNERSHIP

Journal of Nursing & Allied Health referred to as 'JNAH', is the property of Rawalpindi Medical University, a not-for-profit, provincially chartered, public sector University. It is governed

and maintained by the editorial board of the journal under the supervision of the statutory bodies of the University.

OPEN ACCESS POLICY

JNAH provides open access to its content with the vision that making research freely available to the public supports the global exchange of knowledge.

COPYRIGHTS

DISCLAIMER

The content published represent(s) the opinion of the author(s). The editorial board makes every effort to ensure the accuracy and authenticity of material(s) printed in the journal. However, conclusion(s) and statement(s) expressed are view(s) of the author(s) and do not necessarily reflect the opinion(s)of the editorial board of JNAH.

TABLE OF CONTENTS

EDITORIAL	
Exploring The Complex Landscape Of Low Back Pain: Unravelling The Biopsychosocial Tapestry; *Aamer Naeem*	64
ORIGINAL ARTICLES	
Association Of Cognition In Physically Active And In-Active Young Adults; *Humda Niaz, Zuha Zahir Sayeda, Muhammad Shahid Shabbir, Aniza Shahid, Noor Fatima*	66
Effects of Smartphone Overuse On Quality Of Sleep And Academics Among University Students; *Misbah Marryam, Sania Ahmed Khan, Aaila Mussarat, Ghazala Bibi*	72
Mammography And Sonomammography As Index Test For Breast Carcinoma Keeping Biopsy As a Gold Standard; *Sumiya Abid, Sana Shahzadi, Ayesha Imtiaz, Areeba Ikram, Irum Rasheed*	78
Association Of Amblyopia With Ametropia And Strabismus; *Hadia Iqbal , Sehrish Akram, Saba Ghalib, Tehmina Waqar, Syeda Aal e Zahra Kazmi , Duaa Waseem*	83
Prevalence Of Proprioception Error And Restricted Cervical Ranges Among Students Wearing headscarves In Public Sector Universities; *Hira Sardar, Rabbiya Riaz, Areej Ali, Sammar Abbas, Hina Yaqoob, Rabail Farrukh*	88
CASE REPORT	
Coprophagia In A Young Girl: A Case Study; *Natasha Shaukat, Amna Sajjad, Amna Ijaz*	94

Editorial

Exploring the Complex Landscape of Low Back Pain: Unravelling the Biopsychosocial Tapestry

Aamer Naeem[1]

Kulsum International Hospital, Islamabad[1]

Low back pain (LBP) remains a pervasive and challenging health concern worldwide, affecting individuals across diverse demographic spectra. While the biomedical model traditionally dominated the understanding and management of LBP, recent research has highlighted the significance of incorporating biopsychosocial factors into the broader framework. This editorial aims to elucidate the impact of biopsychosocial factors in the etiology, progression, and management of low back pain, drawing upon evidence from peer-reviewed journals.

Understanding the anatomical and physiological aspects of LBP is crucial for effective management. Studies by Maher et al. (2017) and Hartvigsen et al. (2018) emphasize the role of biomechanical stress, disc degeneration, and structural abnormalities in contributing to LBP. It is imperative to recognize that the interplay of these factors forms only one layer of the complex tapestry that characterizes low back pain.

Psychosocial factors significantly influence the experience and trajectory of LBP. Chronic pain often intertwines with psychological factors such as anxiety, depression, and cognitive distortions. The study by Gatchel et al. (2018) underscores the bidirectional relationship between psychosocial factors and the perception of pain, suggesting that addressing these dimensions is paramount for comprehensive pain management.

Socioeconomic and cultural factors also play a crucial role in the manifestation of low back pain. Vulnerable populations may face disparities in access to healthcare, employment opportunities, and social support systems, exacerbating the impact of LBP. The work of Buchbinder et al. (2018) underscores the importance of considering social determinants to develop holistic and equitable interventions for low back pain.

A paradigm shift towards integrated, patient-centered care is essential for effective LBP management. The biopsychosocial model, as advocated by Engel (1977), provides a comprehensive framework that acknowledges the interconnectedness of biological, psychological, and social factors. A study by Foster et al. (2020) demonstrates the efficacy of multidisciplinary interventions that address all facets of the biopsychosocial spectrum, leading to improved outcomes for individuals with LBP.

In conclusion, the impact of biopsychosocial factors in low back pain is a multifaceted interplay that extends beyond traditional biomedical perspectives. The evidence presented from peer-reviewed journals highlights the necessity of embracing a comprehensive approach that considers the intricate relationships between biological, psychological, and social elements. As we navigate the evolving landscape of LBP research and practice, an integrated understanding of these factors will pave the way for more effective prevention, management, and treatment strategies. By acknowledging and addressing the diverse layers of the biopsychosocial tapestry, we can enhance the quality of care provided to individuals grappling with the complex challenges of low back pain.

References:

1. Maher, C., Underwood, M., & Buchbinder, R. (2017). Non-specific low back pain. The Lancet, 389(10070), 736-747.
2. Hartvigsen, J., Hancock, M. J., Kongsted, A., Louw, Q., Ferreira, M. L., Genevay, S., & Woolf, A. (2018). What low back pain is and why we need to pay attention. The Lancet, 391(10137), 2356-2367.
3. Gatchel, R. J., Neblett, R., & Kishino, N. D. (2018). The biopsychosocial approach to chronic pain: scientific advances and future directions. Psychological Bulletin, 144(2), 123-151.
4. Buchbinder, R., van Tulder, M., Öberg, B., Costa, L. M., Woolf, A., Schoene, M., & Foster, N. E. (2018). Low

back pain: a call for action. The Lancet, 391(10137), 2384-2388.

5. Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. Science, 196(4286), 129-136.

6. Foster, N. E., Anema, J. R., Cherkin, D., Chou, R., Cohen, S. P., Gross, D. P., & Turner, J. A. (2020). Prevention and treatment of low back pain: evidence, challenges, and promising directions. The Lancet, 391(10137), 2368-2383.

Original Article

Association of Cognition in Physically Active and In-Active Young Adults

Humda Niaz [1], Zuha Zahir Sayeda[2], Dr Muhammad Shahid Shabbir[3], Aniza Shahid[4], Noor Fatima[5]

Abstract

Objective: To discuss the intriguing connection between physical exercise and cognitive abilities in both genders.
Study design: It is a cross sectional study.
Place and duration of study: A Six-month study was carried out in Zohra Institute Health sciences, Rawalpindi. (from March 2022 to September 2022)
Material and Methods: A sample size of 382 participants was selected in accordance with inclusion criteria the subjects selected were aged between 18-40 years with graduation. The subjects with injury, neurological deficit and co-morbid condition were excluded. Self- administered questionnaires[2,3,4] were added to this study using the IPAQ, MOCA, and MMSE. IPAQ-SF aided in identifying the differences between physically active and inactive individuals. MOCA and MMSE were used to identify the level of Cognition.[5]
Results: A total of 382 (mean 29.19) healthy young adult participants were selected within the age limit of 18 to 40 years (52.1% male and 47.9% female). IPAQ was used to initially screen out physically active and inactive individuals. The frequency of low grade physically active individuals was 40 (10.5%), for moderately active individuals it was 54(14.1%) and 288(75.4%) individuals were deemed to be highly active. A cut-off score of 26 used to identify cognitive function for MOCA and MMSE questionnaires. According to MOCA 249 (19.6%) individuals had normal cognition, 58(15.2%) individuals had moderate cognition and 75(65.2%) individuals had low cognition. The results obtained from MMSE showed that 234(61.3%) individuals had no cognitive decline, 120 (31.4%) individuals had mild cognitive impairment and 28(7.3%) individuals had severe cognitive impairment. The correlation between IPAQ and MOCA depicted highly significant results whereas the correlation (0.000) between IPAQ and MMSE is less significant (>0.005)
Conclusion: This study found that people who engage in physical activity have normal levels of cognition and quick thinking abilities, whereas inactive individuals have a decline in cognitive functioning and delay response to challenges.
Keywords: Mini Mental state examination, Montreal Cognitive Assessment, International Physical Activity Questionnaire short form , Cognition, Physically Active, Physically Inactive, Exercise

1. Introduction

Cognition refers to mental processes involved in knowledge acquisition and understanding, including observing, envisioning, memorising, reasoning, assessing, visualising and problem-solving. Regular physical exercise in young adults acts as a safeguard against cognitive decline that often manifests in late adulthood.[6] Engaging in physical activity on a consistent basis provides multifactorial bodily health advantages, including a decreased risk of developing conditions such as stroke, cardiovascular diseases, osteoporosis and diabetes.[7] The correlation between cognitive function and human intelligence poses notable challenges to comprehending human behaviour and task performance. Intelligence is singular in context; evidence supports multiple forms of intelligence operating across different cognitive domains.

The physical activity improves executive functions and has a positive impact on cognition in young adults. It includes abilities such as attention, working memory, and cognitive flexibility. In addition, physical activity has been linked to increasing hippocampal volume and is important for memory consolidation and spatial navigation.

It is hypothesised that physical activity may promote the growth of new neurons in the hippocampus and improve blood flow to the brain, which leads to better cognitive function.[8]

The Physiotherapy clinic, RWP,[1] Zohra Institute of Health Sciences, Rawalpindi,[2,4,5] Lecturer, Zohra Institute of Health Sciences, Rawalpindi,[3]
Correspondence:. Humda Niaz, The Physiotherapy Clinic, RWP **Email:** humdahkhan@gmail.com

Conversely, physical inactivity has been linked to poorer cognitive function in young adults. Sedentary behaviours, such as sitting for an extended period of time, have been associated with reduced executive function and hippocampal volume.[9] According to WHO the physical activity criteria for an adult (aged between 18-40 years) are to perform moderate aerobic exercises for 150-300 minutes and vigorous activity for 75 - 150 minutes thrice a week. The energy expenditure in light physical activity is <3.0 MET, in Moderate physical activity is <3-5.99 MET and in vigorous physical activity, it is <6-8.99 MET. Whereas the MET expenditure for a sedentary lifestyle is <1.5 MET in sitting and reclining positions.[10]

A preliminary work emphasized by Machado observed on the effect of physical activity on cognitive functioning and cerebral blood flow regulation in healthy young adults. His study showed that high cerebral blood flow links to higher mental functioning. There was high cerebral blood flow regulation in 55 young adults who regularly performed aerobic exercise.[11] The blood flow was checked in hypercapnia and hypocapnia states where it was observed that increased cerebral blood increases cerebral functioning and high performance in active young adults.[12] Eadaoin et al worked on the analysis of BDNF factors involved in cognition and improvement in the hippocampal function in physically active individuals was carried out by[13] Running trial study investigation on choric exercise group and acute exercise group. Following acute exercises, serum BDNF levels rises, $p<0.05$ compared to 0 minutes and $p<0.05$ compared to 30 minutes.

A cross-sectional survey by Rai, et al analysed the association between physical activity and the prevention of serious illness in young adults aged between 18-21 years.[14] The IPAQ-SF proved to be a satisfactory method to advocate for physical activity and prevent comorbid illnesses.[18] Moderate exercise or physical activity not only positively impacts physical and cardiovascular health but also fortitudes the mind with the tenacious ability of cognition, perception, reasoning, intelligence and cognition.[16] Physical activity aids in the prevention of non-communicable diseases that notably include cardiopulmonary diseases, diabetes, and mental health conditions.[17] It assists in enhancing the musculoskeletal endurance and strength of the individual. It progressively delays age-related mild cognitive decline, and dementia.[15] They can process memory function, reasoning, and judgement apace with enhanced cortical function. In the interesting analysis of Aichberger, M.C., et al[6], It has been evidently observed that physical activity increases synaptic function to enhance learning and memory, consequently increasing neuronal plasticity in higher-fit individuals.[6] With the help of three assessment scales—the MOCA, MMSE,[19] and IPAQ[20] —this study compares the cognitive capacities of physically active and sedentary individuals in order to bolster the findings of important studies. The Rationale of this study postulated to determine physically active individuals have higher level of cognition .

2. Materials & Methods

The participants have verbally explained the purpose, procedure and nature of the study. For documentation purposes, written consent was initially taken from the involved participants. After securing the ethical approval from Zohra Institute of Health Sciences (Rawalpindi, Pakistan), permission letters to conduct research the cross-sectional survey was conducted between physically active and inactive young adults. The 382 (199 male, 189 female) individual participants were chosen at random from various classes at the respective institute and general population The participants signed written consent to take part in the study. The selected population were aged between 18 to 40 years having at least 12 years of education. The exclusion criteria included individuals having neurological disorders, cognition deficits, underlying co-morbid conditions and geriatric population. The questionnaires were self-administered, a brief introduction of the 3 questionnaires (MOCA, MMSE, IPAQ) and intent of research was orally given to the participants . The Montreal Cognitive Assessment (MOCA) is a moderate cognitive impairment screening tool. The results are more precise and provide a more accurate understanding of an individual's cognitive function when paired with MMSE. To determine an individual's level of physical activity and if they meet the WHO physical activity guidelines, we have incorporated IPAQ into our research.The researchers actively helped the participants when they were having trouble understanding the question. The participants were polled to acquire about their demographics and educational background.

To measure cognition Montreal Cognitive Assessment scale (MOCA) and Mini-mental State examination scale (MMSE) were administered by random participants.[15] To differentiate the cognitive score between physically active and inactive individuals International Physical Activity Questionnaire- Short Form (IPAQ-SF)[14] was filled out by inclusive participants. Both the cognition-testing procedure and physical activity questionnaire were described by the researcher and then demonstrated it. He calculated and recorded the results of the tests when they were completed. Each participant was allocated 30 minutes to fill out all three questionnaires. On average the MOCA takes 12 minutes, MMSE takes around 8 to 11 minutes and IPAQ-SF takes 7 minutes to complete.

Table 1: IPAQ and MOCA Cross Tabulation

		MOCA			Total
		moderate cognitive impairment	mild cognitive impairment	Normal	
IPAQ	Low	32	4	4	40
	Moderate	4	12	38	54
	High	39	41	208	288
Total		75	57	250	382

Statistical Analysis was performed using SPSS version 21. Pearson Chi-square test was used to investigate the relationship between physical activity and cognition. The significance criteria of $P< 0.05$ was implemented to calculate and analyse correlation.

3. Results

A total number of 382 participants (199 males and 183 females) were selected using the convenience sampling technique in this study.

The correlation between MOCA, MMSE and IPAQ was found using Pearson chi square test. The MOCA and IPAQ Correlation showed 0.000 and the MMSE and IPAQ showed 0.005 hence both MOCA and MMSE depicted positive Correlation between cognition and physical activity.

The data obtained from IPAQ shows that out of 382 participants, 10.5% falls under the low grade of IPAQ score with frequency of 40. Moderate grade has frequency and % of 54 and 14.1% respectively, high grade has frequency and % of 288 and 75.4%.

The data obtained from MOCA shows that moderate cognitive impairment has frequency and % of 75 and 19.6%,mild cognitive impairment has frequency and % of 58 and 15.2%,normal cognition has frequency and % of 249 and 65.2%.

The data obtained from MMSE shows that out of 382 participants, severe cognitive impairment has frequency and % of 28 and 7.3%,mild cognitive impairment has frequency and % of 120 and 31.4%,no cognitive impairment has frequency and % of 234 and 61.3%.

The results between the correlation of MOCA ,MMSE and IPAQ is shown below in, Table1, Table 2.

Table 2: Chi-Square Tests (MOCA-IPAQ)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	107.477[a]	4	0.000

The above table shows association between MOCA and IPAQ ,the p value 0.000 which shows it is significant.

Table 3: IPAQ and MMSE Cross tabulation

		MMSE			Total
		severe cognitive impairment	mild cognitive impairment	no cognitive impairment	
IPAQ	Low	5	19	16	40
	Moderate	4	18	32	54
	High	19	82	187	288
Total		28	119	235	382

Table 4: Chi-Square Tests (MMSE IPAQ)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.449[a]	4	.051

IPAQ results from low-grade physically active individuals have a frequency of 40, moderate actively has 54, while highly physically active individuals have a frequency of 288.MOCA results show that normal participants have a frequency of 249, which shows normal Cognition, and mild and moderate cognitive impairment has a frequency of 58 and 75, which shows a little cognitive decline. MMSE results show that individuals with no cognitive impairment have a frequency of 234, mild cognitive impairment and severe cognitive impairment have a frequency of 120 and 28. MOCA and IPAQ are highly significant, whereas the association between IPAQ and MMSE is less significant.

4. Discussion

The objective of our research was to ascertain the physical adults and assess their cognitive functioning. Two additional tools were employed in our study for precise subject assessment, IPAQ and MMSE in correspondence with MOCA. IPAQ identifies those who are physically active. According to the scores provided by MOCA and MMSE, patients who engage in physical activity have greater levels of cognition than people who do not. A cross-sectional study with a sample size of n=137 on the topic of "Identifying level of cognition in physically active and inactive individuals" was published in a Pakistan Physical Therapy Journal; in this study only MOCA was used to measure cognition. The participants selected were verbally asked for their level of physical activity. Out of 137 selected participants 86 (62.8%) individuals were active and 51 (37.2%) individuals were inactive. The mean results showed that 42 (30.7%) scored below 26 (low cognition) and 95 (69.3%) scored above 26 (normal cognition) The study had flaws, in selected few participants, and provided insufficient evidence to distinguish between people who are active and those who are inactive.1 In relation to our study, we used IPAQ-SF to quantitatively screen out active and inactive individuals. A cross tabulation results between IPAQ * MOCA (0.000) and IPAQ * MMSE (<0.005) was used to administer level of cognition and assess activity level of individual

Physical activity lowers the psychological prevalence of depression, anxiety, and stress.[16] A healthy lifestyle is indicated by physical and mental exercise. Exercise boosts dopamine levels, which lower stress and depression and enhance mood. It also improves mental performance.[21] All levels of physical activity—light, moderate, and intense—have a good impact on cognition. The individual who is physically active can express things more clearly. Regular exercise improves one's ability to think effectively.

Engaging in aerobic exercise has a favorable impact on cognition and can enhance memory and reasoning.[22,24] in comparison individuals who engage in moderate physical[20] Non-contact athletes who play board games, scrabble, and other similar activities typically have greater executive function and moderate cognitive abilities compared to athletes who play non-contact sports like badminton and footballs.[25] Active individuals have larger hippocampal and basal ganglia,

which means more brain activity, connectivity, memory, and reasoning.[26]

Aerobic exercise has a positive influence on cognition and brain function.[22,25] Moderate physical activity reduces the risk of dementia, enhances intellectual performance, and boosts flexibility.[24,27] The individuals who regularly participated in moderate physical activity had higher executive functions, visuospatial orientation, memory and attention depicted by the results of MOCA and MMSE. It has also been demonstrated that those with greater cardiovascular fitness had higher frontal volumes.[29,30,31] Enhanced aerobic and cardiorespiratory fitness directly leads to increases in cortical and subcortical size.[28]

Conclusion:

The cross sectional study observed that exercise enhances rapid thinking abilities, problem solving strategies, increases higher mental functioning and retaining long term memory. We have examined executive brain cognitive levels utilizing MOCA and MMSE, and we have utilised IPAQ to distinguish between physically active and inactive people. It was concluded that there was a strong correlation between cognitive function and physical activity.

References:

1. Shabbir, Muhammad Shahid, et al. "Identification of cognition level in physically active and inactive young adults." Pakistan Journal of Physical Therapy (PJPT) (2022).
2. Hobson J. The montreal cognitive assessment (MoCA). Occupational Medicine. 2015 Dec 1;65(9):764-5.
3. Mitchell AJ. The Mini-Mental State Examination (MMSE): an update on its diagnostic validity for cognitive disorders. Cognitive screening instruments: A practical approach. 2013:15-46.
4. Lee PH, Macfarlane DJ, Lam TH, Stewart SM. Validity of the international physical activity questionnaire short form (IPAQ-SF): A systematic review. International journal of behavioral nutrition and physical activity. 2011 Dec;8(1):1-1.
5. Hoops S, Nazem S, Siderowf AD, Duda JE, Xie SX, Stern MB, Weintraub D. Validity of the MoCA and MMSE in the detection of MCI and dementia in Parkinson disease. Neurology. 2009 Nov 24;73(21):1738-45.
6. Aguirre-Loaiza, H., Arenas, J., Arias, I., Franco-Jímenez, A., Barbosa-Granados, S., Ramos-Bermúdez, S., ... & García-Mas, A. (2019). Effect of acute physical exercise on executive functions and emotional recognition: Analysis of moderate to high intensity in young adults. Frontiers in Psychology, 10, 2774.
7. Aichberger, M. C., et al. "Effect of physical inactivity on cognitive performance after 2.5 years of follow-up: Longitudinal results from the Survey of Health, Aging, and Retirement (SHARE)."
8. Basso, J. C., & Suzuki, W. A. (2017). The effects of acute exercise on mood, cognition, neurophysiology, and neurochemical pathways: A review. Brain Plasticity, 2(2), 127-152.
9. Debert, C. T., Benson, B. W., & Dukelow, S. (2013). Montreal cognitive assessment (MoCA): baseline evaluation of cognition in the athletic population. British Journal of Sports Medicine, 47(5), e1-e1
10. Pastuszak A, Lisowski K, Lewandowska J, Buśko K. Level of physical activity of physical education students according to criteria of the IPAQ questionnaire and the recommendation of WHO experts. Biomedical Human Kinetics. 2014 Jan 1;6(1).
11. Effects of acute bouts of exercise on cognition. Acta psychologica, 112(3), 297-324.
12. Erickson, K. I., and Arthur F. Kramer. "Aerobic exercise effects on cognitive and neural plasticity in older adults." British journal of sports medicine 43.1 (2009): 22-24.
13. Griffin, É. W., Mullally, S., Foley, C., Warmington, S. A., O'Mara, S. M., & Kelly, Á. M. (2011). Aerobic exercise improves hippocampal function and increases BDNF in the serum of young adult males. Physiology & behavior, 104(5), 934-941.
14. Rai, R. H., Asif, M., & Malhotra, N. (2018). Reliability of International Physical Activity Questionnaire–Short Form IPAQ-SF for Young Adults in India. European Journal of Physical Education and Sport Science.
15. Shabbir, Muhammad Shahid, et al. "Identification of cognition level in physically active and inactive young adults." Pakistan Journal of Physical Therapy (PJPT) (2022).
16. Gomez-Pinilla, F., & Hillman, C. (2013). The influence of exercise on cognitive abilities. Comprehensive Physiology, 3(1), 403.
17. Guiney, H., Lucas, S. J., Cotter, J. D., & Machado, L. (2015). Evidence cerebral blood-flow regulation mediates exercise–cognition links in healthy young adults. Neuropsychology, 29(1), 1.

18. Jia, X., Wang, Z., Huang, F., Su, C., Du, W., Jiang, H., ... & Zhang, B. (2021). A comparison of the Mini-Mental State Examination (MMSE) with the Montreal Cognitive Assessment (MoCA) for mild cognitive impairment screening in Chinese middle-aged and older population: a cross-sectional study. BMC psychiatry, 21(1), 1-13.

19. Rai, R. H., Asif, M., & Malhotra, N. (2018). Reliability of International Physical Activity Questionnaire–Short Form IPAQ-SF for Young Adults in India. European Journal of Physical Education and Sport Science.

20. Hobson, J. (2015). The montreal cognitive assessment (MoCA). Occupational Medicine, 65(9), 764-765.

21. Kumar, A., Saraswathi, I., Sembulingam, P., & Sembulingam, K. (2015). Impact of perceived stress on cognitive ability and physical performance in young adults. World journal of pharmaceutical research, 4, 1620-1632.

22. Erickson, Kirk I., Charles H. Hillman, and Arthur F. Kramer. "Physical activity, brain, and cognition." Current opinion in behavioral sciences 4 (2015): 27-32.

23. Ludyga, S., Gerber, M., Brand, S., Pühse, U., & Colledge, F. (2018). Effects of aerobic exercise on cognitive performance among young adults in a higher education setting. Research quarterly for exercise and sport, 89(2), 164-172.

24. Rathore, A., & Lom, B. (2017). The effects of chronic and acute physical activity on working memory performance in healthy participants: a systematic review with meta-analysis of randomized controlled trials. Systematic reviews, 6(1), 1-16.

25. Suwabe, K., Hyodo, K., Byun, K., Ochi, G., Fukuie, T., Shimizu, T., ... & Soya, H. (2017). Aerobic fitness associates with mnemonic discrimination as a mediator of physical activity effects: evidence for memory flexibility in young adults. Scientific reports, 7(1), 1-10.

26. Rezab, S. (2015). Exercise and cognition in young adults

27. Stern, Y., MacKay-Brandt, A., Lee, S., McKinley, P., McIntyre, K., Razlighi, Q., ... & Sloan, R. P. (2019). Effect of aerobic exercise on cognition in younger adults: A randomized clinical trial. Neurology, 92(9), e905-e916

28. Szturm, T., Maharjan, P., Marotta, J. J., Shay, B., Shrestha, S., & Sakhalkar, V. (2013). The interacting effect of cognitive and motor task demands on performance of gait, balance and cognition in young adults. Gait & posture, 38(4), 596-602.

29. Shah, S., Shah, S., & Chauhan, S. (2020). Relationship between physical activity and cognition among young adults. Physiotherapy-The Journal of Indian Association of Physiotherapists, 14(1), 41.

30. Vieira, I. S., Ferrugem, S. C. R., Reyes, A. N., Branco, J. C., Mondin, T. C., de Azevedo Cardoso, T., ... & Moreira, F. P. (2021). Effects of depression and excess body weight on cognition and functioning in young adults: A population-based study. Journal of Affective Disorders, 282, 401-406.

31. Weuve, Jennifer, et al. "Physical activity, including walking, and cognitive function in older women." Jama 292.12 (2004): 1454-1461

Original Article

Effects of smartphone overuse on quality of sleep and academics among university students

Misbah Marryam,[1] Sania Ahmed Khan,[2] Aaila Mussarat,[3] Ghazala Bibi[4]

Abstract

Objective: To determine the association of smartphone addiction of male and female university students with quality of sleep and academic performance.
Study design: It is a comparative cross sectional study.
Place and duration of study: A three-month study was carried out in different universities of Rawalpindi and Islamabad. (from October 2017 to January 2018)
Material and Methods: Non probability purposive sampling technique was used for data collection. Students between the ages of 18 to 25 using smartphone more than two hours per day were included. Students suffering from diagnosed sleeping disorders and taking psychological treatment were excluded from the study. Data was collected by using Pittsburgh Sleep Quality Index (PSQI), Smartphone addiction scale (SAS), semester grade point average (SGPA) and cumulative grade point average (CGPA). Data was analyzed by using SPSS version 21.
Results: The mean age of the participants was 20.70±1.52 years, out of which 67% were males and 33% were females. Mean and standard deviation of global PSQI was 7.31±3.33 and SAS was 93.05±21.4 with no significant difference between males and females (P value >0.05). Mean and standard deviation of CGPA and SGPA were 3.02±1.288 and 3.38±11.19 with significant difference in SGPA (P value<0.05). SAS has showed association with PSQI and academic performance (P value <0.05).
Conclusion: Students spend a significant amount of time on smart phone thus developing addictive tendencies. It can be concluded that sleep quality and academics are directly associated with smartphone addiction in a negative way. There is no difference in sleep quality and smartphone addiction whereas academics were more affected in male students than female students.

Keywords: Academic performance, PSQI, SAS, Sleep quality, Smartphone addiction

1. Introduction

Smart phone has been labelled as one of the greatest inventions of 20th century with highly boosting abilities. The evolution of information technology brought a drastic change in our lives. It was predicted previously that mobile phone will replace the PCs for surfing web and will change the people's life in many aspects like; replacing our digital cameras, video players and would be a perfect substitute for our credit and debit cards. Now when we look at the present situation, not only mobile phone impacts are so obvious but has also penetrated our lives badly.[1]

Limiting the usage of smartphones, proves to be benevolence for the people in this century. However immense usage proves to be detrimental and unsafe for the user.

There are numerous positive effects of smart phone on human life. The smart phone has become fundamental and valuable part of people life. It allows user to connect with their cheerful moments digitally in the form of pictures, personal information, memories along with health, work and financial data in one tap. Transferring and storing data, checking emails and sharing information has become easier than ever.[2] Mobile phones along with internet access have brought people much closer. It is a matter of only one touch to get connected with anyone in the world. But on one hand it connected the people distant from us but has disconnected us from those living with us.[3]

Physiotherapist, Benazir Bhutto Hospital, Rawalpindi, Pakistan,[1] Lecturer, Yusra Medical and Dental College, Islamabad, Pakistan,[2] Medical Coder, MTBC Inc. Islamabad,[3] Physiotherapist, Margalla Hospital Taxilla[4]
Correspondence: Misbah Marryam, Physiotherapist, Benazir Bhutto Hospital, Rawalpindi, Pakistan **Email:** physiomisbah@gmail.com

Smartphones work as a great source of entertainment; it has internet facilities which enables user to watch online TV, download and play online game.[4] As for the business industry, smartphones do provide a greater ease of management. Having own marketing apps on Android makes it easier for companies to look over their business quickly and easily. As far as the studies are concerned, the internet facilities in a smartphone have enabled students to access study related data easily. In addition, there are many study oriented applications that help in better understanding of the topics.[5] In case of life threatening emergencies, having a smartphone, one can easily get in touch with anyone or emergency care providers on the spot.[6]

However, besides so many positive effects of smart phone, there are multiple negative effects. One of major negative effect is its addiction Not only youngster but kids have also fallen perpetually prey to the addiction of mobile phones. They tend to dawdle their day by watching mindless videos, playing video games and using other apps. These poor addictive habits produce underachiever students who are low in studies and overall performance.[7] Extended periods of smartphone screen exposure can result in a deterioration of eyesight. The screen's glare can be detrimental to eye health, and prolonged smartphone usage, particularly during lengthy phone calls, can contribute to additional health issues like headaches.[8] Continuously carrying and using smartphones over extended durations can lead to the repeated utilization of particular muscles, resulting in muscle fiber damage, the accumulation of harm from sudden injuries, and a frequent occurrence of myogenic tension, primarily in the neck and shoulder area.[9] Straining the neck and shoulders through excessive pressure leads to muscle tiredness, reduced productivity, and impacts the musculoskeletal system. Persistent texting and scrolling on a smartphone's touchscreen can result in a medical condition known as "Text claw," characterized by cramped fingers, wrist discomfort, and muscle pain among those affected.[10] It usually occurs due to inflammation of the tendon known as tendonitis. In addition to that it aggravates the tendon inflammation further. The harmful radiations emitting from smartphone produces counterproductive effects on the mental health of the user.[8] According to expert researches, smartphone addiction negatively impacts on user's emotional, psychosocial, psychological, behavioral and health factors. In order to keep one's self busy the user uses smart phone for infinite period makes the user feel lonelier and fall into depression. The feeling worsens if person doesn't use cell phone for some time mimicking feelings similar to withdrawal effects.[11] The smart phones increases person's availability for work and increases working hour even after signing off from work. This creates a ruinous communication gap between individual and their family, reducing the family time by being continuously sticking with phone. The person frequently checks, reply's to emails which viciously increases users level of stress.[12]

Smart phone is becoming one of the leading addiction among students and a primary gadget to be dependent upon. The excessive use of smart phone results in daytime sleepiness along with working for late hours. This imposes increased stress levels on student, affecting their body; mentally, physically and emotionally. Therefore, concerns about sleep related problems are increasing with increased use of smartphone. According to a study when animals, including humans are sleep deprived, many of their bodily systems fail to work properly. Not only memory, performance and attention span suffers but immune and endocrine systems are also impaired.[13]

Smart phone also raises fatigue among the users. Though it seems like our phone provide a way to destress before bedtime, but in reality, the blue light of screen actually has an opposite effect. The brain can be activated by the light emitted from smartphone's screen which makes it harder to fall asleep and even harder to get a sleep of good quality. It is therefore necessary for students to have "screen free" time before bed. According to studies, students who spend more than 4 hours a day looking at the screens of their smart phone had 49 percent more chances of taking longer to fall asleep and almost three and a half times more likely to sleep for less than five hours each night.[14] Many university students are sleep deprived, have poor sleeping habits, and experience poor sleep quality. Young adults are recommended a full eight to nine hours of high quality sleep a night.[15]

Due to these positive and negative effects of the smartphone and their effects on sleep and academic performance the current study was designed. The objectives of the study were to determine the association

of smartphone addiction with quality of sleep and academic performance of the students. The effects of sleep quality on academic record of both male and female university students were also determined.

2. Materials & Methods

It was a comparative cross sectional study conducted in different universities of Rawalpindi and Islamabad from October 2017 to January 2018. A total of 1000 students were recruited in the study after getting permission from the administration of different universities including; Riphah International university, Bahria university, National university of modern languages, Comsats, Air university and Arid Agriculture university. Non probability purposive sampling technique was used for data collection. Data was collected from six different departments including engineering, social sciences, management sciences, computer sciences, media sciences and biosciences. The university students between the ages of 18 to 25 using smartphone more than two hours from 9pm to 2am were included in the study. While all those students who were suffering from diagnosed sleeping disorders and were under any psychological treatment were excluded from the study. Data was collected from the students after taking informed consent by sharing all the information regarding the study with maintenance of their confidentiality. Data was collected by using Pittsburgh Sleep Quality Index (PSQI)[35] for measuring sleep quality, Smartphone addiction scale (SAS)[36] for measuring smart phone addiction and semester grade point average (SGPA) and cumulative grade point average (CGPA) for the measurement of academic performance. Besides these, demographic information was also taken from all the students included in the study. 1100 questionnaires were distributed but only 1000 were returned with complete responses whereas 100 were either incomplete or were not returned by the students. After collection, data was analysed by using SPSS version 21. Qualitative data was presented in form of frequencies and percentages and for quantitative data; mean with standard deviation was used. For inferential statistics; independent samples t test was used for comparisons between male and female students and Pearson's rank correlation was used to find associations between different variables.

3. Results

Total number of participants in the current study was 1000 out of which 670 (67%) were males and 330 (33%) were females. The mean age of the participants was 20.70±1.52 years. Data was collected from six different departments with highest percentage from engineering department i.e. 36.6 % and lowest from social sciences i.e. 4.8%. Students from management sciences were 193(19.3%), computer sciences were 183(18.3%), media sciences were 85(8.5%), biosciences were 125(12.5%) depending on their response rate. Mean and standard deviation of global Pittsburgh sleep quality index (PSQI) was 7.31±3.33. The details of all components of PSQI were provided in table I.

Means and standard deviation of SAS was 93.05±21.4. Total number of smartphone usage hours was 7.96±4.70 on average. The most common purpose of smartphone use was social media with frequency of 439 (43.9%) which was followed by communication i.e. 192(19.2%). Smartphone usage for study was 59(5.9%), entertainment 123(12.3%) and for all above mentioned purposes was 187(18.7%). Mean and standard deviation of CGPA and SGPA were 3.02±1.288 and 3.38±11.19 respectively.

Table I: Mean and standard deviation of different components of Pittsburgh sleep quality index (PSQI)

Components	**Mean±SD**
Subjective sleep quality	1.09±0.82
Sleep latency	1.27±0.97
Sleep duration	1.26±1.06
Habitual sleep efficiency	0.83±1.11
Sleep disturbance	1.26±0.57
Use of sleep medication	0.39±0.81
Daytime dysfunction	1.22±0.99

When comparisons were made between male and female students, it was found that the mobile usage hours of females are more than the males with a statistically significant difference (P value<0.05). Whereas no significant difference was found when smartphone

addiction scale and global score of PSQI was compared between male and female as P value> 0.05. In components of PSQI, significant differences were found in sleep disturbance, use of sleep medication as well as day time dysfunction (P value<0.05). When academic performance of male and female students was compared, no statistically significant difference was obtained in CGPA but it was noted in SGPA where female students have shown improved performances than the male students (P value<0.05) (table II).

Table II: Comparison Of Means Of Different Variables In Male And Female Students

Variables	Male (Mean±SD)	Female (Mean±SD)	P value
Mobile usage hours	7.70±4.56	8.49±4.95	0.01*
SAS	92.65±21.10	93.88±22.05	0.39
PSQI	7.32±3.31	7.31±3.37	0.96
Subjective sleep quality	1.10±0.84	1.08±0.76	0.81
Sleep latency	1.26±0.98	1.30±0.94	0.49
Sleep duration	1.31±1.06	1.26±1.06	0.03*
Habitual sleep efficiency	0.86±0.12	0.76±0.08	0.19
Sleep disturbance	1.23±0.57	1.33±0.56	0.009**
Use of sleep medication	0.42±0.08	0.32±0.07	0.05*
Daytime dysfunction	1.16±0.98	1.33±1.007	0.008**
CGPA	2.96±1.33	3.16±1.17	0.02*
SGPA	2.97±1.00	4.21±1.95	0.10

PSQI: Pittsburgh Sleep Quality Index, SAS: Smartphone addiction scale, SGPA: Semester grade point average, CGPA: Cumulative grade point average *= P value<0.05, **= P value<0.01

When associations were found between different variables, it was found that academic performance(both CGPA & SGPA) has a negative association with smart phone addiction as smart phone addiction increases academic performance decreases (P value<0.05). Smart phone addiction has also showed positive association with all components of sleep quality index showing as addiction of smartphone increases, sleep quality decreases (P value<0.05). However no association was found between sleep quality and academic performance (P value>0.05) (table III).

Table III: Association of different variables

Variable	Correlation coefficient	P value
SGPA& SAS	-.068*	0.032
CGPA & SAS	-.091**	0.004
PSQI & SAS	0.227***	<0.001
Subjective sleep quality & SAS	0.161***	<0.001
Sleep latency& SAS	0.132***	<0.001
Sleep duration& SAS	0.071*	0.025
Habitual sleep efficiency& SAS	0.083**	0.009
Sleep disturbance& SAS	0.104**	0.001
Use of sleep medication& SAS	0.075*	0.018
Daytime dysfunction& SAS	0.185***	<0.001
PSQI & CGPA	-0.06	0.06
PSQI & SGPA	-0.039	0.215

PSQI: Pittsburgh Sleep Quality Index, SAS: Smartphone addiction scale, SGPA: Semester grade point average, CGPA: Cumulative grade point average, *= P value<0.05, **= P value<0.01

4. Discussion

According to current study, an increased smartphone usage is associated with an increase in poor quality of sleep and poor academic performance. Although females were found to use mobile phones more than males but there was no statistical difference in their sleep quality and CGPA but there is a difference in SGPA. There is association of sleep quality and smartphone addiction as well as smart phone addiction and academic performance. The results of the current study are in accordance with the results of the previous studies done in different regions of the world. According to the findings of a study by Majid Sadoughi done in Kashan, an increasing use of mobile phone had negative effects such as low sleep quality, high perceived stress and their undesirable effects on student's life. In both the studies sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI), the value of which in both these cases was

above 5 showing disturbed sleep quality. Soni et al, in their study reported that those who used smart phone excessively had high Global PSQI scores showing disturbances in the quality of sleep and DASS-21scores showing high levels of depression, anxiety and stress. The results of their study support the results of the current study as in the current study, the PSQI scores were found to be high among those who were using smart phone excessively in addition to low performance in academics.

A survey was conducted by Cho et al to find the relationship between smartphone usage, sleep pattern and deprivation. It was found that though the rate of smartphone addiction was low in high school students but smart phone addiction and sleep deprivation had a positive relation. This is because the light stimulation from phone's screen disturbed sleep quality and thus sleep deprivation.

A research was conducted to find effects of sleep quality on the association between problematic mobile phone use and mental health symptoms in Chinese college students and it was reported that an increase in mobile phone usage was associated with poor quality of sleep which in turn was associated with mental health problems whereas in the current study the increase in mobile phone use showed an increase in poor quality of sleep which in turn affected their academic performance and resulted in poor GPAs at universities. In both the researches mobile phone overuse had a negative effect on quality of sleep with additional poor effects on mental health (as shown in previous study) and a poor effect on academics (as evident in the current study).

Ahn et al did a research to analyse the effects of mobile phone overuse on quality of sleep. He studied smart phone usage pattern, wake up time, time spent in bed and overall sleep quality and concluded that smart phone had a negative effect on quality of sleep. The result of current study is in accordance with the previous study as smart phone overuse in current study too had negative effects on quality of sleep. In both the studies there was an increase in late night mobile usage hours and an increase in the time spent in bed using mobile phone.

Tamura et al found the association between excessive mobile phone usage, insomnia and depression and found that those having an excessive mobile phone usage usually more than 5 hours a day presented with an increased depression and insomnia, which shows poor sleep quality. Whereas in the current study an increase in smartphone usage usually more than 7 hours was found prevalent and it was associated with poor quality of sleep. In a study by Mohammad Beigi it was found that an increase in mobile phone use was associated with poor sleep quality as well as quantity. Similarly a study by Demicri et al found that increase in mobile phone usage led to increased depression and anxiety which in turn affected sleep quality in a negative way. The results of both studies are in accordance with the results of the current study.

Aman et al did a study to find out the relation between mobile phone overuse and academics, it was seen that an increase in mobile phone usage was associated with poor academic performance of students. In current study similar results were found i.e. an increase in smartphone usage was associated with poor academic performance. In both these studies GPA was used as a means to measure student's academic performances.

There are some limitations of the study. As smart phone addiction and its effect on sleep quality and academics is a highly prevalent problem, so in future, studies should be done with larger sample size and from different cities in order to generalize the results to whole population. All the participants of study were university students and male ratio was greater than females, studies with equal gender distribution are needed. As questionnaire includes information of academic performance, some students were reluctant to fill that section. All subjects were well-educated in the current study, the samples included people from backgrounds of different educational and varying age. The school curriculum, strenuous school activities and competing examinations causes psychological distress to student's mental health. It occurs more in youngsters and teens, attributing to increasing use of smart phones to combat stress. Association of all components of sleep quality with smartphone addiction should also be evaluated independently in future students.

Conclusion:

With the growing admiration of smart phone among university students addictive tendencies are also increasing. The current study indicated that sleep quality and academics are directly associated with smartphone

addiction and affects quality of all the components of sleep. The students having high addiction of smartphone showed poor academic performance. No significant association was found between sleep quality and academics thus sleep has no effect on academic performance of students. In comparison between male and female gender, no differences were found in sleep quality and smartphone addiction whereas academics were more affected in male students than the female students.

References:

1. Thomée S, Härenstam A, Hagberg M. Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults-a prospective cohort study. BMC public health. 2011;11(1):66.

2. Putzer GJ, Park Y. The effects of innovation factors on smartphone adoption among nurses in community hospitals. Perspectives in Health Information Management/AHIMA, American Health Information Management Association. 2010;7(Winter).

3. Ezoe S, Toda M, Yoshimura K, Naritomi A, Den R, Morimoto K. Relationships of personality and lifestyle with mobile phone dependence among female nursing students. Social Behavior and Personality: an international journal. 2009;37(2):231-8.

4. Wei R. Motivations for using the mobile phone for mass communications and entertainment. Telematics and Informatics. 2008;25(1):36-46.

5. Ozcelik E, Acarturk C. Reducing the spatial distance between printed and online information sources by means of mobile technology enhances learning: Using 2D barcodes. Computers & Education. 2011;57(3):2077-85.

6. Rumsfeld JS, Brooks SC, Aufderheide TP, Leary M, Bradley SM, Nkonde-Price C, et al. Use of mobile devices, social media, and crowdsourcing as digital strategies to improve emergency cardiovascular care: a scientific statement from the American Heart Association. Circulation. 2016;134(8):e87-e108.

7. Park W. Mobile phone addiction In Mobile Communications (pp. 253–272). London: Springer; 2005.

8. Patrick K, Griswold WG, Raab F, Intille SS. Health and the mobile phone. American journal of preventive medicine. 2008;35(2):177-81.

9. Berolo S, Wells RP, Amick III BC. Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: a preliminary study in a Canadian university population. Applied ergonomics. 2011;42(2):371-8.

10. İNal EE, Demirci K, ÇetİntürkA, Akgönül M, Savaş S. Effects of smartphone overuse on hand function, pinch strength, and the median nerve. Muscle & nerve. 2015;52(2):183-8.

11. Samaha M, Hawi NS. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. Computers in Human Behavior. 2016;57:321-5.

12. Bian M, Leung L. Linking loneliness, shyness, smartphone addiction symptoms, and patterns of smartphone use to social capital. Social science computer review. 2015;33(1):61-79.

13. Choi K, Son H, Park M, Han J, Kim K, Lee B, et al. Internet overuse and excessive daytime sleepiness in adolescents. Psychiatry and clinical neurosciences. 2009;63(4):455-62.

14. Heo J-Y, Kim K, Fava M, Mischoulon D, Papakostas GI, Kim M-J, et al. Effects of smartphone use with and without blue light at night in healthy adults: A randomized, double-blind, cross-over, placebo-controlled comparison. Journal of psychiatric research. 2017;87:61-70.

15. Lund HG, Reider BD, Whiting AB, Prichard JR. Sleep patterns and predictors of disturbed sleep in a large population of college students. Journal of adolescent health. 2010;46(2):124-32.

Original Article

Mammography and Sonomammography as Index Test for Breast Carcinoma keeping Biopsy as a Gold Standard

Sumiya Abid [1], Sana Shahzadi[2], Ayesha Imtiaz[3], Areeba Ikram[4], Irum Rasheed[5]

Abstract

Objective: To compare breast carcinoma on mammography and sonomammography keeping biopsy as gold standard and to check advantages of biopsy over imaging modalities.
Study design: It is an observational study.

Place and duration of study: The was carried out in Jahangir SON-X Diagnostic Center, Rawalpindi.

Material and Methods: This is an observational study of 150 female patients having breast cancer diagnosed on mammography and sonomammography whose biopsies were also available.
Results: On sonography 123 (82%) patients have shown true positive and 09 (6%) have shown true negative results.18 (12%) patients have shown false positive results. No (0%) patients have shown false negative results. On mammography 123 (82%) have shown have shown true positive results .09 (6%) have shown true negative and 09 (6%) have shown false positive results and 09 (6%) have shown false negative results.In comparison to 100% sensitivity of biopsy, sonomammography is also 100% and mammography is 93.3%. Mammography is 50% specific and sonography is 33.3% specific. Diagnostic accuracy of mammography and sonomammography is 88.2% than 100% accuracy of biopsy.
Conclusion: The research illustrates the importance of mammography and sonomammography as its diagnostic accuracy is 88.2% compared to 100% accuracy of biopsy. So,its importance cannot be denied and must be used in correlation to biopsy as in index test for breast carcinoma.
Keywords: Breast carcinoma, Mammography, Sonomammography,Fine needle aspiration (FNA),Ultrasound(US)

1. Introduction

The mammary gland, or breast, is the most fundamental structure in the pectoral region. Breast cancer is a disease in which growth of breast cells is uncontrolled. Abnormal cells grow more rapidly than healthy cells and it usually starts in ducts. Breast cancer may spread to the skin and lymph nodes affecting the ducts or lobules. It is sometimes referred to as metastasis if it spreads to other body organs. One of the primary causes of death for middle-aged women is breast cancer. Even though breast cancer can be identified in its early stages, misinformation usually results in cases being recognized much later. X-ray mammography was the earlier screening and detection technique for breast cancer. One of its primary advantages as an early detection technique is its ability to identify small amounts of micro calcification. It does have certain disadvantages, nevertheless, like the radiation problem, which is detrimental to young women with dense breast tissue, etc[2]. Recent decades have seen an increase in the utilization of MRI and ultrasound as cutting-edge methods for breast cancer screening. There is controversy over how best to treat women who have a high lifetime risk of breast cancer. This is especially true if there is a suspicion of or evidence from, a germline mutation of a breast cancer susceptibility gene (BRCA) causing familial or hereditary breast cancer[13].

Radiology Department, Holy Family Hospital, Rawalpindi, [1,2,3] Lecturer, Riphah International University, Islamabad.[4,5]
Correspondence: Sana Shahzadi, Radiology Department, Holy Family Hospital, Rawalpindi. **Email :** sanshahzadi@gmail.com

Females having strong family history of breast cancer have presence of BRCA1 and BRCA2 genes may have breast cancer .Females with history of early menopause, having no child or first child at late age, obese females and females with unnecessary exposure to radiations are suspected for breast cancer. Females with history of alcoholism and post menopausal hormonal therapy may have suspicion of breast cancer[16.]

The gold standard for an accurate diagnosis of breast cancer is a histopathological assessment. The "triple assessment"—imaging, clinical examination, and needle biopsy—is the standard procedure for diagnosing breast diseases[19.]

Mammography is best for early diagnosis and treatment of breast cancer but limited in females of less than age 35.So it works best for fatty breast of females of age greater than 45. It is generally acknowledged, consequently, that mammography is not a reliable method of screening all breast cancers. By providing false assurance, false negative mammography could delay diagnosis and treatment. Poor mammography technique that excludes the tumor from the area investigated observer error, the radiologic density of the breast, tumor development pattern, and lack of tumor calcification are some of the reasons why mammography fails to identify some breast cancers[5]. Mammography is a widely accepted and cost-effective technique for evaluating clinically suspected breast lesions and for breast cancer screening.

Primarily in dense breasts, sonomammography is a helpful supplementary technique that aids in that describes a palpable abnormality that is not noticed by mammography. According to multiple studies, women with thick breasts who had breast ultrasonography screening and had negative results from clinical exams, mammograms, and other tests reported an additional cancer detection rate of 2.8 to 4.6 cases per 1000 women. Multiple research investigations have demonstrated that breast density is an additional risk factor for the occurrence of breast cancer. Research has indicated that women with dense breasts have lower mammography sensitivity. In addition, further ultrasound screening can detect tumors that would otherwise remain undetected in these women, regardless of their risk level[10]. Sonography is generally not utilized as a screening tool for breast cancer, despite the fact that it is highly helpful in differentiating breast tumors in cystic lesions . Instead, it is used as a second method to examine breast abnormalities discovered on mammography or during physical examination.

A breast biopsy is a technique to remove small tissue of breast for laboratory testing. It helps in evaluation of suspicious area in breast to determine whether it is breast cancer or not . It is predicted that US guided core needle biopsy of breast tissue and axilla would demonstrate a comparable improvement in sensitivity, as image-guided core needle biopsy has a higher sensitivity than FNA (fine needle aspiration) for assessing breast lesions.

The type of treatment depends upon breast cancer stage. Treatment options include lumpectomy, mastectomy, prophylactic surgery or breast reconstruction. Cancer can also be treated with chemotherapy, radiotherapy, immunotherapy or hormonal therapy[20.]

2. Materials & Methods

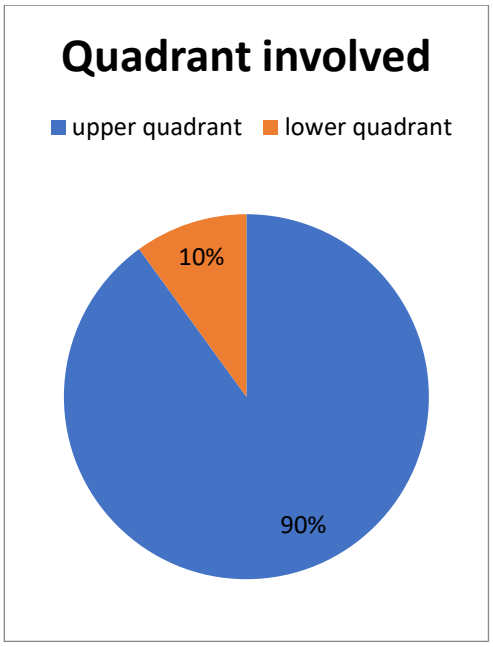
It was prospective study. 150 female patients are studied with age > 30 years that are presenting with lump. Male patients are not included in the study. Non-probability, convenience sampling technique is used. Data of patients who have undergone mammography, sonomammographgy and biopsy would be included. The final diagnosis of consultant radiologist and surgeon should be taken final. This may help to understand the effectiveness of mammography sonomammography and biopsy in detecting breast cancer. Mammography and sonomammography was performed according to department protocols. Appropriate statistical data analysis technique by using SPSS 22 will be applied.

3. Results

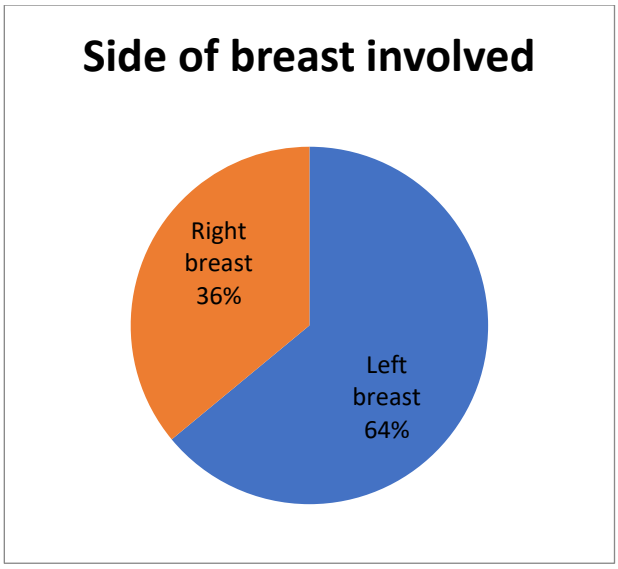
In my research female patients 45(30%) were of age 31-40 and 33(22%) patients with age 41-50 ,45 (30%)were of age between 51-60,18(12%) were between 61-70 and 09 (6%) were of age 81-90. 54(36%) have right breast cancer whereas 96(64%) have left breast cancer 135(90%) patients have cancer in upper outer quadrant and 15(10%) patients have cancer in lower outer quadrant.

This observational study was done at holy family hospital. Total 150 patients were included in the study. 54(36%) have right breast cancer whereas 96(64%) have

left breast cancer.135(90%) patients have cancer in upper outer quadrant and 15(10%) patients have cancer in lower outer quadrant.



Pie chart ll: Side of breast involved.



Sonomammography findings

Table l: Ultrasound Findings

	Frequency	Percent
Valid true positive	123	82
True negative	9	6
False positive	18	12
Total	150	100

123(82%) patients have shown true positive results and 09(6%) patients have shown true negative results. 18(12%) patients have shown false positive results. No (0%) patients have shown false negative results.

Mammographic findings:

Table ll: Mammography Findings

	Frequency	Percent
Valid true positive	123	82
True negative	9	6
False positive	9	6
False negative	9	6
Total	150	100

123(82%) patients have shown true positive results. 09(6%) patients have shown true negative results.09(6%) patients have shown false positive results. 09(6%) patients have shown false negative results.

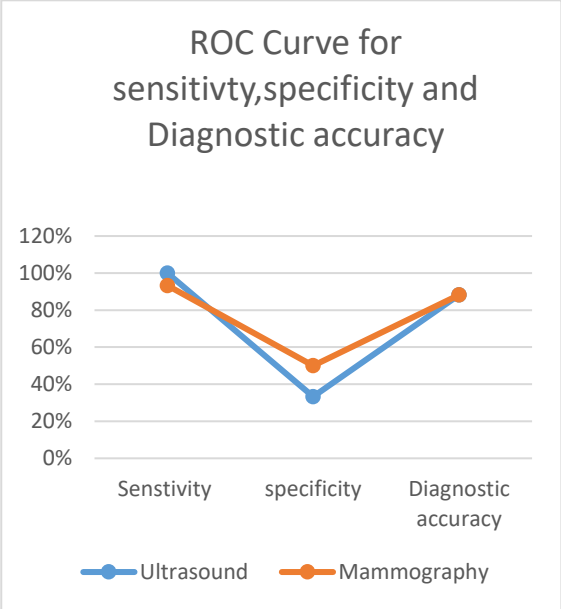
Pie chart l: Quadrant involved.

The instrument's sensitivity is determined by how well it can identify a problem. Think of a medical test as an example, which is used to determine the ailment. The ability of the test to precisely rule out a condition is known as specificity. Think of a test that is used to identify a medical condition.

Table lll: Comparison of sensitivity and specificity and diagnostic accuracy of Sonomammography and Mammography.

Modality	Sensitivity	Specificity	Diagnostic Accuracy	Positive Predictive Value	Negative Predictive Value
Sono-mammography	100%	33.30%	88.20%	87.50%	100%
Mammography	93.30%	50%	88.20%	93.30%	50%

Graph l: ROC Curve



4. Discussion

42(82.4%) patients have shown true positive results and 3(5.9%) patients have shown true negative results. 6(11.8%) patients have shown false positive results. No (0%) patients have shown false negative results. 123(82%) patients have shown true positive results.09 (6%) patients have shown true negative results. 09(6%) patients have shown false positive results. 09(6%) patients have shown false negative results. Sensitivity of mammography in detecting breast cancer is 93.3% that is less than 100% sensitivity of sonomammography. Specificity of mammography in detecting breast cancer is 50% that is more than 33.3% specificity of sonomammography. Diagnostic accuracy of mammography and sonomammography is equal that is 88.2%.

Conclusion:

In comparison to 100% sensitivity of biopsy in detecting breast carcinoma sonomammography is also 100% and mammography is 93.3%. Mammography is 50% specific and sonography is 33.3% specific as compared to 100% specificity of biopsy for breast cancer diagnosis. Diagnostic accuracy of mammography and sonography is 88.2% than 100% accuracy of biopsy. So importance of mammography and sonomammography cannot be ignored completely. Biopsy is gold standard but it must be accompanied with mammography and sonomammography.

Limitations:

The study is based on a relatively small sample size of 150 female patients. A larger sample size would provide more robust and generalizable results, allowing for better conclusions about the accuracy of mammography and sonomammography in breast cancer detection.

The study appears to be cross-sectional in nature, providing a snapshot of the accuracy of mammography and sonomammography at a specific point in time. Longitudinal data, tracking patients over time, would offer insights into the effectiveness of these imaging modalities in detecting breast cancer at different disease stages.

While biopsy is considered the gold standard for diagnosing breast cancer, it may not be without its limitations. Biopsy results can also be subject to interpretation and may have false negatives or false positives, potentially impacting the accuracy comparison with imaging modalities.

References:

1. Abdullah R, Abdelmonem L, Nasry N, Ayoub M. Contrast Enhanced Mammography: The added value in the assessment of Suspicious Breast Lesions. QJM: An International Journal of Medicine. 2020 Mar 2;113.

2. Abhisheka B, Biswas SK, Purkayastha B. A comprehensive review on breast cancer detection, classification and segmentation using deep learning. Archives of Computational Methods in Engineering. 2023 Jul 7:1-30.

3. Antabe R, Kansanga M, Sano Y, Kyeremeh E, Galaa Y. Utilization of breast cancer screening in Kenya: what are the

determinants?. BMC health services research. 2020 Dec;20(1):1-9.

4. Edmonds CE, Lamb LR, Mercaldo SF, Sippo DA, Burk KS, Lehman CD. Frequency and cancer yield of BI-RADS category 3 lesions detected at high-risk screening breast MRI. AJR Am J Roentgenol. 2020 Feb 1;214(2):240-8.

5. Edmonds CE, Zuckerman SP, Guerra CE. Racial disparities persist in cancer screening: New USPSTF Colorectal Cancer Screening Guidelines illuminate inadequate breast cancer screening guidelines for black women. Journal of General Internal Medicine. 2022 May;37(6):1534-6.

6. Ezeofor SN, Iloanusi NI, Okere PC. Concerns About Breast Pain: How Useful Is Imaging?. Health Scope. 2022 Aug 31;11(3).

7. Hussein AM, EL-Shinnawy MA, Moftah SG, Nada OM, Hussein RS. Contrast-Enhanced Mammography Versus Dynamic Contrast-Enhanced MRI in the Evaluation of Sonomammographic BI-RADS 3 &4 Breast Lesions. QJM: An International Journal of Medicine. 2023 Jun 1;116(Supplement_1):hcad069-709.

8. Hussein AM, EL-Shinnawy MA, Moftah SG, Nada OM, Hussein RS. Contrast-Enhanced Mammography Versus Dynamic Contrast-Enhanced MRI in the Evaluation of Sonomammographic BI-RADS 3 &4 Breast Lesions. QJM: An International Journal of Medicine. 2023 Jun 1;116(Supplement_1):hcad069-709.

9. Khan MD, Banerjee S, Tarafdar S, Kundu D. Role of sonomammography and its diagnostic accuracy for evaluating benign and malignant breast lesions. Int J Res Med Sci. 2021 May;9(5):1448-53.

10. Kopans DB, Sharpe Jr RE, Eby PR. Including the method of detection for breast cancer in the Surveillance, Epidemiology, and End Results database is long overdue. Journal of Medical Screening. 2023 Aug 25:09691413231197131.

11. Monticciolo DL, Malak SF, Friedewald SM, Eby PR, Newell MS, Moy L, Destounis S, Leung JW, Hendrick RE, Smetherman D. Breast cancer screening recommendations inclusive of all women at average risk: update from the ACR and Society of Breast Imaging. Journal of the American College of Radiology. 2021 Sep 1;18(9):1280-8.

12. Patro S, Das S, Mohapatra SS. A Comparative Study of Mammography and Sonomammography with FNAC Correlation in Evaluating Palpable Breast Masses. Annals of the Romanian Society for Cell Biology. 2021 May 4:14429-39.

13. Pichert G, Bolliger B, Buser K, Pagani O. Evidence-based management options for women at increased breast/ovarian cancer risk. Annals of oncology. 2003 Jan 1;14(1):9-19.

14. Priyanka B, Ismail M, Shashikumar M, Rajendrakumar N, Nanjaraj CP. A Comparative Study of Mammography and Sonomammography with Histopathology in Evaluating Palpable Breast Masses.

15. Qaseem A, Lin JS, Mustafa RA, Horwitch CA, Wilt TJ, Clinical Guidelines Committee of the American College of Physicians*. Screening for breast cancer in average-risk women: a guidance statement from the American College of Physicians. Annals of internal medicine. 2019 Apr 16;170(8):547-60.

16. Rolfes M, Borde J, Möllenhoff K, Kayali M, Ernst C, Gehrig A, Sutter C, Ramser J, Niederacher D, Horváth J, Arnold N. Prevalence of cancer predisposition germline variants in male breast cancer patients: results of the German Consortium for Hereditary Breast and Ovarian Cancer. Cancers. 2022 Jul 5;14(13):3292.

17. Runjjala K, Naidu YT. Combined Mammographic and Sonomammographic Evaluation of Breast Masses. International Journal of Contemporary Medicine Surgery and Radiology. 2020;5(1):A162-5.

18. Sedguli S, Gowda RS, Ranganathan R. Diagnostic Accuracy of MR Mammography in Comparison with Digital Mammography and Sonomammography. Galician Medical Journal. 2022 Mar 1;29(1):E202214-.

19. Sengupta S, Chhabi SR, Singh A. MR Mammography and Sono-mammography in Characterization of Breast Lesions in a Tertiary Care Centre of Eastern India. Annals of International Medical and Dental Research.;7(2):22.

20. Shi J, Liu J, Tian G, Li D, Liang D, Wang J, He Y. Association of radiotherapy for stage I–III breast cancer survivors and second primary malignant cancers: a population-based study. European Journal of Cancer Prevention. 2023:10-97.

21. Tang Y, Tian W, Xie J, Zou Y, Wang Z, Li N, Zeng Y, Wu L, Zhang Y, Wu S, Xie X. Prognosis and dissection of immunosuppressive microenvironment in breast cancer based on fatty acid metabolism-related signature. Frontiers in Immunology. 2022 Mar 31;13:843515.

22. van den Brandt PA, Ziegler RG, Wang M, Hou T, Li R, Adami HO, Agnoli C, Bernstein L, Buring JE, Chen Y, Connor AE. Body size and weight change over adulthood and risk of breast cancer by menopausal and hormone receptor status: a pooled analysis of 20 prospective cohort studies. European Journal of Epidemiology. 2021 Jan;36:37-55.

23. Yamakanamardi S, Hiremath BV. Accuracy of mammography and sonomammography and its correlation with histopathology in the detection of breast cancer. International Surgery Journal. 2021 Jan 29;8(2):624-30.

24. Zielonke N, Gini A, Jansen EE, Anttila A, Segnan N, Ponti A, Veerus P, de Koning HJ, van Ravesteyn NT, Heijnsdijk EA, Heinävaara S. Evidence for reducing cancer-specific mortality due to screening for breast cancer in Europe: A systematic review. European journal of cancer. 2020 Mar 1;127:191-206.

Original Article

Association of amblyopia with ametropia and strabismus

Hadia Iqbal[1], Sehrish Akram[2], Saba Ghalib[3], Tehmina Waqar[4], Syeda Aal e Zahra Kazmi[5] , Duaa Waseem[6]

Abstract

Objective: To find out the association of amblyopia with ametropia and strabismus.
Study design: It is a descriptive cross sectional hospital based study.

Place and duration of study: A Nine-month study was carried out in Ophthalmology department of Holy Family Hospital, Rawalpindi. (from September 2022 to June 2023

Material and Methods: Fifty patients were studied during the research duration. Detailed history and examination of patients was done starting from Slit lamp examination followed by assessment of visual acuity, refraction and Fundus examination. Orthoptics assessment was done to the patients who were presented with complaint of deviation.

Results: Amblyopia is a condition of significant vision loss.I collected data of 50 patients of different age group depending on the time availability.Subjects of age group 11-20 years showed more prevalence of amblyopia (60%). 35 were females and 15 were male. Anisometropia was most common cause (60%).

Conclusion: This study showed that unequal refractive error in both eyes is termed as aniosometropia is the major leading cause of amblyopia.Crossed eyes or squint is the second most common cause of amblyopia. High prevalence of amblyopia in age group 10-20 is due to lack of screening causing late diagnosis,un awaremess in general public,the lack of counselling of parents. Late diagnosis makes it more difficult to revrese the condition.

Keywords: Amblyopia , ametropia, strabismus, visual acuity, refraction.

1. Introduction

Amblyopia is defined as the decrease in visual acuity that is caused by the deprivation of vision or by the unusual binocular interaction. There is no apparent cause can be seen on physical examination of eye. This condition is reversible by some therapeutic measure. Amblyopia can be unilateral and bilateral.[1] In other words amblyopia is basically neurodevelopmental disorder of visual cortex that happens when the binocular vision is disturbed in early childhood. This can be easily diagnosed on the basis of visual acuity.[2] Visual acuity is estimate of keenness of sight. The relationship between visual detection and size of the stimulus is known as visual acuity.[3] The mechanism to see one image by the both eyes simultaneously are called binocular single vision. There are certain areas in retina when they stimulated at the same time they produce the sensation of single vision. These areas are corresponding retinal areas. Normal retinal correspondence refers to phenomenon of cortex in which the corresponding points of both retinas lie in the same position with respect to fovea.[4,5] Visual confusion occurs when the corresponding points are stimulated with dissimilar images. When the non-corresponding points are stimulated with the same image it results in double vision and known as diplopia.[6,7] To avoid this visual confusion and diplopia there is a mechanism in cortex that ignores the one of images. This mechanism is known as Suppression.[8,9] If this suppression is monocular that it is non-alternating suppression, then this can lead to amblyopia.[10]

Student BSc. Optometry and Orthoptics, Rawalpindi Medical University, Rawalpindi, Pakistan,[1,6] Ophthalmology department, Holy Family Hospital, Rawalpindi,[2,3] Refractionist, Holy Family Hospital, Rawalpindi,[4,5]
Correspondence:, Duaa Waseem, Student BSc. Optometry and Orthoptics, Rawalpindi Medical University, Rawalpindi. **Email:** duaawaseem19@gmail.com

There are three types of amblyopia, strabismic amblyopia, anisometropic amblyopia, and deprivation amblyopia. These may occur at the same time in a single eye. There is no underlying pathology in the eye that affects the normal development of vision after birth, there are some other factors that influence the developmental process and cause amblyopia. These factors are strabismus that cause the disturbance in development of binocular vision refractive error especially anisometropia. If these factors are present earlier in postnatal period, there is more possible impact on vision development. If the time duration of affected vision is longer then the degree of amblyopia will be high.[11]

Anisometropic amblyopia may occur when there is a focusing difference between the two eyes. This may be caused by conditions such as astigmatism, hyperopia, or myopia. The brain only sees with the stronger eye, and as a consequence, the vision in the weaker eye does not develop. If there is a notable difference in the refractive errors of both the eyes, then this is anisometropia. It is spherical anisometropia if there is difference in spherical equivalent and it is astigmatic anisometropia if there is difference in the power of cylinder.[12,13] If there is a hyperopic difference of >1 diopters, myopic difference of >3 diopters and >1.5 astigmatic difference in refraction then this is anisometropic amblyopia.[14]

The misalignment of the eye in certain condition is known as strabismus. This condition can lead to diplopia and resulted in a visible squint. So in this case children can suppress the image formed by one eye to avoid diplopia.[15,16] The misalignment of eyes results in a binocular rivalry and the input of non-dominating eye is suppressed by the other eye. The neuro functional disorder occurring during first years of life provoke several monocular and binocular anomalies such as crowding, deficits in the accommodative response, contrast sensitivity, and ocular motility abilities. Congenital malformations affecting the pupil or retina such as congenital cataract, scars, etc., can cancel the vision of one eye, causing a loss of fixation. If it is not treated early the developed amblyopia will be profound and its reversibility will be more difficult. Early surgery can develop better visual acuity in both eyes but there is still affected stereopsis due to disturbed binocular vision in early age.[17]

Deprivation Amblyopia is reduced vision of one of the eyes, due to an obstacle in the anterior visual pathway such as cataract, ptosis and corneal opacities. In case of congenital media opacities and ptosis, the image formation on retina is distort or completely blocked. Occlusion amblyopia is a type of deprivation amblyopia that is a result of excessive patching for therapy purpose. In case of anisometropic amblyopia, the image in affected eye is not focused on retina due to the difference in the refractive errors of both eyes. In case of strabismus the images formed on retina are dissimilar. Amblyopia develops in the eye that is deviated all the time (it can be esotropia, exotropia, hypertropia and hypotropia). So in all these factors the development of perception of vision in visual cortex is hindered or disturbed that leads to amblyopia.[18,19]

Ametropia refers to any refractive condition that results in the image of the object in view, which does not allow for a properly focused image on the retina. As such, hyperopia, myopia, and astigmatism are all considered in these abnormal refractive disorders. Ametropia is commonly known as refractive error and is one the most common causes of visual impairment. vision screening is most commonly carried out on school children which is valuable method of identifying the refractive error and amblyopia. [20]

Three types of refractive error are: Myopia, Hyperopia and Astigmatism. If light converges on fovea, then eye is an emmetrope. These refractive errors are measured in diopters. Positive value for hypermetropia and negative value for myopia.[21] In myopia, usually close objects are clear and in hyperopia vice versa.

Treatment in adolescence can induce betterment in visual acuity. The level of visual loss and the rate at which vision is improving determines the duration of therapy. The treatment is basically to improve the image perception on retina by reducing the stimulation of good eye.

Occlusion therapy: It is a commonly used technique in which the good eye is covered with an adhesive patch for the stimulation of amblyopic eye. The duration of wearing patch is variable.

Atropine penalization: This technique works by paralyzing the accommodation and blurring the near vision so that amblyopic eye will be used. This is used to dilate the pupil of eye.[22] Both patching and atropine

therapies are effective but atropine therapy is more useful for patients who are not comfortable with occlusion therapy. The side effects of the atropine are headache, sensitivity of light and irritation but these don't result in discontinuation of therapy.

Surgery: It may be advised in strabismus to resolve the misalignment of eyes for the better binocular vision development. It is also done in ptosis and cataracts.

Refractive correction: Corrective lenses should be given for refractive error treatment so that the visual acuity will be maximized.

Additional techniques: These include cloth for patching of glasses, opaque contact lenses and to adjust the prescription for the blurring of vision in better eye.

A research done in Jaipuriya Hospital, Jaipur to detect the types of amblyopia in children of age group 5-15 years. Of the total 4020 children Amblyopia was diagnosed in 44 children. Types of amblyopia diagnosed were Anisometropic amblyopia (29.5%), strabismic amblyopia (25%), combined mechanism amblyopia (15.9%), meridional amblyopia (13.6%), ametropic amblyopia (11.6%), and the least was that of visual deprivation amblyopia being 4.5%. [22]

A study done at national level about clinical profile of amblyopia among children of age group 3-14 years was done at Khyber Institute of Ophthalmic Medical Sciences, Peshawar, Pakistan. This study included 316 children. Out of 316 children,120 children had strabismic amblyopia, 136 children had anisometropic amblyopia, while 60 children had combined mechanism amblyopia (strabismus and anisometropia both). [23]

A study was done in Department of Ophthalmology, College of Medicine, Sultan Qaboos University, Sultanate of Oman. From a randomly selected sample, including 49 primary schools, a total of 6292 children from Grade 1 and Grade 6 were examined. Amblyopia was present in 0.92%, and anisometropic amblyopia was present in 0.44%. Amblyopia with strabismus was present in 0.48% of the children. [24]

2. Materials & Methods

Descriptive cross-sectional hospital based study of 06 months duration was conducted from 01st of September 2022 to the of June 2023 at the ophthalmology department of Holy Family Hospital Rawalpindi. Out of 23761 patients from eye OPD of Holy Family Hospital Rawalpindi 8976 were referred to refraction room. I selected 50 patients in my sample according to the time and availability. The data of patients who were amblyopic and did not have any other pathology in refractive media and retina were obtained on specially designed proforma. Ophthalmic examination of amblyopic patients included vision assessment, objective refraction, subjective refraction, best corrected vision assessment with pin hole. Orthoptics assessment was done to the patients who were presented with complaint of deviation. Patients of both genders, Patients of all ages, Patients having complaint of decreased vision, Patients with anisometropia, Patients with strabismus were included in this study. I excluded patients with any other ocular pathology (media opacities and retinal abnormalities) and non-cooperative patients.

3. Results

I found that most commonly, anisometropia results in amblyopia. Out of 50 patients 30 patients were amblyopic (60%) due to anisometropia, there were 10(20%) out 50 with strabismus and 10 (20%) had both ametropia and strabismus.

Age wise distribution showed that amblyopia is common in age group 10-20(30 patients) out of 4 groups and then in 20-30 age group (15patients) and then in1-10 . 30-40age group (2 ,2 patients) and above 50 there was only 1 patient. This showed that amblyopia is most common in young people and children .

Gender wise distribution showed that amblyopia is more prevalent in females as compare to males. Out of 50 patients 35 patients were females and 15 patients were male.percentage of females was 70% and of males was30%.

Result of my research study showed that 7 patients out of 10 strabismic patients had esotropia and 3 patients had exotropia and 40 patients were orthophoric.in my research unilateral amblyopic cases were more frequent

than bilateral cases. Monocular vision loss disturbs the binocular vision and stereopsis and the quality of life also affected. Out of 50 patients 46 patients were unilateral amblyope and only 4 were bilateral amblyopes.

Amblyopia can be mild, moderate and severe depending on the vision deterioration level. This

data was gathered on the basis of best visual acuity. Frequency of moderate amblyopia was highest and of severe amblyopia is second highest.

Table. 1: Severity of Amblyopia

Severity of amblyopia		Frequency	Percent
	Mild-6/9-6/12	5	10.0
	Moderate-6/12-6/36	26	52.0
	Severity >6/36	19	38.0
	Total	50	100.0

4. Discussion

Amblyopia is a vision deterioation or impaired binocular vision due to stiummulus abnormality or deprivation in an eye.it can be due to high refractive errors or anisometropia, strabismus ,stumulus deprivation as in congenital cataract ,ptosis or congenital corneal opacity.in amblyopia binocular vision and stereopsis are affectedand it is difficult to reverse the loss specially after the age of plasticity that is between 10 -20 years .so it is a serious eye condition. The study was started from 01st of September 2022 to the of June 2023. Out of 23761 patients from eye OPD of Holy Family Hospital Rawalpindi 8976 were referred to refraction room. I selected 50 patients in my sample according to the time and availability. I have done this research to determine the association of amblyopia with ametropia and Strabismus. If I discuss the prevalence of amblyopia according to age my results show that it is more prevalent in age group from 11-20. Out of 50 patients 30 patients were amblyopic (60%) due to anisometropia, there were 10(20%) out 50 with strabismus and 10 (20%) had both ametropia and strabismus.

Age wise distribution showed that amblyopia is common in age group 10-20(30 patients) out of 4 groups and then in 20-30 age group (15patients) and then in1-10 . 30-40age group (2 ,2 patients) and above 50 there was only 1 patient. This showed that amblyopia is most common in young people and children .

Gender wise distribution showed that amblyopia is more prevalent in females as compare to males. Out of 50 patients 35 patients were females and 15 patients were male.percentage of females was 70% and of males was30%.

Result of my research study showed that 7 patients out of 10 strabismic patients had esotropia and 3 patients had exotropia and 40 patients were orthophoric.

According to my research anisometropia is most common cause of amblyopia and than strabismus and then mixed. These results support the results of Sir Hassan Hashemi who conducted study on prevalence of amblyopia and its determinants in underserved rural villages of Iran. According to his research anisometropia is most common cause of amblyopia and strabismus is the second most common cause of amblyopia.

In my research moderate amblyopia is most common and mild amblyopia is less comon.

Limitationsof my study are one hospital based study and small sample size.larger sample size with more hospital based study could give better results.

Conclusion:

Unequal refractive error in both eyes is termed as aniosometropia is the major leading cause of amblyopia.crossed eyes or squint is the second most common cause of amblyopia. High prevalence of amblyopia in age group 10-20 is due to lack of screening causing late diagnosis,un awaremess in general public,the lackof counselling of parents. Late diagnosis makes it more difficult torevrese the condition.

Acknowledgements/Authors contribution:

First author of this paper duely acknowledge this paper to the Holy Family Hospital, and its dedicated staff, for their tireless efforts and gartis services and support to achieve this milestone.

Disclosure/Conflict of interest:

Authors declared no conflict of interest.

References:

1. Von Noorden GK. Binocular vision and ocular motility. Theory and management of strabismus. 1990.

2.Holmes JM, Clarke MP. Amblyopia. The Lancet. 2006 Apr 22;367(9519):1343-51.

3. Kniestedt C, Stamper RL. Visual acuity and its measurement. Ophthalmology Clinics of North America. 2003 Jun 1;16(2):155-70.

4. Tsai J, Denniston A, Murray P. Oxford American handbook of ophthalmology. OUP USA; 2011 Jan 28.

5. Wick BR. Stability of retinal correspondence in normal binocular vision. Optometry and Vision Science: Official Publication of the American Academy of Optometry. 1991 Feb 1;68(2):146-58.

6. Flom MC. Corresponding and disparate retinal points in normal and anomalous correspondence. American Journal of Optometry and Physiological Optics. 1980 Sep 1;57(9):656-65.

7. Van Waveren M, Jägle H, Besch D. Management of strabismus with hemianopic visual field defects. Graefe's Archive for Clinical and Experimental Ophthalmology. 2013 Feb; 251:575-84.

8. Edelman PM. Functional benefits of adult strabismus surgery. American Orthoptic Journal. 2010 Jan 1;60(1):43-7.

9. Adams DL, Economides JR, Sincich LC, Horton JC. Cortical metabolic activity matches the pattern of visual suppression in strabismus. Journal of Neuroscience. 2013 Feb 27;33(9):3752-9.

10. Black JM, Hess RF, Cooperstock JR, To L, Thompson B. The measurement and treatment of suppression in amblyopia. JoVE (Journal of Visualized Experiments). 2012 Dec 14(70).

11. Sengpiel F, Blakemore C. The neural basis of suppression and amblyopia in strabismus. Eye. 1996 Mar;10(2):250-8.

12. Attebo K, Mitchell P, Cumming R, Smith W, Jolly N, Sparkes R. Prevalence and causes of amblyopia in an adult population. Ophthalmology. 1998 Jan 1;105(1):154-9.

13. Multi-ethnic Pediatric Eye Disease Study Group. Prevalence of amblyopia and strabismus in African American and Hispanic children ages 6 to 72 months: the Multi-ethnic Pediatric Eye Disease Study. Ophthalmology. 2008 Jul 1;115(7):1229-36.

14. Varma R, Deneen J, Cotter S, Paz SH, Azen SP, Tarczy-Hornoch K, Zhao P, Study Group TM. The multi-ethnic pediatric eye disease study: design and methods. Ophthalmic epidemiology. 2006 Jan 1;13(4):253-62.

15. Repka MX, Beck RW, Holmes JM, Birch EE, Chandler DL, Cotter SA, Hertle RW, Kraker RT, Moke PS, Quinn GE, Scheiman MM. A randomized trial of patching regimens for treatment of moderate amblyopia in children. Archives of ophthalmology (Chicago, Ill.: 1960). 2003 May 1;121(5):603-11.

16. Kanski JJ, Bowling B. Clinical ophthalmology: a systematic approach. Elsevier Health Sciences; 2011 Apr 28.

17. Tsai J, Denniston A, Murray P. Oxford American handbook of ophthalmology. OUP USA; 2011 Jan 28.

18. McKee SP, Levi DM, Movshon JA. The pattern of visual deficits in amblyopia. Journal of vision. 2003 Jun 1;3(5):5-.

19. Williams C, Northstone K, Harrad RA, Sparrow JM, Harvey I. Amblyopia treatment outcomes after screening before or at age 3 years: follow up from randomised trial. Bmj. 2002 Jun 29;324(7353):1549.

20. Eibschitz-Tsimhoni M, Friedman T, Naor J, Eibschitz N, Friedman Z. Early screening for amblyogenic risk factors lowers the prevalence and severity of amblyopia. Journal of American Association for Pediatric Ophthalmology and Strabismus. 2000 Aug 1;4(4):194-9.

21.Dandona R, Dandona L. Refractive error blindness. Bulletin of the World Health Organization. 2001:79:237-43

22.Jarwal PN, Singh R. Evaluation of amblyopia in school going children. DJO. 2020 Jan;30(3).

23.Shah M, Khan MT, Khan MD, Rehman H. Clinical profile of amblyopia in Pakistani children age 3 to 14 years. J Coll Physicians Surg Pak. 2005 Jun 1;15(6):353-7.

24.Lithander J. Prevalence of amblyopia with anisometropia or strabismus among schoolchildren in the Sultanate of Oman. Acta Ophthalmologica Scandinavica. 1998 Dec 1;76(6):658-62.

Original Article

Prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities, Rawalpindi

Hira Sardar[1], Rabbiya Riaz[2], Areej Ali[3], Sammar Abbas[4], Hina Yaqoob[5], Rabail Farrukh[6]

Abstract

Objective: To investigate the Prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities, Rawalpindi

Study design: It is a descriptive cross sectional study.

Place and duration of study: A four-month study was carried out in public sector Institutes of Rawalpindi city. (from June 2023 to September 2023)

Material and Methods: A Descriptive Cross-Sectional study design, in which 300 females from Public Sector Universities, in Rawalpindi city participated. Female subjects from age 15-29 years, wearing a headscarf for 1-2 years continuously, and wearing a scarf for up to 4 to 5 hours per day participated in the research to check the appropriate results. Those who have a history of orthopedic, neurological, or vestibular disease, who don't wear headscarves daily, and females wearing headscarves for >3 hours/day and less than 1 year were excluded. After the informed consent, data is analyzed by SPSS version 26.

Results: Overall, the study showed that 71% (213/300) of students who wore headscarves in public universities in Rawalpindi city had issues with sensing their neck position and limited neck movement while 87 are normal.

Conclusion: The research provided valuable insights into the prevalence of position errors and restricted neck movement among female students in Rawalpindi city and it was concluded that it is much more prevalent in the females wearing it regularly for more than 2 years and for more than 3- 4 hours/day.

Keywords: cervical spine, joint position error, cervical range of motion, goniometer, headscarf, self-structured questionnaire

1. Introduction

Seven cervical vertebrae make up the head-neck system, which has a special motion and morphology to meet the demands of the highly mobile head-torso transitional zone. The kinematics of this system are quite intricate, the sensory platform is also supported by the cervical spine, which also moves and positions it in three dimensions.[1,2] The cervical spine, which is the neck part of the spine, can be divided into five sections. Each of these sections has its unique shape that affects how it moves and contributes to the overall neck function. These sections are the connection between the head and neck (C0-C1), the first bone (C1), the second bone (C2), the area between C2 and C3, and the levels from C3 to C7. The main differences between the upper part of the neck (upper cervical spine) and the lower part (lower cervical spine) are that there's no disc between the bones, the ligamentum flavum is missing, and C1 and C2 have different shapes.[1,3,4] The head, which weighs 10 to 15 pounds, stays steady on the atlas thanks to the flexible neck. The neck, in turn, is held up by the head, which acts like a support beam. No other portion of the musculoskeletal system moves more than 600 times an hour on average, whether we are awake or asleep; this includes the neck.[5,6]

Student, Center of Advanced studies in Health and Technology, Satellite Town, Rawalpindi, Pakistan.[1,3,5,6] Assistant Professor & Head of the Department of Allied Health and Life Sciences, Center of Advanced studies in Health and Technology, Satellite Town, Rawalpindi, Pakistan.[2] Assistant professor, Mohi-ud-din Institute of Rehabilitation Sciences, Mirpur,AJ&K, Pakistan,[5] Bashir Institute of Health sciences, Bharakahu.[4]

Correspondence: Rabbiya Riaz, Assistant Professor & Head of the Department of Allied Health and Life Sciences, Center of Advanced studies in Health and Technology, Satellite Town, Rawalpindi. **Email:** rabbiya.riaz77@gmail.com

The "Functional Spine Unit" (FSU) is like a tiny working part of your spine. It includes two neighboring vertebrae (the bones in your spine) and the soft stuff that connects them, without the muscles. When something moves in a certain way, it spins around a special point called the "Instantaneous Axis of Rotation" (IAR).[3] This IAR usually goes through or very close to one of the vertebrae in your spine. In simple terms, each FSU can move in six different ways, like forward, backward, side to side, and turning, thanks to this IAR. So, we say each FSU has 6 degrees of freedom for movement.[3,7] While during cervical extension, a motion pattern trend was seen from lower to middle segments, the cervical flexion movement first relied more on the middle cervical segments and thereafter on the lower ones.[8] When we talk about how your spine and neck move, we're mainly looking at how the top and front parts of your spine shift around.[9,10] The neck can move in different ways: Bending it forward (flexion) is usually between 0 to 45 degrees, Leaning it backward (extension) is also about 0 to 45 degrees, Tilting it sideways (lateral flexion) goes from 20 to 45 degrees, Turning your head left or right (rotation) can go from 0 to 90 degrees.[11] The Universal Goniometer (UG) was used to measure active CROM. The UG's dependability ranged between considerable and perfect.[12] Restricted cervical ranges typically refer to limited motion or range of motion in the neck. Cervical function is essential for daily activities involving head stabilization and orientation. People with neck pain often can't move their neck as much as usual, and how much it's affected depends on how much pain they're feeling and how well they think they're doing.[13,14] The cervical facet capsules' existence of mechanoreceptive and nociceptive nerve terminals indicates that the cervical spine's proprioception and pain perception are influenced by neural input from the facets and that the cervical spine is under the control of the central nervous system.[15,16,17,18] The many spindles in neck muscles, along with the receptors tell our brain how our body is positioned. According to some evidence, the CNS receives ensemble encoding of the muscle spindle discharge patterns and uses a pattern recognition system to determine joint position and movement.[19,23] Proprioception is critical for sensorimotor control of posture and movement. Han et al described proprioception as like your body's built-in GPS. It uses sensors to figure out where your body parts are and how they're moving.[20,21] Revel et al., 1991 pioneered the joint position error (JPE) test. It is a popular test for determining head repositioning accuracy. To check how well people can tell where their head is, a special laser on a headband was used. The test started with participants sitting up straight about 90 centimeters (cm) from a wall. They had their feet on the floor and their backs against a chair. They were told to find a comfortable head position and remember it as their "normal" position. Then, with their eyes closed, they were asked to slowly turn their head left and right, bend it forward and backward as much as they could. After each move, they had to go back to that comfortable "normal" head position they remembered.[22] Treatments like neck adjustments, cold and hot therapy, gentle muscle massage, acupuncture, and careful stretching can be helpful.[24] When it comes to hands-on treatments, some focus on moving the joints gently, like mobilization and manipulation, while others work on the soft tissues with massage and nerve techniques; and combined techniques include targeted exercises.[25] Cervical discomfort, posture, and general mobility can all benefit from stretching your neck, eyes to the sky, ear to shoulder, and chin to the chest.[26] Along with traditional physiotherapy, stretching exercises and massages performed on the SCM muscle promote ROM and endurance.[27]

2. Materials & Methods

The research was conducted by Descriptive Cross-Sectional study design, in which 300 females from Public Sector Universities, in Rawalpindi will participate. The duration of this study is 4 months. A total of 300 female subjects from age 15-29 years participated in the research to check the appropriate results. Subjects were selected from government colleges and universities Arid Agriculture University, Rawalpindi Medical University, Rawalpindi Women's University, Fatima Jinnah University, Government Viqar-un-Nisa University for Women. We chose people for the study based on who was available and willing to participate, rather than using a random method. Participants will be selected for the study according to the inclusion and exclusion criteria. Inclusion criteria include; age: 15-29 years. Females wearing headscarves for a minimum duration of 1-2 years. Females who wore a scarf for up to 4 to 5 hours per day. Exclusion criteria include; a history of orthopedic, neurological, or vestibular disease. Females who don't wear headscarves

daily. Females wearing headscarves for >3 hours/day and less than 1 year. Data Collection Tools are a self-designed questionnaire, goniometer, and cervical joint position error test.

Data will be analyzed by SPSS version 26. For qualitative and quantitative variables mean, frequency, and percentages were taken. Frequency charts and plots were used to show the results of qualitative variables.

3. Results

In the current study total of 300 study participants i.e., public sector university students of Rawalpindi are included and the objective of the study is to find out the prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi. The findings indicated that 45 students were between 15 and 19 years old, 82 students were in the 20 to 24 age range, and 173 participants were between 25 and 29 years old.

Findings	Frequency	Percent	Valid Percent	Cumulative Percent
relocation in 1.5-2 inch=NO ERROR	92	30.7	30.7	30.7
relocation in >2 inch =ERROR	208	69.3	69.3	100.0
Total	300	100.0	100.0	

Table 1 illustrates that 92 participants out of 300 have normal cervical flexion while 208 out of 300 show marked joint position error in cervical flexion.

Table 1: Joint position error in active cervical flexion

According to this study majority of participants have no position error in left lateral flexion and 105 students wearing headscarves have shown positive results.

Figure 1: Joint position error in active cervical left lateral flexion

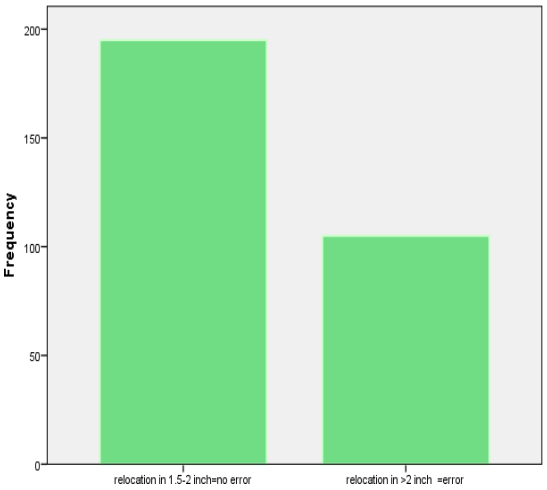


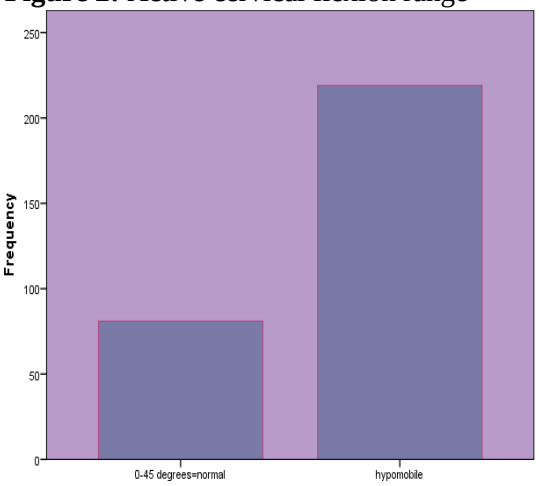
Table 2 shows that 174 out of 300 have cervical joint position error in left cervical rotation and 126 participants have shown normal results.

Table 2: Joint position error in the active cervical rotation left

Findings	Frequency	Percent	Valid Percent	Cumulative Percent
relocation in 1.5-2 inch=NO ERROR	126	42.0	42.0	42.0
relocation in >2 inch=ERROR	174	58.0	58.0	100.0
Total	300	100.0	100.0	

Only 81 students wearing a scarf had normal cervical flexion range of motion and 219 were hypo-mobile while wearing a scarf.

Figure 2: Active cervical flexion range



As per the results of the study, 213 out of 300 (71% of total participants showed positive results) i.e., proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi city are prevalent. And 87 participants showed negative results i.e., proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi are not prevalent in 29% of participants.

Table 3: Total score of the self-designed questionnaire

Range of total score	Frequency	Percent	Valid Percent	Cumulative Percent
0-24(-ve)	87	29.0	29.0	29.0
25-48(+ve)	213	71.0	71.0	100.0
Total	300	100.0	100.0	

4. Discussion

This study aims to analyze the prevalence of proprioception error and restricted cervical ranges among students wearing headscarves in public sector universities of Rawalpindi. Due to the long-term use of hijab/headscarf from years and for long duration daily, the sequel study shows that there is a high prevalence of JPE in active cervical flexion & and left side rotation and ranges are mostly restricted in active cervical flexion due to the use of headscarf.

Likewise, results are shown in the study by Alqabbani, S. F. et.al in 2016, in both the cumulative joint position error score and during head rotation to the right, the joint position error was higher in women wearing headscarves than in women who did not. Equivalently, our study emphasizes the prevalence of JPE however we took a sample size of 300, and the above-mentioned study only includes 12 participants in their research. The purpose of above mention study is to compare the joint position sense of scarf wearer women with the non-wearer but our study is prevalence-based. The results of the above-mentioned study and the findings of our study depict that there is a high proportion of JPE in female students wearing a headscarf.[22]

According to Aziz, K., Ali, S. T., Fahim, M. F., Khan, R., & Shahid, the study aims to find out how wearing a hijab affects the range of motion in the neck compared to what's considered normal. The age limit of participants of our study is greater as compared to the above study i.e., our age limit is b/w 15 to 29 years & participants of the above study are b/w 18 to 23 years of age. According to the findings of our study the particular movement in which participants show hypo mobility is active cervical flexion. (i.e., 219 were hypo-mobile while wearing scarf) which is measured via UG. Our also includes another variable of proprioception along with CROMs.[28]

In 2023, researcher Reem Javed Malik and her team conducted a study at Shifa Tameer-e-Millat University in Islamabad. They had 111 undergraduate students, aged 17 to 26, take part in this study. The main goal of this study was to figure out what's considered normal when it comes to how accurately people can sense the position of their necks (called cervical joint positioning error or CJPE) and how this relates to how the neck works. Our study particularly targeted hijab-wearing female students ranging in age b/w 15-29 years. Above mentioned study only includes a few students of one university on the other hand the results of our research are more generalized as compared to it because we have a larger sample size and we include more universities in our study.[29]

A particular demographic group, such as students who wear headscarves or are from a particular ethnicity or cultural background, may be overrepresented in the sample. The generalizability of your findings might be constrained by this. It may be difficult to prove a direct causal connection between the wearing of a headscarf and proprioception problems or reduced cervical ranges. Numerous other elements, such as physiology, way of life, and habits of an individual, may also be at play in these problems. It might be challenging to measure cervical ranges and proprioception faults accurately. The validity and reliability of your results may be impacted by differences in measurement instruments and

methods. A cross-sectional study might not be able to identify changes over time due to the small duration of time.

Conclusion:

This study gave a detailed understanding of the extent of JPE & CROM restrictions among female students in the area. We concluded that most students have position errors and range limitations as a result of wearing the hijab for a prolonged period. It was also found that these problems are not prevalent in the females who are involved in regular fitness activities; those who weren't enrolled in such programs were more likely to experience the effect on their spine. The results showed that the effect is infrequent when students wear scarves for shorter periods.

Recommendations:

We recommend that if someone researched the same topic they should include all the female students including hijab wearer and non-wearer so the results would be more comprehended. One should also consider other elements, such as physiology, way of life, and habits of an individual. For valid & reliable results in research that follows the same area, they should use standardized and specially designed tools. They should do the research for an extended period so that changes can also be recorded.

Conflict of Interest:

The authors declare that there is no conflict of interest.

References:

1. Smith, T.J. and G.R. Fernie, Functional biomechanics of the spine. Spine (Phila Pa 1976), 1991. **16**(10): p. 1197-203.
2. Lind, B., et al., Normal range of motion of the cervical spine. Arch Phys Med Rehabil, 1989. **70**(9): p. 692-5.
3. Ramieri, A., G. Costanzo, and M. Miscusi, Functional anatomy and biomechanics of the cervical spine. Cervical Spine: Minimally Invasive and Open Surgery, 2022: p. 11-31.
4. Panjabi, M., et al., Cervical spine kinematics and clinical instability, The Cervical Spine, Edited by Clark CR. 2005, Philadelphia, Lippincott Williams & Wilkins.
5. Bland, J.H. and D.R. Boushey. Anatomy and physiology of the cervical spine. In Seminars in arthritis and rheumatism. 1990. Elsevier.
6. Toendury, G., The cervical spine, its development and changes during life. Acta orthopaedica Belgica, 1959. **25**: p. 602-626.
7. Frobin, W., et al., Sagittal plane segmental motion of the cervical spine. A new precision measurement protocol and normal motion data of healthy adults. Clin Biomech (Bristol, Avon), 2002. **17**(1): p. 21-31.
8. Wu, S.-K., et al., Segmental percentage contributions of cervical spine during different motion ranges of flexion and extension. Clinical Spine Surgery, 2010. **23**(4): p. 278-284.
9. Kaiser, J.T., V. Reddy, and J.G. Lugo-Pico, Anatomy, Head and Neck: Cervical Vertebrae, in StatPearls. 2023.
10. Jung, B., A.C. Black, and B.S. Bhutta, Anatomy, Head and Neck, Neck Movements, in StatPearls. 2023.
11. Swartz, E.E., R. Floyd, and M. Cendoma, Cervical spine functional anatomy and the biomechanics of injury due to compressive loading. Journal of athletic training, 2005. **40**(3): p. 155.
12. Whitcroft, K.L., et al., Comparison of methods of measuring active cervical range of motion. Spine, 2010. **35**(19): p. E976-E980.
13. Rudolfsson, T., et al., Direction-specific impairments in cervical range of motion in women with chronic neck pain: influence of head posture and gravitationally induced torque. PloS one, 2017. **12**(1): p. e0170274.
14. Lee, H., L.L. Nicholson, and R.D. Adams, Neck muscle endurance, self-report, and range of motion data from subjects with treated and untreated neck pain. J Manipulative Physiol Ther, 2005. **28**(1): p. 25-32.
15. McLain, R.F., Mechanoreceptor endings in human cervical facet joints. The Iowa Orthopaedic Journal, 1993. **13**: p. 149.
16. McLain, R.F., Mechanoreceptor endings in human cervical facet joints. Spine, 1994. **19**(5): p. 495-501.
17. Kallakuri, S., et al., Innervation of cervical ventral facet joint capsule: histological evidence. World Journal of Orthopedics, 2012. **3**(2): p. 10.
18. Sirisena, D., Chapter 9 - Spine, in Ultrasound Guided Musculoskeletal Procedures in Sports Medicine, D. Sirisena, Editor. 2021, Academic Press. p. 103-122.
19. Armstrong, B., P. McNair, and D. Taylor, Head and neck position sense. Sports Medicine, 2008. **38**: p. 101+.

20. Alqabbani, S., The Effects of Wearing Headscarves on Cervical Spine Proprioception and Range of Motion. 2017.

21. Han, J., et al., Assessing proprioception: a critical review of methods. Journal of Sport and Health Science, 2016. **5**(1): p. 80-90.

22. Alqabbani, S.F., et al., The Effect Of Wearing Headscarves On Cervical Spine Proprioception. Internation Journal of Physiotherapy and Research, 2016. **4**(2): p. 1389-1393.

23. Artz, N. J., Adams, M. A., & Dolan, P. (2015). Sensorimotor function of the cervical spine in healthy volunteers. Clinical biomechanics (Bristol, Avon), 30(3), 260– 268. https://doi.org/10.1016/j.clinbiomech.2015.01.005

24. Cheever, K., Kawata, K., Tierney, R., & Galgon, A. (2016). Cervical Injury Assessments for Concussion Evaluation: A Review. Journal of athletic training, 51(12), 1037–1044. https://doi.org/10.4085/1062-6050-51.12.15.

25. Kuligowski, T., Skrzek, A., & Cieślik, B. (2021). Manual Therapy in Cervical and Lumbar Radiculopathy: A Systematic Review of the Literature. International journal of environmental research and public health, 18(11), 6176. https://doi.org/10.3390/ijerph18116176.

26. Laura Inverarity, DO (2022). Gentle Stretching Exercises for Your Neck. Gentle Stretching Exercises for Your Neck (verywellhealth.com).

27. Büyükturan, B., Şaş, S., Kararti, C., & Büyükturan, Ö. (2021). The effects of combined sternocleidomastoid muscle stretching and massage on pain, disability, endurance, kinesiophobia, and range of motion in individuals with chronic neck pain: A randomized, single-blind study. Musculoskeletal Science and Practice, 55, 102417.

28. Aziz, K., et al., Effects of wearing modern hijab on cervical range of motion in female students in a private college of Karachi. 2021.

29. Malik, R. J., Farooqi, H., Qureshi, F., & Batool, F. (2023). Cervical joint positioning error and its association with cervical spine mechanics among undergraduate students. JPMA. The Journal of the Pakistan Medical Association, 73(2), 381–383.

Case Report

Coprophagia in a Young Girl: A Case Study

Natasha Shaukat [1], Amna Sajjad[2], Amna Ijaz[3]

Abstract

Objective:
Study design: It is a case study.
Place and duration of study: Psychological intervention was carried out in The Neurocounsel, Islamabad for a patient suffering with Coprophagia (from 2019 to 2023)
Material and Methods: Applied Behavior Analysis was adopted as the course of treatment, setting up achievable goals and rewards to motivate desired behaviors.
Results: During the treatment duration of almost 5 years, her problem of coprophagia is no longer present, and her behavioral issues have improved drastically.
Conclusion: The treatment including different medications and psychological intervention technique of Applied Behavioral Analysis resulted in the total elimination of the coprophagy issue and other problems have also shown improvement.
Keywords: Coprophagia, Behavioral Therapy, Applied Behavioral Analysis

1. Introduction

Coprophagia or Coprophagy refers to the act of ingesting one's feces. While it is quite a normal occurrence in non-human species such as rabbits, pigs, or rodents[1], the condition is rare among humans, and usually presents with psychosis or dementia. In literature, it has been documented mainly in institutionalized patients. We present a pediatric case of coprophagia, which was successfully managed and treated in a semi-controlled environment. Along with medications, ABA therapy was used for her treatment. Applied Behaviour Analysis is a very useful therapy, which is presumably based on learning and behavior. It includes small tasks and goals, their measurements to see if it is working, and thus changing behavior to desired one. It is mostly used for social skill training, teaching child basic self-care and communication etc.[2]

2. Materials & Methods

A 7-year-old girl was referred to the Neurocounsel Outpatient Department for a neurology consultation, with complaints of encopresis, in addition to severe behavioral issues and learning difficulties. The patient, accompanied by her mother, had been to several other doctors with the same complaints, but none had been able to give her a proper diagnosis. No medications were prescribed during these previous visits, and a 15-day course of TENS (Transcutaneous Electrical Nerve Stimulation) for her encopresis did not produce any satisfactory results.

The child is the youngest of three siblings. There was no significant family history of physical and mental disorders. The patient was born after a full-term gestational period and by vaginal birth, but had a delayed birth cry. She was born with a healthy weight. The mother reported that she had a calcium deficiency during her pregnancy and reported symptoms of depression, though never properly diagnosed. The mother also reported that she only breastfed for 3-4 months, after which the child was bottle-fed. The child had delayed developmental milestones. She had delays in neck holding and crawling, for which a doctor diagnosed her with a calcium deficiency and bone weakness. Upon treatment, she skipped the crawling phase and started walking at two and a half years. At the same time, she was reported as having control over her bladder, but no bowel control.

Clinical Psychologist, The Neurocounsel, Islamabad,[1] The Neurocounsel, Islamabad.[2,3]

Correspondence: Natasha Shaukat, Clinical Psychologist,The Neurocounsel, Islamabad,,Pakistan. Email: natasha.shaukat@gmail.com

The patient remained in diapers until the age of nine. Her diet and nutrition was also severely disturbed, being bottle-fed until age 6 and given baby food until age 4. Workups and tests done before and during her treatment were all in the normal range, including a complete blood panel, MRI of the brain and dorsal spine, thyroid workup, and x-ray for bone age. Although, her weight was observed to be very low for her age. Her height was also a point of concern but was ruled out to be genetic and non-pathological.

The neurologist called for a psychology consult, to assess the patient for cognitive/intellectual dysfunction and to rule out any psychological disorders. In her first session, the mother revealed that she had seen her daughter consume feces, and had noticed her keeping it in toys, her fixation on picking it up, smelling it, or smelling her soiled clothes. She also reported the smell of feces coming from her daughter's mouth. She first suspected something when the smell would persist around the room and in the child's belongings.

The patient was assessed using the Wechsler Abbreviated Scale of Intelligence WASI-II and diagnosed with mild to moderate cognitive impairment, along with an extremely low IQ of 69. She presented with severe behavioral issues, a high degree of aggression and stubbornness, lack of social skills and communication. There were also severe delays in learning. At this time, she had dropped out of school, could barely read and write, and was very behind for her age. She had an inadequate diet consisting mainly of milk, some fruit and junk food, and was an extremely fussy eater.

With the consultation of our neurologist, she was prescribed anti-anxiety tablets and a brain stimulant. In terms of psychological intervention, the psychologist started with establishing a strong rapport with the girl, and employed the technique of Applied Behavioral Analysis (ABA) in combination with the medication, setting up a system of rewards and punishment to both encourage positive behaviors (eating a balanced diet, engaging in social situations) and discouraging unwanted behaviors (aggression and coprophagic behavior). After building a strong rapport and developing trust with the child, small episodic incentives were set up such as the child's desirable snacks/foods (sweets, chocolates, biscuits) or small toys and gifts, with the condition that no complaints of a particular behavior will be reported in the next session. Praise and encouraging words also played a huge role in motivating the girl to behave accordingly.

Hands-on treatment was discontinued in late 2019-early 2020 due to the COVID-19 lockdown. In mid-2020, treatment was continued at a private clinic with the same team. During this, appetite enhancers and supplements of calcium, vitamins B and D, and omega-3 were prescribed to deal with nutritional deficiencies. No recurrent episodes of coprophagia had been observed at this point and her weight had increased to the healthy range for her age.

The family was involved in the treatment process. Sessions were conducted with the family members, separately with parents and siblings, to psycho-educate them on how to best deal with aggressive and non-cooperative behaviors at home in accordance with the child's cognitive level. The family was facilitated in the process of carrying out the reward/ punishment system at home for optimum improvement. The girl was also put back in school in 2020 after seeing improvement in her cognitive ability. At this point, the teachers were also given instructions on how to best handle the academics and behavior of the girl, requiring some special attention owing to her cognitive delay.

In July 2021, a relapse of coprophagic behavior occurred at a family event. The mother reported that she was busy, and could not pay much attention to the girl at that time. When discovered, the psychologist met with the child virtually for some intervention.

3. Results

In subsequent assessments before COVID-19 lockdown, we saw an improvement in the above-mentioned behaviors with the use of this system.

An impressive improvement can be noticed in the patient's recent sessions. IQ and cognitive function has improved. A recent IQ reassessment using the Wechsler Abbreviated Scale of Intelligence WASI-II showed the patient in the lower-average range with an IQ of 81. The child's aggression has also reduced drastically, the physical and verbal aggression, and the temper tantrums have almost stopped. Social skills have also improved, and she now engages with extended family members and same-age peers more positively and frequently. Academically, she has advanced to the third grade. The process is not linear; we see our share of ups and down. Some behavioral issues come up from time to time,

particularly manifesting as jealousy and attention seeking, for which she continues to have occasional sessions. However, since the last relapse, no further complaints of coprophagia have been made. A brief overview, marking the extent of improvement of behaviors, has been provided in Table I.

Behaviors	Initial Assessment (2018)	Midway Assessment (2021)	Recent Assessme
Coprophagic Behaviour	Persistent ingestion of fecal matter, Smelling of fecal matter or soiled clothes	Single episode of such behavior at a family event	No episodes of s behavior since l relapse.
Learning	Out of school, unable to learn basic reading and writing	In school for a year, improved but still a relatively slow learner	A student of 3rd able to read and recognizes word speech and can them down, imp memory
Aggression	Overtly and physically aggressive, would hit siblings, throw temper tantrum and only settle on her own terms	Physical aggression has reduced, screaming and crying persists when extremely upset	Rarely physical, tantrums have re
Social Skills	Only interact with her mother, not interactive with same-age peers or extended family	Increased interaction/play with family, increased involvement in family events	Interaction with school. More op other people and with conversatio attention-seekin behavior persist
Diet	Very limited diet, not open to new foods	More variety in foods, more balanced diet, supplements for nutrition	Balanced diet, e types of fruits, vegetables, mea dairy. No more supplements

4. Discussion

As disgusting as it sounds, coprophagic behavior is fairly common in many non-human species such as rabbits, pigs, dogs, and rodents.[1] For some, it is necessary for survival as they derive nutrients from their feces. However, the condition is rare among human beings, usually found in patients with severe psychological or neurological disorders. We usually find the occurrence of coprophagia associated with mental retardation[3,4,7], Schizophrenia[3,5,7], dementia[6,7], or cerebral structural abnormalities[7]. There are few cases of coprophagia reported worldwide. To our knowledge, only one study on this disorder has been reported in Pakistan[8]. The cause remains unknown and controversial. Based on experiments performed on dogs, thiamine deficiency has been suspected to be the cause, and lesion studies in monkeys point towards the involvement of the amygdala[1]. Overall, we are no closer to a complete understanding of coprophagy in humans. Our patient did not present with any structural brain abnormalities, nor did she have any indicators of psychosis. Although upon psychological assessment, she did appear to have mild mental retardation, for which brain stimulants were prescribed. This was the appropriate course of treatment as consecutive IQ assessments show that her intellectual functioning has improved since the initial assessment.

The main course of treatment recommended for the patient was outpatient psychological services, employing the use of behavioral modification therapy with psychosocial support in order for the child to let go of the compulsion. Behavioral intervention has been the first line of intervention for coprophagic patients and appears to have successful results[8,10,11]. Foxx and Martin reported successful treatment of coprophagia using aversion therapy. In our patient, Applied Behavioral Analysis or behavior modification proved to be successful as well, in treating both the child's coprophagia as well as other behavioral dysfunctions. Apart from a single relapse, the child has had no more incidences of coprophagic behavior.

Some researchers believe that coprophagy is a form of Pica[13]. The DSM-V TR defines pica as "persistent eating of nonnutritive, nonfood substances, inappropriate to the individual's developmental level."[12] However, this point of view is rather controversial and not so widely accepted. Interestingly, proper nutritional supplementation and a change towards a balanced diet have shown positive effects on the occurrence of both Pica and Coprophagia.[3,14] Similarly, for our patient, our neurologist prescribed her Vitamin, Calcium, and Omega-3 supplements, on and off, as deemed necessary. Explicit instructions were given to the parents to pay attention to the child's diet. These appeared to have a positive impact on the child's coprophagic behavior.

Coprophagia patients risk quality of life, for both themselves and their caretakers/families. Our patient's mother could not bring up the situation with anyone else for fear of shame or exclusion. As such, they risk their opportunity to receive proper treatment and diagnosis.

Conclusion:

Coprophagia is usually comorbid with different types of medical issues; like dementia, mental retardation, schizophrenia, OCD, and epilepsy. In our case, multiple medical tests were carried out to rule out any other illness. In our patient, coprophagia was seen along with delayed milestones, behavioral disturbance, and lower

IQ. Therefore, we worked alongside a neurologist for the betterment of the child. During the duration of treatment, different medications and psychological intervention technique of Applied Behavioral Analysis was employed. It resulted in the total elimination of the coprophagy issue and other problems have also shown improvement as we continue to work on them.

Conflict of interest:

None to declare

References:

1. Soave O, Brand C. Coprophagy in animals: a review. PubMed [Internet]. 1991 Oct 1;81(4):357–64.
2. Applied Behaviour Analysis (ABA) [Internet]. Raising Children Network. 2022.
3. Bugle C, Rubin H. Effects of a nutritional supplement on coprophagia: A study of three cases. Research in Developmental Disabilities [Internet]. 1993 Nov 1;14(6):445–56.
4. Beck D, Frohberg NR. Coprophagia in an Elderly Man: A Case Report and Review of the literature. International Journal of Psychiatry in Medicine [Internet]. 2005 Dec 1;35(4):417–27.
5. Chaturvedi SK. Coprophagia in a schizophrenic patient: case report. Psychopathology [Internet]. 1988 Jan 1;21(1):31–3.
6. Ghaziuddin N, McDonald C. A clinical study of adult coprophagic.British Journal of Psychiatry [Internet]. 1985 Sep: 147(3): 312-3.
7. Josephs KA, Whitwell JL, Parisi JE, Lapid MI. Coprophagia in neurologic disorders. Journal of Neurology [Internet]. 2016 Mar 26;263(5):1008–14.
8. Waheed N, Cheema HA, Saeed A, Fayyaz Z, Muhammad Nadeem. Coprophagia in a Young Child. Pakistan Pediatric Journal. 2021 Sep 1:45(4):487–498.
9. Foxx RM, Martin ED. Treatment of scavenging behavior (coprophagy and pica) by overcorrection. Behaviour Research and Therapy [Internet]. 1975 Jun 1;13(2–3):153–62.
10. Friedin BD, Johnson HK. Treatment of a retarded child's feces smearing and coprophagic behavior. Journal of Mental Deficiency Research. 1979: 23:55-61.
11. Bacewicz A, Martin K. Coprophagia in an 8-Year-Old Hospitalized Patient: A Case Report and Review of the literature. Case Reports in Psychiatry [Internet]. 2017 Jan 1;2017:1–4.
12. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 5th ed. 2013.
13. Ing AD, Roane HS, Veenstra RA. FUNCTIONAL ANALYSIS AND TREATMENT OF COPROPHAGIA. Journal of Applied Behavior Analysis [Internet]. 2011 Mar 1;44(1):151–5.
14. Gutelius MF, Millican FK, Layman EM, Cohen GJ, Dublin CC. NUTRITIONAL STUDIES OF CHILDREN WITH PICA. Pediatrics [Internet]. 1962 Jun 1;29(6):1012–23.