pISSN 1997-3438
eISSN 1997-3446
Indexed in
Index Pakistan (IP/016)
WHO Index Medicus (IMEMR)
EMBASE
EBSCO
Clavirate
IMEMR
Asian Digital Library (ADL)
Elsevier
Pakmedinet
NETMEDICS
ISI
Scopus
Recognized by
PM&DC
HEC
http://www.jmedsci.com

QUARTERLY

JOURNAL OF MEDICAL SCIENCES

PESHAWAR-PAKISTAN

Recognized by Higher Education Commission of Pakistan

J Med Sci 2024 July-September;32(3)

KHYBER MEDICAL COLLEGE, PESHAWAR - PAKISTAN

JOURNAL OF MEDICAL SCIENCES

Patron

Professor Dr. Mahmud Aurangzeb
Dean, Khyber Medical College, Peshawar

Chief Editor

Dr. Farooq Ahmed
Director Medical Education
Khyber Medical College, Peshawar

Managing Editor

Associate Professor Dr. Mohsin Shafi, Khyber Medical College, Peshawar

Executive Editor

Associate Professor Dr. Iqbal Haider, Khyber Teaching Hospital, Peshawar

Editors

Dr. Rubina Gul, Dr. Sabahat Amir, Dr. Zahidullah Khan, Dr. Irum Sabir Ali,
Dr. Muhammad Idrees, Dr. Fazleena Shaid, Dr. Naila Bukhari, Dr. Syed Dilbagh Ali Shah, Dr. Fauzia Afridi

National Members

Prof. Dr. Mohammad Humayun, Retired Professor of Medicine, Khyber Medical College, Peshawar
Prof. Dr. Mushtaq Ahmad. Prof of Surgery, Khyber Medical College, Peshawar
Prof. Dr. Mudassir Ahmed Khan, Prof of Biochemistry, Kabir Medical College, Peshawar
Prof. Dr. Bushra Iftikhar. Prof of Community Medicine, Khyber Medical College, Peshawar
Prof. Dr. Bashir Ahmad. Prof of Psychiatry, Khyber Teaching Hospital, Peshawar
Prof. Dr. Akhtar Sherin, Prof of Medicine, KMU Institute of Medical Sciences, Kohat
Assoc. Prof. Dr. Zafar Iqbal. Pulmonlogy Department, Lady Reading Hospital Peshawar

International Members

Dr. Faisal Mukhtar (University of Florida College of Medicine, Gainesville, Florida, USA)
Dr. Muhammad Fuad Bangash, (Desert Regional Medical Center, Palm Springs, CA, USA)
Dr Inayat Ali Shah (Fraser Health Authority, British Columbia, Canada)
Dr. Ihsan Mahmood (Forth Valley Royal Hospital, UK)
Dr Shazia Ghufran (Consultant Paediatrician, British Columbia, Canada)
Dr. Arshad Hussain (Altnagelvin Hospital Londonderry, Ireland)

Biostatistician: Syed Muhammad Hamid

JMS Coordinator: Manzar Hussain Shah

Printed at:
Khyber Prints
E-mail: khyberprints@gmail.com

J Med Sci 2024 July-September;32(3)
http://www.jmedsci.com

Journal of Medical Sciences (Peshawar, Print/Online) is a peer reviewed open access journal that publishes biomedical public health and educational research on quarterly basis.

Editorial correspondence should be addressed to:

Associate Prof. Dr. Mohsin Shafi
Managing Editor JMS
Peshawar - Pakistan
E-mail: contact@jmedsci.com

The Editorial Board makes every effort to ensure the accuracy and authenticity of material printed in the journal. However, conclusion and statements expressed are views of the authors and do not necessarily reflect the opinions of the Editorial Board or the Khyber Medical College. Publishing of advertising material does not imply an endorsement by the Khyber Medical College.

CONTENTS

Journal of Medical Sciences is published on controlled circulation basis and distributed among the faculty of all national medical colleges, main libraries throughout the province, Pakistan Medical Research Council, PMDC, HEC and Tertiary Referral Centers.

The publisher and the members of the Editorial Board can not be held responsible for errors or for any consequences arising from the use of information contained in this journal.

Journal of Medical Sciences is published quarterly, composed and printed at Khyber Printers, Peshawar KP, Pakistan.

Annual Subscription
Pakistan: Rs. 5000/-
Overseas: US $ 500/-

Printed at:
Khyber Prints
E-mail: khyberprints@gmail.com

EDITORIAL

DEVELOPING A MEDICAL CONFERENCE ABSTRACT BOOK

Farooq Ahmed

Department of Medical Education, Khyber Medical College, Peshawar - Pakistan

This article may be cited as: Ahmed F. Developing A Medical Conference Abstract Book. J Med Sci 2024 July-September;32(3):209-210

The development of a Medical conference abstract book is a valuable resource that provides attendees with a brief overview of the research presented at a conference. As a journal editor, one can play an important role in creating a great abstract book that will benefit conference organizers and attendees.

Here are some important points to consider before developing an abstract book:

- Define the scope and format in relation to the conference. That will help in streamlining the whole contents of the book.
- Explain the specific topics that the abstract will cover. That includes committees, state-of-the-art lectures, verbal/oral, workshops, and poster presentations.
- Determine the structure of the abstract, including the number of pages, sections, and format. Set the number of words for each section. Set download guidelines if the book is made available online.
- Content: An emphasis should be placed on the structure of the contents included in the book. These might be different for different components of the book. For example, the contents of a state-of-the-art lecture will be different from that of an oral presentation of original research. A poster will need to mention relevant sections such as the objectives, methods, results, conclusion, and references.
- Formatting: Provide guidelines for fonts, spacing, citation style, and others. Keep the layout and style consistent throughout the book. Create a professional abstract book template. Organize summaries logically and visually.
- Establish an evaluation process: Establish a peer review system to ensure the quality and relevance of submitted abstracts before including these in an abstract book. Establish clear criteria for reviewing abstracts, such as academic merit, originality, and clarity.
- Collection and organization of abstracts and other contents of the conference before presenting these in the form of a book must be done through a committee comprising subject experts and organizers. Organize summaries of the workshops, state-of-the-art lectures, and other events according to their topic or theme.
- Quality Control: Ensure all downloads follow established guidelines. Send feedback to the authors and suggest edits if necessary. Read the entire book carefully for grammatical, spelling, and formatting errors. Make sure the style and wording are consistent.
- Printing and distribution: Decide whether you want to publish the book and summaries in print, digitally, or both. Decide how the book will be distributed to participants and other stakeholders. A virtual abstract can provide an easy way and reduce costs. You can provide services such as abstract formatting or editing to authors. Use your channels to promote the book and encourage your audience to download or buy it.

You can contribute to the success of your medical conference and increase your reputation. The abstract of the medical session can be published before the start of the session. Some reasons why early publication of the abstract can be beneficial are; Participants can review abstracts and plan their meeting agenda. An abstract book can be used to advertise the event and attract more participants. Participants can use this book to identify colleagues or research partners, or share their work with others.

CONCLUSION

An abstract book can be issued before or after the session. This is a common practice for several reasons. An abstract book provides an overview of the research presented at the conference and is kept for future reference. This document may be distributed to the general public, including those who did not attend the meeting. Researchers may cite short articles in their work, even if they do not attend the conference. However, there are some disadvantages to publishing abstracts after the event. Information contained in abstracts may be lost over time. Some of the research presented at the conference is no longer relevant or groundbreaking. This book may be of limited accessibility to those interested in the latest developments in the field. The conference will provide an opportunity for deep conversations, presentations, and connections that cannot be fully replicated in a book. Ultimately, the decision to publish an abstract book after a conference depends on the specific goals of the conference organizers and the value of the book to the scientific community.

REFERENCES

1. Foster C, Wager E, Marchington J, Patel M, Banner S, Kennard NC, Panayi A, Stacey R, GPCAP Working Group. Good practice for conference abstracts and presentations: GPCAP. Research Integrity and Peer Review. 2019 Jun 5;4(1):11.
2. STEPS VF. Oral Presentations Abstracts, 26th Annual Meeting of the International Association of Medical Science Educators, June 47, 2022.
3. da Silva EF, Reis AP, Patinha C, Dias AC, Durães N, Candeias C, Inácio MM, Marques JM, Neves O, editors. MedGeo2015: Book of Abstracts of the 6th International Conference on Medical. UA Editora, Universidade de Aveiro; 2015.

Dr. Farooq Ahmed
MBBS, FCPS, MHPE
Director of Medical Education, Khyber Medical College,
Peshawar - Pakistan
Cell: +92-313-3799901
Email: drfarooq.ahmed@kmc.edu.pk

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

COMPARISON OF STRENGTH OF ELBOW FLEXORS MEASURED BY MANUAL MUSCLE TESTING AND HAND-HELD DYNAMOMETRY IN YOUNG FEMALES: A CROSS-SECTIONAL STUDY

Saadia Perwaiz[1], Ghulam Fatima[2], Muhammad Waqar Afzal[3], Nimra Basit[4]

[1]Akhtar Saeed College of Rehabilitation Sciences ASMDC, Lahore - Pakistan

[2]Faculty of Rehabilitation and Allied Health Sciences, Riphah International University, Lahore - Pakistan

[3]Physical Therapy Department, University of Lahore Teaching Hospital, Lahore - Pakistan

[4]Akhtar Saeed College of Rehabilitation Sciences ASMDC, Lahore - Pakistan

ABSTRACT

Objective: This study compared manual muscle testing with the objective measures of the Hand-Held dynamometer for detecting strength deficit across grades 4 and 5 in elbow flexors of young females.

Materials and Methods: In this cross-sectional study, 300 young females in the age group of 18–39 years, having strength in grades 4 and 5, were recruited by non-probability convenient sampling. The strength of elbow flexors of dominant and non-dominant extremities was measured according to standard protocols of manual muscle testing and make test of Hand-held dynamometry. The data were tabulated and analyzed by SPSS version 25. The tests used were independent sample t-tests to compare the mean of strength variation in the normal population. A comparison of both tools to predict the extent of variation in the variable of strength was made through Pearson correlation.

Results: The weakness in elbow flexors was revealed by grade 4 of manual muscle testing in the young healthy female population. Quantified strength by dynamometer presented a varied range of strength, with overlap in strength in grades 4 and 5. There was a significantly weaker correlation in both techniques (0.242 on the non-dominant side and 0.317 on the dominant side) in the detection of strength differences at a p-value of 0.00.

Conclusion: This study quantified the strength variation across the subjective realm of grades 4 and 5 through dynamometric measures in the elbow flexors of young females. The comparison of strength across both grades showed a weak correlation for the quantification of strength measured through a dynamometer.

Keywords: Muscle strength, Dynamometer, Elbow Flexors, Manual Muscle testing.

This article may be cited as: Perwaiz S, Fatima G, Afzal MW, Basit N. Comparison Of Strength Of Elbow Flexors Measured By Manual Muscle Testing And Hand-Held Dynamometry In Young Females: A Cross-Sectional Study. J Med Sci 2024 July-September;32(3):211-216

INTRODUCTION

Manual Muscle Testing and Hand-Held Dynamometer are the two most commonly used and handy tools to document impairment in muscle strength. [1, 2] Since its origin, Manual Muscle Testing has undergone modifications and advancements in the grading system. Various modified scales include Kendall, Medical Research Council [3], Daniel and Worthingham, [4] Manual muscle testing (measures muscular weakness in patients with myopathies)[5], and ASIA scales. [6] Hand-held dynamometers have advanced with digitalization of the instrument showing more sensitivity to detect strength deficit and differences by quantifying strength. Validity and reliability studies of manual muscle testing reveal subjectivity across grades 4 and 5 along with the strength of the evaluator to be questionable domains. [7, 8] The hand-held dynamometer measures variations in strength alongside with handling and stability issues while evaluating powerful muscle groups. [9-11] Although the comparative studies testify that both tools sufficiently correlate to detect strength d differences with moderate to strong correlations, however, the subjectivity across grades 4 and 5 gives advantage of hand-held dyna-

Correspondence
Dr. Saadia Perwaiz
Lecturer
Akhtar Saeed College of Rehabilitation Sciences ASMDC, Lahore - Pakistan
Email: pervezsadia96@gmail.com
Date Received: 03/02/2022
Date Revised: 07/07/2024
Date Accepted: 20/08/2024

mometer to be more sensitive to measure small strength deficits and differences. [12-14] The strength differences and deficits across grades 4 and 5 need objectification. Many studies provide reference ranges of dynamometric measures in various muscle groups in different populations of different age groups,[15-18] but their results cannot be generalized owing to morphological and physiological racial differences. In this perspective, dynamometers are sensitive to detect small strength differences but they lack the reference to label weakness. So along with objectification of strength in the normal population, there is a need to devise normative data.

Bohannon has worked on the diagnostic accuracy of knee extensors and grip strength. In these studies, the accuracy of manual muscle testing was measured at a different percentage of strength deficit of dynamometric measures. In his studies, he concluded Manual muscle testing to be a less accurate tool to detect strength differences in grades 4 and 5 with overlap in strength and he further advised to extend this study design to other muscle groups.[19, 20] These studies considered patients with muscles in different grades and measured diagnostic accuracy. This research design can be extended to healthy populations with different muscle groups to address the subjectivity of the grading system regarding grades 4 and 5.

In this context, this study was meant to conduct a comparative analysis of quantified strength of elbow flexors with grades of manual muscle testing in young female populations of different age groups. The young population was selected to explore the subjectivity of manual muscle testing. The elbow joint is one of the complex joints of the human body.[21, 22,] and flexion at this joint constitute an important part of functional movements.[23-25]

In this study variation of strength in elbow flexors in healthy females is evaluated. It is aimed at the comparison of quantified strength with respect to grades in young females along with the correlation between measurements of both tools to detect weakness. The correlation analysis measures the trend of association of detection of strength deficit and differences between both tools in the young female population. This study principally is an effort towards the objectification of grades of manual muscle testing and standardization of dynamometric measures.

MATERIALS AND METHODS

In this study, the strength of wrist flexors of 300 young adult females in the range of 18- 39 years was measured. It was a cross-sectional study design. The sample size was calculated by the formula

$\frac{Z^2_{1-\frac{\alpha}{2}} Sn(1-Sn)}{l^2 \times Prevalence}$, $Z^2_{1-\frac{\alpha}{2}} = (1.96)^2$ here, Sn= 62.9, Sp. =89.2, L=6, Prevalence= 65.4%.[19]

The participants in the age of 18-39 years were divided into 5 age groups (18-19, 20-24, 25-30, 31-34, 35-39). The grouping technique was discrete age grouping in which the participants above 19 years of age and less than 20 years were included in the age group of 18-19 years. A similar methodology was adopted for the remaining groups. The selected age and age groups were based on strength differences regarding studies of Backman and Harlinger. [18, 27]

Young healthy females without any ailment of the upper extremity in the age group of 18-39 years were selected. Those having any ailment of upper extremity (deformity, or musculoskeletal abnormality), neurologic, musculoskeletal, cardiovascular, or any systemic illness were excluded. The sample was collected by non-probability convenience sampling method. The research was approved by the Institutional review board of the University Institute of Physical Therapy, University of Lahore. The data was collected from the Association of Fatima Jinnah old graduate's association and the University of South Asia, Lahore. The hand used for writing was considered a dominant hand. The purpose of the study and procedure was carefully explained to the subjects, and consent was obtained. The university's ethics review board approved to conduct this research.

Manual muscle testing and Hand-Held Dynamometers were used to measure the strength of elbow flexors bilaterally in the selected subjects. Manual muscle testing was performed by the standard method as given by Hislop and Montgomery. As the subjects were healthy females the testing method for grades 4 and 5 was implied.

For dynamometric measures, the protocol of the make test was used. Participants were instructed to build force to a maximum of 2-seconds. The dynamometer was held fixed by the assessor against the exertion of the subject. Subjects were then fortified to carry on with a maximum exertion for another 4.0 to 5.0 seconds. Former studies have found this duration enough to measure the maximum force.[29] Participants were in short sitting

with shoulder and elbow flexed to 45 degrees. The forearm was in supination. The therapist evaluated strength held dynamometer stationary just above the wrist of the subject with one hand and with the other hand stabilized the upper arm of the subject while standing by the side of the subject. The subjects were then encouraged to build maximal force according to the criteria explained earlier. The strength was depicted in kilograms. The quantitative data measured by a dynamometer was assorted following grades by comparing means across a particular grade, the p-values were calculated using the independent sample t-test. Pearson correlation analysis was used to measure the correlation between dynamometric measures and grading to detect strength differences. This analytical process determines the correlation and variation of strength across grades 4 and 5. SPSS version 25 was used for data tabulation and analysis.

RESULTS

The mean age of the 300 participants in the age group of 18-39 was 23.11±4.72 years. Table 1, provides the mean strength for grade in dominant elbow flexors of young healthy females in different age groups. The whole picture depicted by the overall mean in the age group of 18-39 years showed that the dynamometric mean in grade 4 was 8.02kgs and 25.7 percent of participants fell in this category. The strength of 74.3% of the participants was in grade 5 and the dynamometric mean was 9.98kgs. The mean of dynamometric strength of dominant elbow flexors along with the standard deviation in various age groups is given in the table. The overlap in strength across grades 4 and 5 can be observed in all age groups. The age group of 18-19, 20-24, and 25-29 years showed significant strength differences at a p-value equal to or less than 0.05 calculated by independent sample t-test.

Table 2 depicts the strength of non-dominant elbow flexors according to various age groups. The overall strength found in grade 4 was 8.20kgs ± 2.95 and in grade 5 it was 9.56kgs ± 2.61kgs. The strength for age along with maximum and minimum quantitative strength is given in the table. The strength difference was found to be significant in the age group of 18-19 years and 24-29 years at a p-value equal to or less than 0.05. This table depicts a significantly weak correlation between the strength deficits measured by manual muscle testing and dynamometric measures in both dominant and non-dominant elbow flex-

Table No 1: Quantification of Strength of Dominant Elbow Flexors for Grades in Different Age Groups

Age Group	M1							p-values
		Mean (Kgs)	N	SD	Min. (Kgs)	Max. (Kgs)	% of Total N	
18-19	Good	7.49	36	2.13	3.40	12.59	12.0%	0.000
	Normal	9.98	73	2.37	4.99	16.55	24.3%	
	Total	9.16	109	2.57	3.40	16.55	36.3%	
20-24	Good	7.54	27	1.77	4.54	10.77	9.0%	0.017
	Normal	8.70	97	2.29	4.88	16.10	32.3%	
	Total	8.44	124	2.23	4.54	16.10	41.3%	
25-29	Good	9.86	7	1.50	7.82	12.02	2.3%	0.002
	Normal	12.54	35	2.04	7.60	16.55	11.7%	
	Total	12.10	42	2.19	7.60	16.55	14.0%	
30-34	Good	11.38	5	1.04	9.52	12.02	1.7%	0.176
	Normal	11.10	11	1.76	7.48	13.61	3.7%	
	Total	11.19	16	1.54	7.48	13.61	5.3%	
35-39	Good	9.15	2	2.02	7.71	10.58	0.7%	0.122
	Normal	13.13	7	2.93	8.16	17.54	2.3%	
	Total	12.24	9	3.17	7.71	17.54	3.0%	
Total	Good	8.02	77	2.18	3.40	12.59	25.7%	
	Normal	9.98	223	2.69	4.88	17.54	74.3%	
	Total	9.47	300	2.70	3.40	17.54	100.0%	

SD= Standard Deviation, Min.= Minimum, Max.= Maximum

D1= Dynamometric Strength of Dominant Elbow Flexors

M1= Strength of Dominant Elbow Flexors measured by Manual Muscle Testing

Good= Grade 4, Normal= Grade 5, p-value ≤0.05 = significant difference

Table No 2: Quantification of Strength of Non-Dominant Elbow Flexors for Grades in Different Age Groups

Age Group	M2	Strength of non-Dominant Elbow Flexors D2						p-values
		Mean (Kgs)	N	SD	Min. (Kgs)	Max. (Kgs)	% of Total N	
18-19	Good	7.96	42	2.29	2.95	14.63	14.0%	0.001
	Normal	9.59	67	2.33	5.22	16.10	22.3%	
	Total	8.96	109	2.43	2.95	16.10	36.3%	
20-24	Good	7.42	31	1.90	4.99	11.56	10.3%	0.052
	Normal	8.26	93	2.11	4.65	14.51	31.0%	
	Total	8.05	124	2.08	4.65	14.51	41.3%	
25-29	Good	10.18	9	1.22	7.26	11.45	3.0%	0.017
	Normal	12.03	33	2.13	7.37	16.55	11.0%	
	Total	11.64	42	2.11	7.26	16.55	14.0%	
30-34	Good	10.51	6	0.86	9.52	12.02	2.0%	0.195
	Normal	10.81	10	1.55	8.39	13.61	3.3%	
	Total	10.69	16	1.31	8.39	13.61	5.3%	
35-39	Good	9.52	2	0.32	9.30	9.75	0.7%	**0.100**
	Normal	13.01	7	2.47	8.62	16.78	2.3%	
	Total	12.23	9	2.64	8.62	16.78	3.0%	
Total	Good	8.20	90	2.20	2.95	14.63	30.0%	
	Normal	9.56	210	2.61	4.65	16.78	70.0%	
	Total	9.15	300	2.57	2.95	16.78	100.0%	

SD= Standard Deviation, Min.= Minimum, Max.= Maximum

D2= Dynamometric Strength of Non-Dominant Elbow Flexors

M2= Strength of Non-Dominant Elbow Flexors measured by Manual Muscle Testing

Good= Grade 4, Normal= Grade 5, p-value ≤0.05 = significant difference

Table No 3: Correlation Between Grading and Dynamometric Strength of Elbow flexors (n=300)

Variables	R	p- value
M1, D1	0.317**	0.000
M2, D2	0.242**	0.000

**Correlation is significant at 0.01 level (2-tailed).

ors of young females at p value 0.01.

DISCUSSION

Preceding studies have provided the strength of elbow flexors in the normal population. In this context, most of the available data considers Caucasian populations. A study measuring the strength of elbow flexors in the Swiss population found it to be varying between 16.7 ± 3.6kgs to 16.0 ± 4.0kgs in dominant elbow flexors in females of age between 20 and 39 years. For non-dominant elbow flexors, it was 16.0 3.8 kgs to 13.7± 3.1 kgs. [18] In another study the strength of elbow flexors was found to be varying between 15.56±2.22kgs to 16.40± 3.24kgs in non-dominant elbow flexors and 15.80±2.11kgs to 16.70kgs±2.87kg in dominant extremity in females of same age group. [17] In this study the strength of elbow flexors showed range varying between 8.70 ± 2.29kgs to 12.24± 3.17kgs in age of 20-39 years for dominant elbow flexors. For non-dominant groups, it varied between 8.26 ± 2.11 kgs12.23 ± 2.64kgs. This novel finding regarding the Asian population showed on average reduced strength compared with other races. Moreover, the normal female population showed weaker elbow flexors depicted through strength in grade 4. From the teenage to the group of twenties there was a dip in strength, which onwards increased with age. There was an overlap in strength as indicated by the range in grade 4 and 5 and insignificant strength differences at p value < 0.05 calculated by independent sample t-test. The reference studies previously quantified strength in the normal population where the absence of any gross ailment is considered as normal. In this study, the strength in the normal population was further standardized by the reference of the grades described in Tables 2 and 3.

Regarding correlation analysis, previous studies have correlated manual muscle testing using a hand-held dynamometer to varying extent concluding both techniques measure muscle strength.[27,28] Correlation for elbow flexors in patients with inflammatory myopathies and neuromuscular disorders was concluded to be moderate through Spearman correlation.[28] The Pearson correlation among elbow flexors in this study varied between 0.242 and 0.342 at $p < 0.001$ in the correlation. This supports the previously established slant that strength is the common variable measured by both tools, but the weak correlation among both tools does not equate to the tendency or capacity of both tools to measure strength. The cause of lower correlation may be due to the variation of strength among subjects as subjects belonged to the healthy segment with strength in grades 4 and 5.

CONCLUSION

This study objectifies the grading system through the quantification of strength. The weaker correlation exhibits the variation in strength across grades 4 and 5. This variation induces subjectivity in grades. Regarding different variables of muscle strength, this study is a step towards standardization of both tools. The objective approach of the dynamometer provides detection of small differences across grades 4 and 5.

This study considered a subgroup of females in the age group of 18- 39 years. Other age groups and the strength of the male population needed to be explored. Other variables of the strength of muscle also needed to be considered in an effort towards standardization of both tools.

REFERENCES

1. Bohannon RW. Hand-held dynamometry: adoption 1900–2005. Perceptual and motor skills. 2006;103(1):3-4.
2. Avers D, Lott DJ, Brown M. Daniels and Worthingham's Muscle Testing-E-Book: Daniels and Worthingham's Muscle Testing-E-Book. Elsevier Health Sciences; 2024 Feb 6.
3. Compston A. Aids to the investigation of peripheral nerve injuries. Medical Research Council: Nerve Injuries Research Committee. His Majesty's Stationery Office: 1942; pp. 48 (iii) and 74 figures and 7 diagrams; with aids to the examination of the peripheral nervous system. By Michael O'Brien for the Guarantors of Brain. Saunders Elsevier: 2010; pp.[8] 64 and 94 Figures. Brain. 2010;133(10):2838-44.
4. Hislop H, Avers D, Brown M. Daniels and Worthingham's muscle Testing-E-Book: Techniques of manual examination and performance testing: Elsevier Health Sciences; 2013.
5. Health NIo. Manual Muscle Testing Procedures for MMT8 Testing. Bethesda, MD: NIH; 2011.
6. Kirshblum SC, Burns SP, Biering-Sorensen F, Donovan W, Graves DE, Jha A, et al. International standards for neurological classification of spinal cord injury (revised 2011). The journal of spinal cord medicine. 2011;34(6):535-46.
7. Knepler C, Bohannon RW. Subjectivity of forces associated with manual-muscle test grades of 3+, 4-, and 4. Perceptual and motor skills. 1998;87(3_suppl):1123-8.
8. Bohannon RW. Reliability of manual muscle testing: A systematic review. Isokinetics and Exercise Science. 2018(Preprint):1-8.
9. Arnold CM, Warkentin KD, Chilibeck PD, Magnus CR. The reliability and validity of handheld dynamometry for the measurement of lower-extremity muscle strength in older adults. The Journal of Strength & Conditioning Research. 2010;24(3):815-24.
10. Jepsen J, Laursen L, Larsen A, Hagert C-G. Manual strength testing in 14 upper limb muscles A study of inter-rater reliability. Acta Orthopaedica Scandinavica. 2004;75(4):442-8.
11. Stark T, Walker B, Phillips JK, Fejer R, Beck R. Hand-held dynamometry correlation with the gold standard isokinetic dynamometry: a systematic review. PM&R. 2011;3(5):472-9.
12. Bohannon RW. Measuring knee extensor muscle strength. American journal of physical medicine & rehabilitation. 2001;80(1):13-8.
13. Sisto SA, Dyson-Hudson T. Dynamometry testing in spinal cord injury. Journal of rehabilitation research and development. 2007;44(1):123.
14. Bittmann FN, Dech S, Aehle M, Schaefer LV. Manual muscle testing—force profiles and their reproducibility. Diagnostics. 2020 Nov 25;10(12):996.
15. Andrews AW, Thomas MW, Bohannon RW. Normative values for isometric muscle force measurements obtained with hand-held dynamometers. Physical therapy. 1996;76(3):248-59.
16. Bohannon RW. Reference values for extremity muscle strength obtained by hand-held dynamometry from adults aged 20 to 79 years. Archives of physical medicine and rehabilitation. 1997;78(1):26-32.
17. Bohannon RW, Peolsson A, Massy-Westropp N, Desrosiers J, Bear-Lehman J. Reference values for adult grip strength measured with a Jamar dynamometer: a descriptive meta-analysis. Physiotherapy. 2006;92(1):11-5.
18. Van Harlinger W, Blalock L, Merritt JL. Upper limb

strength: study providing normative data for a clinical handheld dynamometer. PM&R. 2015;7(2):135-40.

19. Bohannon RW. Manual muscle testing: does it meet the standards of an adequate screening test? Clinical rehabilitation. 2005;19(6):662-7.
20. Bohannon RW. Grip strength measured by manual muscle testing lacks diagnostic accuracy. Isokinetics and Exercise Science. 2018 Jan 1;26(4):253-6.
21. Alcid JG, Ahmad CS, Lee TQ. Elbow anatomy and structural biomechanics. Clinics in sports medicine. 2004;23(4):503-17.
22. Bryce CD, Armstrong AD. Anatomy and biomechanics of the elbow. Orthopedic Clinics of North America. 2008;39(2):141-54.
23. Bremer AK, Sennwald GR, Favre P, Jacob HA. Moment arms of forearm rotators. Clinical Biomechanics. 2006;21(7):683-91.
24. Houglum PA, Bertoti DB. Brunnstrom's clinical kinesiology: FA Davis; 2011.
25. Standring S. Gray's anatomy e-book: the anatomical basis of clinical practice: Elsevier Health Sciences; 2015.
26. Bäckman E, Johansson V, Häger B, Sjöblom P, Henriksson KG. Isometric muscle strength and muscular endurance in normal persons aged between 17 and 70 years. Journal of Rehabilitation Medicine. 1995;27(2):109-17.
27. Bohannon R. Testing isometric limb muscle strength with dynamometers. Crit Rev Phys Med Rehabil. 1990;2:75-86.
28. Pfister PB, de Bruin ED, Sterkele I, Maurer B, de Bie RA, Knols RH. Manual muscle testing and hand-held dynamometry in people with inflammatory myopathy: An intra-and interrater reliability and validity study. PloS one. 2018;13(3).

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Perwaiz S	✓	×	✓	×	✓	×
Fatima G	✓	✓	×	✓	✓	×
Afzal MW	×	✓	×	×	✓	×
Basit N	✓	✓	✓	×	✓	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of University of Lahore. Vide No. IRB/UOL/FAHS/459/2019. Dated: 29 04 2019

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

RATES AND DETERMINANTS OF MEDICATION ADHERENCE IN PATIENTS WITH BIPOLAR AFFECTIVE DISORDER: A CROSS-SECTIONAL STUDY

Muhammad Shakeel[1], Qasim Riaz[2], Adeela Bibi[3], Ghulam Sarwar[4]

[1]Department of Psychiatry, Pak International Medical College (PIMC), Peshawar - Pakistan

[2]Sarhad Hospital for Psychiatric Diseases, Peshawar - Pakistan

[3]Cantonment Hospital, Peshawar - Pakistan

[4]Department of Community Medicine, Pak International Medical College, Peshawar - Pakistan

ABSTRACT

1- To find out rates of medication adherence in patients with bipolar affective disorder.

2 - To find out the impact of demographic factors, use of substances, and positive family history of bipolar affective disorders on medication adherence in patients with bipolar affective disorder.

Materials And Methods: In this study, 386 patients who were suffering from Bipolar Affective Disorder (BAD), were included through a convenient sampling technique from Government Sarhad Hospital for Psychiatric Diseases Peshawar. Data was collected through a self-prepared questionnaire. Odds ratio (OR) with 95% confidence interval (CI) were calculated with the help of SPSS version 24, while using Chi square test and Logistic Regression Analysis.

Results: Among 386, 302 (78.2%) were males while 84 (21.8%) were females. Regarding education 164 (42.5%) were educated up to the primary level. Familial and sporadic cases were 138 (35.8%) and 248 (64.2%) respectively. Moreover, 232 (60.1%) had poor while 154 (39.9%) had good medication adherence. The frequencies of use of any substance, tobacco, and substance other than tobacco were 222 (57.5%), 214 (55.4%) and 114 (29.5%) respectively. There is a statistically significant impact of gender, education, positive family history of BAD, use of any substance, tobacco, and substance other than tobacco on medication adherence. At the same time, marital status, age of onset of BAD, and current age have no statistically significant impact on medication adherence.

Conclusion: Gender, education, positive family history of BAD, use of any substance, tobacco, and substances other than tobacco are statistically significant while marital status, age of onset of BAD, and current age have no significant impact on medication adherence in BAD.

Keywords: Substance use, Family history of BAD, Demographic factors, Medication adherence, Bipolar affective disorder.

This article may be cited as: Shakeel M, Riaz Q, Bibi A, Sarwar G. Rates And Determinants Of Medication Adherence In Patients With Bipolar Affective Disorder: A Cross-Sectional Study. J Med Sci 2024 July-September;32(3):217-220

INTRODUCTION

Bipolar affective disorder (BAD) is usually a lifelong intermittent psychiatric illness characterized by manic, hypomanic, depressive, and mixed episodes. Its lifetime prevalence is almost 1% to 3%. [1] Its etiology includes both genetic factors e.g. positive family history of similar illness and environmental risk factors e.g. substance misuse, early life adversities, and current life events, etc. [2, 3, 4]

Correspondence
Dr. Muhammad Shakeel
Assistant professor
Department of psychiatry, Pak International Medical College (PIMC), Peshawar - Pakistan
Cell: +92-344-1818806
Email: mshakeel11393@yahoo.com
Date Received: 22/09/2022
Date Revised: 24/07/2024
Date Accepted: 25/07/2024

Comorbid use of substances is quite common among patients with BAD that not only plays its role as a precipitating factor but also has an impact on prognosis including adherence. [5] The lifetime prevalence of comorbid use of substances is highly variable among different studies and has been reported to be up to 72.2%. Similarly, 32.5% of patients with BAD are currently using substances. Alcohol and cannabis are at the top to be used. [6] The prevalence of poor medication adherence for BAD is from 10% to 60% (median=40%). [7] According to another study, BAD is more common in adolescents, having male gender, who are uneducated, belonging to rural areas, and are married. [8] The poor adherence to medication is a multi-causal phenomenon and is affected by the male gender, illiteracy, use of substances, early age of onset, increased severity of illness, and lack of insight. [9, 10] According to other studies, drug abuse not only initiates symptomatology in such patients but also affects treatment adherence. [11, 12] In patients

with BAD use of substances, ethnicity, education, age, severity of illness and comorbid OCD have significant impact while gender has no significant impact on medication adherence. [13, 14] According to another study, marital status, gender, age of the patient, age of onset of disease, duration of the disease, and severity of the disease have no impact on medication adherence. [15] Poor medication adherence can not only cause an increased risk of suicide, almost 5.2 fold but also cause frequent hospitalization, a threat to the lives of others, and hence increase psychosocial and financial disruption for their families does exits. [16] Moreover, no such study has been conducted in recent past in this geographical area to determine the rates and determinants of medication adherence in patients with BAD. Therefore, our study will find rates and determinants of medication adherence for BAD with updated and accurate statistics.

MATERIALS AND METHODS

In this cross-sectional analytical study, 386 patients were included (Indoor and outdoor) from Government Sarhad Hospital for Psychiatric Diseases Peshawar through a non-probability convenience sampling technique from 5th October 2020 to 25th September 2021, after taking approval from the Head of the institution and informed consent from the patient or his/her guardian. The sample size was calculated while considering the prevalence of poor medication adherence in BAD as 50% (CI= 95%). [7] Any patient who met the criteria of ICD-10 (International Classification of Diseases version 10) research version for bipolar affective disorder current episode depression, hypomanic, manic, or mixed and received treatment for at least one month was included. Information was gathered through a self-prepared questionnaire filled by a trained health worker after confirmation of diagnosis by a consultant psychiatrist.

Medication adherence was defined as "the patient is taking medicines in dosage as advised by the psychiatrist for at least one month or since the last visit to the psychiatrist whichever is longer". [17] Substances were grouped into three: 1. Use of any substance (including tobacco), 2. Use of tobacco, and 3. Use of substances other than tobacco.Frequency and percentage were used for categorical variables, while mean and standard deviations were used for continuous variables. With the help of the chi-square test and binary logistic regression analysis OR with 95% CI was calculated. SPSS version 24 was used for all statistical analysis.

RESULTS

In the sample, the majority were males {302 (78.2%), and the females were 84 (21.8%)}. The mean age of the patient was 38.76±14.24 years, and the mean age of onset of BAD was 26.31±10.12 years. Individuals who had education at least up to primary level were 164 (42.5%). The majority of the sample were married 302 (78.2%) while 84 (21.8%) were single. Familial cases were 138 (35.8%) and 248 (64.2%) were the sporadic cases. The frequencies of the use of any substance, tobacco, and substance other than tobacco were 222 (57.5%), 214 (55.4%), and 114 (29.5%) respectively. Regarding medication adherence, patients with poor medication adherence were 232 (60.1%) while 154 (39.9%) were having good

Table No 1. Impact of demographic factors, use of substances, and positive family history of BAD on medication adherence

Variables		Medication Adherence		Sig.	OR with 95% C.I
		Poor	Good		
Gender	Male	190	112	0.033	1.69(1.04-2.76)
	Female	42	42		
Education	Uneducated	144	78	0.026	1.59(1.05-2.40)
	Educated	88	76		
Marital status	Single	54	30	0.376	1.25(0.75-2.07)
	Married	178	124		
Use of any substance	Yes	146	76	0.008	1.74(1.15-2.63)
	No	86	78		
Use of Tobacco	Yes	144	70	0.001	1.96(1.29-2.96)
	No	88	84		
Use of Substance other than tobacco	Yes	94	20	0.000	4.56(2.66-7.81)
	No	138	134		
Positive family history of BAD	Yes	70	68	0.005	0.54(0.35-0.83)
	No	162	86		
Age of onset of BAD		232	154	0.986	1.00(0.97-1.02)
Current age		232	154	0.455	0.99(0.97-1.01)

(BAD= Bipolar affective disorder, CI= confidence interval, OR= Odd ratio)

medication adherence.

Among demographic factors gender, and education had a statistically significant impact on medication adherence while marital status, age of onset of BAD, and current age of patient had no significant impact on medication adherence. The statistical values are given in the table. Similarly, medication adherence was significantly affected by the use of any substance, use of tobacco, and use of substances other than tobacco. Moreover positive family history of bipolar effective disorder significantly affects the medication adherence. the quantification of the effect is given in the table 1.

DISCUSSION

Patients with BAD are frequently reported with poor medication adherence. Contrary to the study of Narayanan et al. [12] , the frequency of poor medication adherence is 61.5%. Comorbid use of substances is also quite common in BAD which also affects medication adherence. In our study, the frequency of use of any substance, tobacco, and substances other than tobacco is 57.5%, 55.4%, and 29.5% respectively. These values are almost near to those reported by a previous study. [5] The use of Substances not only precipitates BAD but also exacerbates the symptomatology of BAD which may lead to loss of insight and hence poor medication adherence. [11] Moreover, time and money needed for medication adherence are utilized for the use of substances. Therefore, in our study, the risk of poor medication adherence is increased if the patient is using any substance with an OR of 1.74 (95% CI=1.15−2.63). Similarly, the use of tobacco and substances other than tobacco also increases the risk of poor medication adherence with OR of 1.96 (95% CI=1.29−2.96) and 4.56 (95% CI=2.66−7.81) respectively. Gonzalez-Pinto et al also concluded similarly. [10] In our study, the familial cases have 1.85 times the odds of good medication adherence compared to the sporadic cases (95% CI=1.2-2.85). These findings are contradictory to earlier studies. [18, 19] Those families who had other similar patients may have more education regarding the importance of early detection of symptomatology, early referral, and a need for regular intake of medication. Males have 1.69 times the odds of poor medication adherence as compared to females (95% CI= 1.04-2.76) which is in line with the literature. [14] This may be due to the reason that males are mostly financially and socially autonomous in our society and may divert their financial and social autonomy to the use of substances instead of medication and hence poor adherence to treatment. Alternatively, it is also possible that males are socially dominant so it is usually difficult for subordinates within the family to refer him in time and enforce. The odds of good medication adherence are 1.59 times higher for those patients who are educated compared to those who are uneducated (95% CI=1.05-2.40). One of the previous studies has similar findings. [13] The mean age of onset of BAD has statistically no significant impact on medication adherence (p=0.52). Similarly, current age (38.76 ± 14.24 years) and marital status have statistically no significant impact (p>0.05) on medication adherence. These findings are contradictory to earlier studies. [9, 10, 13, 14]

No laboratory test was done during this study to confirm or exclude the claim of the patients regarding the use of substances. Moreover, patients or attendants were asked about medication adherence so recall bias may be a factor. The severity of illness, level of education, employment/ financial status, and use of individual substances e.g., Cannabinoids, Alcohol, Opioids, sedative-hypnotics, stimulants, Hallucinogens, and volatile solvents, etc. may affect adherence differently and were not studied in this study individually. Therefore further studies are needed in the future with a large sample size, taken from the community, and also to include these factors in the analysis.

CONCLUSION

The frequency of poor medication adherence in BAD is 60.1%. Gender, education, positive family history of BAD, use of any substance, tobacco, and substance other than tobacco have a significant impact, while marital status, age of onset of BAD, and current age have no significant impact on medication adherence in patients with BAD.

REFERENCES

1. Moreira ALR, Van Meter A, Genzlinger J, Youngstrom EA. Review and meta-analysis of epidemiologic studies of adult bipolar disorder. J Clin Psychiatry. 2017;78(9)
2. Bienvenu OJ, Davydow DS, Kendler KS. Psychiatric 'diseases' versus behavioral disorders and degree of genetic influence. Psychol Med. 2011;41(1):33–40.
3. Bobo W V. The diagnosis and management of bipolar I and II disorders: clinical practice update. In: Mayo Clinic Proceedings. Elsevier; 2017. p. 1532–51.
4. Maniglio R. Prevalence of child sexual abuse among adults and youths with bipolar disorder: a systematic review. Clin Psychol Rev. 2013;33(4):561–73.
5. Anderson IM, Haddad PM, Scott J. Bipolar disorder. BMJ (Overseas retired Dr ed). 2013;346(7889):27–32.
6. Cerullo MA, Strakowski SM. The prevalence and significance of substance use disorders in bipolar type I and II disorder. Subst Abuse Treat Prev Policy. 2007;2(1):1–9.
7. Lingam R, Scott J. Treatment non-adherence in affective disorders. Acta Psychiatr Scand. 2002;105(3):164–72.
8. Manhas RS, Manhas GS, Manhas A, Sharma R, Thappa JR, Akhter R. Prevalence of non-adherence to treatment among patients of bipolar affective disorder. J Med Sci Clin Res. 2019;7(6):623–8.
9. Leclerc E, Mansur RB, Brietzke E. Determinants of adherence to treatment in bipolar disorder: a comprehensive review. J Affect Disord. 2013;149(1–3):247–52.

10. Gonzalez-Pinto A, Reed C, Novick D, Bertsch J, Haro JM. Assessment of medication adherence in a cohort of patients with bipolar disorder. Pharmacopsychiatry. 2010;43(07):263–70.

11. Strakowski SM, DelBello MP, Fleck DE, Arndt S. The impact of substance abuse on the course of bipolar disorder. Biol Psychiatry [Internet]. 2000;48(6):477–85. Available from: https://www.sciencedirect.com/science/article/pii/S0006322300009008

12. Narayanan D, Jith A, Bansal R. Nonadherence in bipolar disorder patients: A 14-year retrospective study. Indian J Psychiatry [Internet]. 2020/05/15. 2020;62(3):290–4.Availablefrom:https://pubmed.ncbi.nlm.nih.gov/32773872

13. Baldessarini RJ, Perry R, Pike J. Factors associated with treatment nonadherence among US bipolar disorder patients. Hum Psychopharmacol Clin Exp. 2008;23(2):95–105.

14. Johnson FR, Özdemir S, Manjunath R, Hauber AB, Burch SP, Thompson TR. Factors that affect adherence to bipolar disorder treatments: a stated-preference approach. Med Care. 2007;545–52.

15. Azadforouz S, Shabani A, Nohesara S, Ahmadzad-Asl M. Non-compliance and related factors in patients with bipolar I disorder: A six month follow-up study. Iran J Psychiatry Behav Sci. 2016;10(2).

16. Gonzalez-Pinto A, Mosquera F, Alonso M, López P, Ramírez F, Vieta E, et al. Suicidal risk in bipolar I disorder patients and adherence to long-term lithium treatment. Bipolar Disord. 2006;8(5p2):618–24.

17. Chakrabarti S. Medication non-adherence in bipolar disorder: Review of rates, demographic and clinical predictors. World J Meta-Anal. 2017;5(4):103.

18. Hajda M, Kamaradova D, Latalova K, Prasko J, Ociskova M, Mainerova B, et al. Self-stigma, treatment adherence, and medication discontinuation in patients with bipolar disorders in remission–a cross sectional study. Act Nerv Super Rediviva. 2015;57(1–2):6–11.

19. Murru A, Pacchiarotti I, Nivoli AMA, Bonnin CM, Patrizi B, Amann B, et al. Rates and clinical correlates of treatment non-adherence in schizoaffective bipolar patients. Acta Psychiatr Scand. 2012;125(5):412–8.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Shakeel M	✓	×	✓	✓	✓	✓
Riaz Q	✓	✓	×	✓	×	×
Bibi A	×	✓	×	×	✓	×
Sarwar G	×	✓	✓	×	×	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Pak-International Medical College, Peshawar. Vide No. 06/DMR/PIMC. Dated: 29 07 2020

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

THE EFFECTS OF MULTICOMPONENT EXERCISE ON MILD COGNITIVE IMPAIRMENT IN ELDERLY POPULATION: A RANDOMIZED CONTROL TRIAL

Hafsah Gul Khattak[1], Hafsah Arshad[1], Saba Aman[2], Imran Amjad[3]

[1]Department of Physical Therapy, Ibadat International University, Islamabad - Pakistan

[2]Premier Institute of health and management sciences, Peshawar - Pakistan

[3]Department of Rehabilitation and Allied Health Sciences, Riphah International University, Islamabad - Pakistan

ABSTRACT

Objective: To determine the effectiveness of multicomponent exercise on mild cognitive impairment in older adults.

Materials and Methods: This randomized control trial was conducted at the Department of Rehabilitation at Pakistan Railway General Hospital, Rawalpindi. Fifty-eight older persons with mild cognition impairment were allocated randomly into 2 groups. The participants of the experimental group (n=29) performed multicomponent exercises two times a week for 55-60 minutes. In the control group (n=29), participants performed 20 minutes of treadmill walking thrice a week. Both groups performed these exercises for 6 weeks. Pre and post assessment was carried out at baseline and after 6 weeks of intervention for the following test: Mini-mental state examination (MMSE), Montreal Cognitive Assessment (MoCA), Trail-making test A (TMT-A) and Trail making test-B (TMT-B). Data was analyzed using SPSS 21.

Results: The mean age of study participants was 62.74±7.4 years. Within-group analysis for MMSE, MoCA, TMT-A, and TMT-B significantly improved ($p < 0.05$) in the experimental group in comparison to the control group. Between-group analysis showed that all parameters were significantly improved ($P < 0.05$) at post-intervention assessment.

Conclusion: Multicomponent exercise training was found to be effective in the elderly with mild cognitive impairment. A combination of exercise can enhance cognitive function, help in the prevention of the decline in cognitive function, and reduce the risk for dementia.

Keywords: Mild Cognitive Impairment, Cognition, Trail Making Test, Dementia

This article may be cited as: Khattak HG, Arshad H, Aman S, Amjad I. The Effects Of Multicomponent Exercise On Mild Cognitive Impairment In Elderly Population: A Randomized Control Trial. J Med Sci 2024 July-September;32(3):221-225

INTRODUCTION

Mild cognitive impairment is a major concern rapidly affecting elderly persons in developing countries. MCI prevalence reported in individuals older than 65 years is about 10% to 20%. Pakistan is among the 7th densely populated countries, where the number of older persons above 60 years is increasing. It is projected that by 2050 number of the people above 60 years of age will be more than 27 million. [1] The estimated prevalence of people with dementia in South Asia is 2% and approximately 2 million cases of dementia are in Pakistan. This increased number of dementia among older persons is causing economic and social burdens in Pakistan. [2]

Correspondence
Dr. Hafsah Gul Khattak
Senior Lecturer
Department of Physical Therapy, Ibadat International University, Islamabad - Pakistan
Cell: +92-315-9828868
Email: hafsah.gul@uipt.uol.edu.pk
Date Received: 26/06/2023
Date Revised: 27/05/2024
Date Accepted: 23/08/2024

Peterson et al. were the first to describe mild cognitive impairment (MCI) as an intermediate stage between normal aging to dementia. It is an impairment of cognition above that which is observed with age-related cognitive decline. Clinical symptoms include memory and language problems, poor attention, disorientation, and motor impairments. [3] It is reported that 5% to 15% of persons affected with MCI progress to dementia if left untreated. Therefore, early identification and control of MCI subjects may help decrease cases of dementia. [4]

Currently, there is no effective pharmacological treatment for improving cognitive function in MCI patients. However symptomatic benefits are achieved along with numerous side effects of medications. Efforts are made to for interventions that help in decreasing the cognitive decline in older adults. Nonpharmacological interventions like diet, lifestyle modification, cognitive/ brain training games, and moderate physical exercise (aerobic, resistance training) have shown promising effects in improving cognitive function in MCI. [5] Several exercise-mediated mechanisms are reported that help in preserving cognition in elder persons. It is observed that physical exercise

improves the blood supply of the brain, and enhances the brain's neural plasticity, thereby increasing the release of protective neurotrophic factors to improve cognition. [6] A recent systemic review has reported that exercise plays a worthy part in the prevention of cognitive decline and enhances the quality of life of individuals diagnosed with cognitive impairment. Exercise improves the levels of growth factors like brain-derived neurotrophic factor, and inflammatory cytokines, decreasing oxidative stress enzymes and thus increasing cerebral blood flow. [7]

Multicomponent exercise programs include a comprehensive training approach to the combination of aerobic, cognitive, resistance, balance, and coordination exercises with a purpose to improve the physical function of elder persons and help in reversing frailty in the geriatric population. This combination of different exercises helps to potentially improve physical and cognitive functions simultaneously as well as maintains overall health of an individual. The advantages of multicomponent exercise are very familiar regarding physical fitness in elder persons, however, evidence related to improvements in cognitive function as a result of multicomponent exercise is less consistent. [8] Literature shows that aerobic, balance, and resistance training in combination helps to improve cardiovascular fitness, and physical and cognitive functions, which are important for the independent functioning of an individual. Moreover, balance problems are a significant concern in persons with MCI and the balance exercise component of this extensive program helps to reduce the risk of falls in these individuals [9]. To the best of our knowledge, no study has been conducted in Pakistan to investigate the effects of multicomponent exercise on cognition among elderly persons with MCI. Therefore, the purpose of the study was to find out the effectiveness of multicomponent exercise on mild cognitive impairment in older adults.

MATERIALS AND METHODS

A randomized control trial was conducted at the Department of Rehabilitation at Pakistan Railway General Hospital, Rawalpindi from January 2019 to June 2019. The current study was approved by the Internal Review Board (IRB) of Riphah College of Rehabilitation Sciences (Riphah/RCRS/REC/00450). The clinical trial registry number of the study is (NCT03938051) registered under the U.S National Library of Medicine. After taking informed consent the benefits and risks involved in the study were described to the participants. The sample size calculated through the open-epi tool was 58 participants. [10] The study included both male and female participants of age >55 years with MMSE scores 18- 23 (mild cognitive impairment). We have excluded those participants who had a history of neurodegenerative disease /stroke, current medical condition, arterial disease history in the past year, and oncologic patients with active treatment with chemotherapy. By the sealed envelope. 58 older adults were randomly allocated into two groups: an experimental group (n=29) and a control group (n=29). The sample was raised using a convenience sampling technique. The assessment was carried out at the baseline and after 6 weeks of intervention for the following test: Mini-mental state examination (MMSE), Montreal Cognitive Assessment (MoCA), Trail-making test A (TMT-A) and Trail making test-B (TMT-B).

The participants of the experimental group performed multicomponent exercises twice weekly, 55-60 minutes for 6 weeks. A whole exercise program was designed to include progressions and variations. Each session included (aerobics, strength, balance, coordination, agility, reaction time, flexibility, and warm-down). Aerobic includes multi-directional movements. Strength training targets all major upper and lower body and core muscle groups. Balance Training involves both dynamic and static balance. For coordination and agility line drills were performed. Reaction time includes flat-foot drumming and walking with bouncing the ball. The session was completed by performing static stretches on the floor. The detail of the intervention is given in Table 1. The participants of the control group performed treadmill walk thrice a week; 20 minutes for 6 weeks. Participants walked with zero inclination at a steady constant pace at the rate of 5 to 7 points on the ten-point Borg scale.

Statistical analyses were done with SPSS 21. Descriptive statistics were used for qualitative and quantitative variables and data was presented as frequencies, percentages, mean, and standard deviation. Shapiro-Wilk test and normality curve were used to check the data normality. The p-value of the Shapiro-Wilk test for all variables measures was greater than 0.05 therefore, parametric tests were used. To examine the difference between the two groups, an independent samples t-test, however, for the difference between the same group at two different time points, the paired-sample t-test was carried out. $P<0.05$ was considered significant.

RESULTS

Among 145 patients assessed, 58 were included according to the inclusion criteria. The participants were randomly divided into experimental groups (n=29) and control groups (n=29). There were four dropouts from the experimental group and three dropouts from the control group. The analysis included fifty-one participants. Detail of the participants assessed and analyzed is given in Figure-1.

The mean age was 62.74±7.4 years. Among them, 26 (50.98%) male participants and 25 (49.01%) were female participants. The mean age in the experimental group was 64.520±6.25 years, 12 male and 13 female. Whereas, in the control group the mean age was 63.961±6.33 years with 14 male and 12 female partic-

ipants. Within group analysis of the experimental group showed a statistically significant difference ($p<0.05$) between pre and post-treatment values for neuropsychological tests i.e. MMSE (p-value 0.002), MoCA (p-value 0.001), TMT-A (p-value 0.001), TMT-B (p-value 0.033). Whereas group analysis of the control group showed a non-significant difference ($p>0.05$) between pre and post-treatment values for neurological tests i.e. MMSE (p-value 0.067), MoCA (p-value 0.231), TMT-A (p-value 0.064), TMT-B (p-value 0.416). (Table 2). Pre-treatment comparison between the two groups showed no significant difference ($p>0.05$). However, post-treatment between-group comparison showed a significant difference with a p-value of < 0.05.i.e MMSE (experimental group 24.36±2.03 vs control group 20.50±2.14, p=0.004), MoCA (experimental group 23.72±3.04 vs control group 19.13±2.17, p=0.006), TMT-A (experimental group 98.94±69.55 vs control group 100.115±69.13, p=0.005), TMT-B (experimental group 246.200±131.19 vs control group 248.269±115.60, p=0.037) (Table 3).

Table No 1. Multicomponent exercise program

TYPE	PHASE 1 Time, intensity	PHASE 2 Time, intensity	PHASE 3 Time, intensity
Aerobic	10mins, 3-4/10RPE	15mins,4-5/ 10RPE	15mins,5-6/10RPE
Strength	15 mins, 2sets 6-8reps	10 mins, 3sets 6-8reps	10 mins,4sets 6-8reps
Balance	10mins	10mins	10mins
Coordination agility	10mins	10mins	10mins
Reaction time	5mins	7 mins	7 mins
Flexibility	10mins,3-4/10RPE Minimum 20 sec	8mins,3-4/10RPE Minimum 20 sec	8mins,3-4/10RPE Minimum 20 sec

Table No 2: Within-group analysis

Variable	Group (n=51)	Mean ± SD Pre and post	P value
MMSE	Experimental (n=25)	20.92±1.65	0.002*
		24.36±2.03	
	Control (n=26)	19.19±1.60	0.067
		20.50±2.14	
MoCA	Experimental (n=25)	18.12±3.28	0.001*
		23.72±3.04	
	Control (n=26)	18.53±2.30	0.231
		19.13±2.17	
TMT-A	Experimental (n=25)	136.72±107.64	0.001*
		98.94±69.55	
	Control (n=26)	102.15±67.10	0.064
		100.11±69.13	
TMT-B	Experimental (n=25)	289.16±130.62	0.033*
		246.200±131.19	
	Control (n=26)	247.34±111.56	0.416
		248.269±115.60	

Table No 3: Between-group analysis

Variable	Experimental group Mean± SD	Control group Mean± SD	P value
MMSE Pre	20.92±1.65	19.19±1.60	0.318
MMSE post	24.36±2.03	20.50±2.14	0.004*
MoCA Pre	18.12±3.28	18.53±2.30	0.460
MoCA Post	23.72±3.04	19.13±2.17	0.006*
TMT-A Pre	136.72±107.64	102.15±67.10	0.706
TMT-A Post	98.94±69.55	100.115±69.13	0.005*
TMT-B Pre	289.16±130.62	247.34±111.56	0.069
TMT-B Post	246.200±131.19	248.269±115.60	0.037*

DISCUSSION

The current study showed that multicomponent exercise training was effective in older adults with mild cognitive impairment. Takao Suzuki et al in their work concluded that a multicomponent exercise program provides beneficial cognitive effects for the elderly with aMCI. They further suggested that exercise benefits were evident for logical memory and general cognitive function. [11] Another RCT conducted by J. Thaiyanto, et al. on elderly women demonstrated that multicomponent exercise training that includes aerobic, resistance, and balance exercise showed beneficial effects in the exercised group $p<0.05$. [12] Another trial done by Takao Suzuki et al. found that improvements in cognitive performance were reported following multicomponent exercise in the treatment group with significant results in MMSE, logical memory, and letter verbal fluency test ($p< 0.05$). [13] In a review conducted by Mikel López Sáez de Asteasu and his colleagues also proposed that in older adults multicomponent exercises had positive effects on cognitive functions. [14] Patrick Eggenberger et al. in their trial proposed that in the elderly beneficial results were reported with multicomponent cognitive training programs. It also had positive effects which boost executive functions in older adults. [15] Betul Fatma Bilgin and Gozde Iyigun proposed MTT and MCT regimes found to be effective in improving cognitive as well as physical outcomes in persons with mild cognitive impairment. [16] The study conducted by Ma, C Y A et al. revealed beneficial effects of multi-component physical exercise program training and results in improvement of attention, executive function, and dual-task performance in elderly with MCI. [17] Navin Kaushalet et al. in their study concluded that multicomponent exercise had positive effects on cognitive functions in the elderly and also proposed that regular session could enhance their executive functioning, which improved their HR-QOL[18]. Qiao-hong Yang et al described improvements in cognitive performance, physical function, depression, and quality in MCI older adults with multicomponent exercise intervention in the East Asia region. [19] Another trial conducted to find the effects of multicomponent exercise training by Li L et al. on MCI showed significant improvement in MMSE and MoCA scores $p<0.05$ in the experimental group which supports our study findings. [20] In the latest review by Luis Carlos Venegas-Sanabria et proposes that beneficial effects on elderly with MCI or dementia were reported with multi-component physical exercise and hence effects on global cognition. [21]

The current study has a sample size was small. No long-term follow-up was conducted. Other parameters of strength, balance, fall, and quality of life were not addressed in this study. Furthermore, confounding factors such as the incidence of hypertension, diabetes, hypercholesterolemia, dyslipidemia, depressive and anxiety symptoms, and the use of medication were not identified. So future research should be conducted with different exercise intensities and combinations, longer duration, and follow-ups. Moreover, research should be carried out to find the effects on Dementia and Alzheimer's patients.

CONCLUSION

Multicomponent exercise programs that include aerobic, strength, balance, coordination, reaction time, and flexibility exercises have positive effects in the prevention of the decline in cognitive function and moreover, reduce the risk for dementia and AD.

REFERENCE

1. Wing EAs. Finance Division, Government of Pakistan, Islamabad. Highlights of Pakistan Economic Survey. 2014;2015.
2. Awan S, Shafqat S, Kamal AK, Sonawalla A, Siddiqui S, Siddiqui F, et al. Pattern of neurological diseases in adult outpatient neurology clinics in tertiary care hospital. BMC research notes. 2017;10:1-6.
3. Zhao Y, Feng H, Wu X, Du Y, Yang X, Hu M, et al. Effectiveness of exergaming in improving cognitive and physical function in people with mild cognitive impairment or dementia: systematic review. JMIR serious games. 2020;8(2):e16841.
4. Huang P, Fang R, Li B-Y, Chen S-D. Exercise-related changes of networks in aging and mild cognitive impairment brain. Frontiers in aging neuroscience. 2016;8:47.
5. Kasper S, Bancher C, Eckert A, Förstl H, Frölich L, Hort J, et al. Management of mild cognitive impairment (MCI): the need for national and international guidelines. The World Journal of Biological Psychiatry. 2020;21(8):579-94.
6. Kirk-Sanchez NJ, McGough EL. Physical exercise and cognitive performance in the elderly: current perspectives. Clinical interventions in aging. 2014:51-62.
7. Huang X, Zhao X, Li B, Cai Y, Zhang S, Wan Q, et al. Comparative efficacy of various exercise interventions on cognitive function in patients with mild cognitive impairment or dementia: a systematic review and network meta-analysis. Journal of sport and health science. 2022;11(2):212-23.
8. Tarazona-Santabalbina FJ, Gómez-Cabrera MC, Pérez-Ros P, Martínez-Arnau FM, Cabo H, Tsaparas K, et al. A multicomponent exercise intervention that reverses frailty and improves cognition, emotion, and social networking in the community-dwelling frail elderly: a randomized clinical trial. Journal of the American Medical Directors Association. 2016;17(5):426-33.
9. Pepera G, Mpea C, Krinta K, Peristeropoulos A, Antoniou V. Effects of multicomponent exercise training intervention on hemodynamic and physical function in older residents of long-term care facilities: A multicenter randomized clinical controlled trial. Journal of Bodywork and Movement Therapies. 2021;28:231-7.
10. Vaughan S, Wallis M, Polit D, Steele M, Shum D, Morris N. The effects of multimodal exercise on cognitive and physical functioning and brain-derived neurotrophic factor in older women: a randomised controlled trial. Age and Ageing. 2014;43(5):623-9.
11. Suzuki T, Shimada H, Makizako H, Doi T, Yoshida D, Ito K, et al. A randomized controlled trial of multicomponent exercise in older adults with mild cognitive impairment. PloS one. 2013;8(4):e61483.

12. Thaiyanto J, Sittichoke C, Phirom K, Sungkarat S. Effects of multicomponent exercise on cognitive performance and fall risk in older women with mild cognitive impairment. The journal of nutrition, health & aging. 2021;25:160-4.

13. Suzuki T, Shimada H, Makizako H, Doi T, Yoshida D, Tsutsumimoto K, et al. Effects of multicomponent exercise on cognitive function in older adults with amnestic mild cognitive impairment: a randomized controlled trial. BMC neurology. 2012;12:1-9.

14. de Asteasu MLS, Martinez-Velilla N, Zambom-Ferraresi F, Casas-Herrero A, Izquierdo M. Role of physical exercise on cognitive function in healthy older adults: a systematic review of randomized clinical trials. Ageing research reviews. 2017;37:117-34.

15. Eggenberger P, Schumacher V, Angst M, Theill N, de Bruin ED. Does multicomponent physical exercise with simultaneous cognitive training boost cognitive performance in older adults? A 6-month randomized controlled trial with a 1-year follow-up. Clinical interventions in aging. 2015:1335-49.

16. Bilgin BF, Iyigun G. Multitask Versus Multicomponent Training on Cognitive and Motor Functions in Persons With Mild Cognitive Impairment: A Randomized Trial. Journal of Aging and Physical Activity. 2022;30(6):1024-37.

17. Ma C, Ng M, Lo M, Chan C, Yung C. Effect of multi-component physical exercise on cognitive function, mood, and dual task gait speed of older adults with mild cognitive impairment. Asian Journal of Gerontology and Geriatrics. 2015;10(2):110-.

18. Kaushal N, Desjardins-Crépeau L, Langlois F, Bherer L. The effects of multi-component exercise training on cognitive functioning and health-related quality of life in older adults. International journal of behavioral medicine. 2018;25:617-25.

19. Yang Q-h, Lyu X, Lin Q-r, Wang Z-w, Tang L, Zhao Y, et al. Effects of a multicomponent intervention to slow mild cognitive impairment progression: A randomized controlled trial. International journal of nursing studies. 2022;125:104110.

20. Li L, Liu M, Zeng H, Pan L. Multi-component exercise training improves the physical and cognitive function of the elderly with mild cognitive impairment: a six-month randomized controlled trial. Annals of Palliative Medicine. 2021;10(8):8919-29.

21. Venegas-Sanabria LC, Cavero-Redondo I, Martínez-Vizcaino V, Cano-Gutierrez CA, Álvarez-Bueno C. Effect of multicomponent exercise in cognitive impairment: a systematic review and meta-analysis. BMC geriatrics. 2022;22(1):1-11.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Khattak HG	✓	✓	✓	✓	✓	×
Arshad H	✓	×	✓	✓	✓	×
Aman S	×	×	✓	×	✓	✓
Amjad I	✓	×	✓	✓	×	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Riphah College of Rehabilitation Sciences Rawalpindi Vide No. RCRS/REC/00450. Dated: 20 12 2018

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

DETERMINING THE FREQUENCY OF BURNOUT AMONG POSTGRADUATE TRAINEES OF A TERTIARY CARE HOSPITAL IN KHYBER PAKHTUNKHWA, PAKISTAN

Mehwish Gohar, Hidaya Sayed, Haya Ayaz, Gulshana Tariq, Minha Shahid, Muzdah Anwar, Navira Fatima, Tanzeela khan

[1]MBBS students of Khyber Girls Medical College, Hayatabad, Peshawar - Pakistan

ABSTRACT

Objective: To determine the frequency of burnout among postgraduate trainees of a tertiary care hospital in KP, Peshawar, Pakistan

Methods and materials: A Cross-sectional study with convenience was conducted among senior postgraduate trainees in general departments of HMC, Peshawar. Self-assessment questionnaires were distributed to collect data, and a sample size of 105 was recorded. Burnout was measured using the Copenhagen Burnout Inventory (CBI) scale. IBM SPSS Version 20 was employed for data analysis. Graphs, figures, and tables were made using MS Excel Version 2010.

Results: In our study, 99 postgraduate trainees actively participated, with 19 participants from the Gynecology & Obstetrics department, 16 from Medicine, 14 from Surgery, 14 from Pediatrics, 9 from Radiology, 8 from Ophthalmology, 6 from Oral & Maxillofacial Surgery, 5 from ENT, 5 from Pathology, and 3 from Anesthesia. The response rate was 94%. The data was analyzed through Descriptive Statistics. All three dimensions measured through CBI (personal burnout, work-related burnout, and patient-related burnout) were documented as being severe as compared to international statistics. A higher prevalence of personal burnout (352.13) and work-related burnout (386.70) was observed in females. The highest mean of work-related burnout (489.47) and patient-related burnout (343.42) were observed in the Gynecology department. The highest mean of personal burnout (375.00) was observed in the oral and maxillofacial surgery department.

Conclusion: Severe burnout was found among the female respondents and in the Department of Gynecology and Obstetrics.

Keywords: Burnout syndrome, Copenhagen Burnout Inventory, Postgraduate trainees, Residents, Stressors, Patient care, Healthcare.

This article may be cited as: Gohar M, Sayed H, Ayaz H, Tariq G, Shahid M, Anwar M, et al. Determining The Frequency of Burnout Among Postgraduate Trainees of A Tertiary Care Hospital In Khyber Pakhtunkhwa, Pakistan. J Med Sci 2024 July-September;32(3):226-231

INTRODUCTION

Burnout is defined as a common syndrome seen among those involved in healthcare, especially physicians, who are consistently exposed to high degrees of work-related stress. [1]

The characteristic signs of burnout include emotional exhaustion, depersonalization, and low personal accomplishment.[2] A study of American medical students and physicians (both in training and in practice) has shown a prevalence that exceeds 50%. [3] Its impact has been linked to causing harm to physicians and patients, often extending to the families and friends of said victims as well as health organizations. Another study mentioned arguments from physicians that their quality time for assessing and caring for patients has significantly been impacted; about 9% of the physicians involved in the study have admitted to making at least one medical error while experiencing burnout. [4]

A general opinion supported the idea that patients were affected as a result of doctors experiencing burnout, although the objective data was of low quality.[5] It has been reported by a meta-analysis that physicians attained significant benefits from organizational interventions to reduce burnout, of which environmental work issues and organizational culture were viewed as significant roots. [6]

An organizational intervention such as mindfulness training was implemented by Agha Khan University Hospital. To reduce burnout, a self-directed learning course was

Correspondence
Hidaya Sayed
MBBS Student
Khyber Girls Medical College, hayatabad, Peshawar - Pakistan
Cell: +92-335-5794905
Email: hidayasayed246@gmail.com
Date Received: 27/06/2023
Date Revised: 18/10/2023
Date Accepted: 19/07/2024

developed for emergency physicians in Agha Khan University Hospital, Karachi, that comprised attainment targets on mindfulness, peer-group discussions, role-playing, and practicing introspection exercises. The purpose was to focus on mindfulness and resilience, comprehending the coping mechanisms that help reduce burnout.[7] It affects society as a whole with its impact on both doctors and patients.

The issue now lies in identifying when a doctor is experiencing burnout. Either way, it has been concluded that burnout is a significant problem in the medical field, and efforts have already been made to begin addressing, finding, and providing solutions to decrease the incidence of burnout among doctors. Physician burnout is a work-related condition that can be classified into three dimensions according to the Copenhagen Burnout Inventory (CBI), i.e., personal burnout, work-related burnout, and patient-related burnout. [2]

Burnout has a detrimental impact on patient care and the healthcare system, which is why it has generated much-pronounced attention in the fields of research and policymaking. Therefore, the study aimed to assess the frequency of burnout among final-year post-graduate trainees at Hayatabad Medical Complex, Peshawar, Pakistan. Final-year post-graduate trainees were included only as they have spent four years in training and the exposure to burnout could be pertinent.

MATERIAL AND METHODS

A cross-sectional survey design was followed in this study, conducted in Hayatabad Medical Complex, Peshawar, from May 1 to June 15, 2022, after obtaining ethical approval by Khyber Girls Medical College and MTI/HMC no. 1419 (Dated: 22.6.2023).

All final-year post-graduate trainees across all the general departments working in Hayatabad Medical Complex were included in the study. We distributed questionnaires among 140 final-year postgraduate trainees, and the response rate was 94%.

All postgraduate trainees across general departments in Hayatabad Medical Complex were included in the study. We excluded those trainees who were unavailable during the time of questionnaire distribution for various reasons, such as those who were on leave or who decided not to fill out the questionnaire. Data was collected through a questionnaire, which consisted of two sections.

The first section included a definition of burnout and information related to individuals taking part in the study. The second part included the English version of the Copenhagen Burnout Inventory (CBI-scale), which is a validated scale designed to assess the level of burnout. [8]

The CBI scale consisted of nineteen items investigating the three dimensions of burnout syndrome (Six questions for personal burnout, seven questions for work-related burnout, and six questions for client-related burnout).

Each item was rated on a five-point frequency rating scale. The three sub-scales measuring burnout syndrome were categorized according to the scoring system of the scale. Data were analyzed using IBM SPSS software package version 20. Descriptive statistics were used to find percentages and frequencies for categorical variables, while for continuous variables, means were calculated. A one-way ANOVA was used for comparison between means.

RESULTS

There were 99 participants in our study, with more male (52.5%) respondents and a mean age of 29.6 years, a range of 10 years, and a standard deviation of 2.024. This chart in figure 1 shows the distribution of postgraduate trainees across the general departments of HMC

Table 1 shows a comparison between mean scores of all three dimensions in the CBI scale where they are compared using One-way ANOVA. Work-related burnout is higher ($p = <0.001$) as compared to the personal ($p = 0.06$) and client-related burnout ($p = 0.073$). This means that physicians experience low burnout when dealing with patients while they report high burnout due to work overload.

Table 2 shows the responses of participants to each item of the CBI scale. Higher levels on all the items were associated with higher levels of Burnout Syndrome (BOS) except for a single item, i.e., item 7 on work related Burnout dimension indicating lower levels of BOS.

Table 3 shows high client-related burnout among males as compared to females. The total personal burnout and work-related burnout among females was greater as compared to males.

As shown in Table 4, the mean of total personal burnout calculated through One-way ANOVA showed the rate of burnout among trainees of oral & maxillofacial surgery (Table 4, Mean=375.00). In our study, the mean of the three dimensions showed lesser burnout among trainees in other departments.

Table No 1: Mean scores of personal burnout, work-related burnout, and client-related burnout among participants using the CBI scale

	Personal Burnout	Work-related burnout	Client-related Burnout
Mean	327.27	364.39	299.75
Standard deviation	118.078	161.746	113.305
P value	0.06	0.073	<0.001

Table No 2: Personal, work, and client-related burnout among study participants

Questions	Always (%)	Often (%)	Sometimes (%)	Seldom (%)	Never (%)
Personal burnout					
1. How often do you feel tired?	18.2	36.4	40.4	5.1	-
2. How often are you physically exhausted?	14.1	33.3	43.4	9.1	-
3. How often are you emotionally exhausted?	15.2	23.2	42.4	14.1	5.1
4. How often do you think “I cannot take it anymore”?	13.1	10.1	37.4	25.3	14.1
5. How often do you feel worn out?	7.1	19.2	41.4	23.2	9.1
6. How often do you feel weak and susceptible to illness?	7.1	17.2	37.4	30.33	8.1
Work-related burnout					
1. Is your work emotionally exhausting?	23.2	21.2	36.4	11.1	8.1
2. Do you feel burnt out because of your work?	16.2	27.3	34.3	16.2	6.1
3. Does your work frustrate you?	10.1	19.2	29.3	21.2	20.2
4. Do you feel worn out at the end of the working day?	19.2	26.3	34.3	15.2	5.1
5. Are you exhausted in the morning at the thought of another day at work?	19.2	19.2	25.3	16.2	20.2
6. Do you feel like every working hour is tiring for you?	7.1	20.2	27.3	25.3	20.2
7. Do you have enough energy for family and friends during your leisure time?	11.1	23.2	30.3	24.2	11.1
Client-related burnout					
1. Do you find it hard to work with clients?	4.0	40.4	39.4	-	16.2
2. Do you find it frustrating to work with clients?	3.0	18.2	43.4	18.2	17.2
3. Does it drain your energy to work with clients?	12.1	28.3	26.3	29.3	4.0
4. Do you feel that you give more than you get back when you work with clients?	19.2	21.2	31.3	21.2	7.1
5. Are you tired of working with clients?	8.1	15.2	44.4	17.2	15.2
6. Do you sometimes wonder how long you will be able to continue working with clients?	7.1	24.2	33.3	20.2	15.2

Table No 3: Personal, Work-related, and Client-related Burnout among males and females.

	Gender of participants	N	Mean	Std. deviation
Total personal burnout	Male	52	304.81	111.148
	Female	47	352.13	121.676
Total work-related burnout	Male	52	344.23	147.746
	Female	47	386.70	174.833
Total client-related burnout	Male	52	302.88	119.801
	Female	47	296.28	106.829

Table No 4: Mean and standard deviation of total personal burnout, work-related burnout, and client-related burnout in different departments.

	N	Mean total personal burnout	Std. Deviation	Mean total work-related burnout	Std. Deviation	Mean total client-related burnout	Std. Deviation
Surgery	14	267.86	80.520	325.00	120.894	276.79	108.071
Medicine	16	284.38	82.095	307.81	155.916	318.75	132.759
Gynecology	19	373.68	107.197	489.47	129.721	343.42	114.571
Pediatrics	14	364.29	151.186	394.64	154.478	298.20	80.542
Radiology	9	372.22	97.183	388.89	103.162	319.44	58.333
ENT	5	335.00	143.178	320.00	163.363	275.00	155.129
Eye	8	371.88	100.390	356.25	202.991	337.50	106.066
Anesthesia	3	216.67	137.689	216.67	112.731	191.67	137.689
Pathology	5	200.00	39.528	140.00	45.415	165.00	97.173
Oral and maxillofacial surgery	6	375.00	141.421	412.50	174.463	275.00	101.242
Total	99	327.27	118.078	364.39	161.746	299.75	113.305

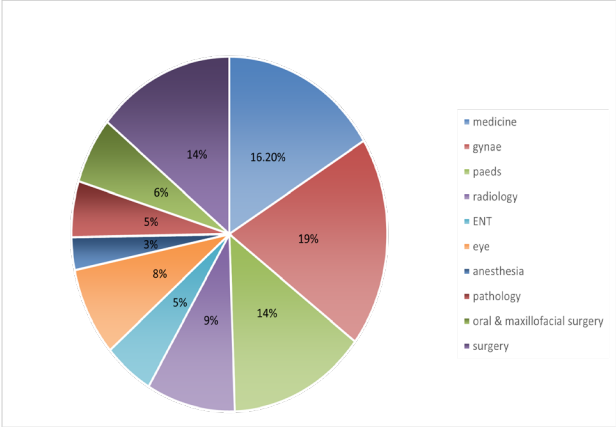

Fig 1: Age groups of breast cancer patients (n=230)

DISCUSSION

Burnout is a serious problem that mostly results from workplace stress, says the World Health Organization (WHO). In the WHO International Classification of Diseases (ICD), 11th revision, burnout is defined as a syndrome resulting from chronic workplace stress that has not been successfully managed. [9]

It reduces productivity and makes you feel downhearted, pessimistic, and deeply distrustful. This not only affects the individual but also his surroundings, like home, work, and social life. Persistent burnout makes a person more susceptible to health problems. [10] Burnout is perceived as an individual problem, and the general perception is that the solution is self-help techniques, which is not accurate.

It is a workplace phenomenon. Thus, this problem should be managed at an organizational level. In Pakistan, further research on how different risk factors lead to such a high prevalence of burnout among doctors is required. To our knowledge, this is the first study aimed at finding the frequency of postgraduate trainee burnout among all the general departments of HMC, Peshawar. Our study found that postgraduate trainees who participated in the study had high levels of burnout. The burnout rate was higher than that recorded among trainees by a study conducted in Lahore; it was 16%. [11]

This may be explained by increased job strain, increased schedule time for work, and patient overload. Self-awareness is essential to seeking help, and it may prove helpful in many ways. [12] Our study showed high levels of burnout among males as compared to females. Many other studies [2, 11-13] using the Copenhagen Burnout Inventory scale showed that females are more at risk than males for personal burnout. This is because females are more likely to head single-parent families, take responsibility for the upbringing of children, make time for household chores, and lack support from family. Another study that was conducted in Kerala, India, showed no significant gender-based difference,[14] which is contrary to our study.

Our study showed that the mean calculated through the T-test demonstrated greater total client-related burnout in males as compared to females. The mean of total personal burnout calculated through one-way ANOVA showed a greater rate of burnout among trainees in oral and maxillofacial surgery. However, a study conducted in the United States to find out whether burnout exists in oral and maxillofacial surgery lines showed

that those surgeons were not at risk for burnout, which is contrary to the findings. [15] This may be due to the limited number of participants in our study. The mean of total work-related burnout and total client-related burnout were greater among trainees in the gynecology department.

A study conducted in Romania aimed to determine the existence and factors responsible for burnout syndrome in this particular medical field. They found that long duty hours per week are a crucial factor in burnout in the gynecology department. [16] Our study shows overall high levels of work-related burnout.

A study conducted in Kerala, India, showed a lower prevalence of work-related burnout. [14] It showed that less inclination towards carrier choice, disinterest in decision-making, and rotation in different departments may be the causes of high work-related burnout in our study. In our study, the mean of all three dimensions showed lesser burnout among trainees in the pathology department (mean total personal burnout = 200, total work-related burnout = 140, and total client-related burnout = 165).

Ratnakaran et al. showed in their study that different departments demonstrated variation in burnout, which was related to the different working environments and various challenges they faced in their respective fields. Among the residents, neurosurgery and neuro-medicine residents had the least prevalence of burnout in all three dimensions. [14] Favorable identity status and work engagement may be the reasons for the low burnout rate observed in certain departments.

CONCLUSIONS

Medical professionals are exposed to many job stressors every day, making them vulnerable to burnout. Our study findings showed that there is a severe burnout rate among trainees at Hayatabad Medical Complex, Peshawar. The majority of them reported high personal and work-related burnout, which showed that there is high exhaustion among trainees. In this regard, there should be an active awareness of burnout syndrome among doctors.

It is an issue of special concern, and an effort should be made to improve doctors' health and reduce stress within the workplace. We would recommend that healthcare employees' mental health be assessed, with healthcare organizations providing need-based interventions. There is a need for support groups and destressing techniques like healthy physical activities. Policymakers need to be informed about the issue and recommend relevant burnout prevention for doctors.

REFERENCES

1. Romani M, Ashkar K. Burnout among physicians. Libyan J. Med. Sci. 2014 Feb 17;9:10.
2. Ng APP, Chin WY, Wan EYF, Chen J, Lau CS. Prevalence and severity of burnout in Hong Kong doctors up to 20 years post-graduation: a cross-sectional study. BMJ Open. 2020 Oct 1;10(10).
3. Rothenberger DA. Physician Burnout and Well-Being: A Systematic Review and Framework for Action. DIS COLON RECTUM. 2017 Jun;60(6):567–76.
4. Patel RS, Bachu R, Adikey A, Malik M, Shah M. Factors Related to Physician Burnout and Its Consequences: A Review. Behav. Sci.. 2018 Oct 25;8(11):98.
5. Yates SW. Physician Stress and Burnout. Am J Med. 2020 Feb 1;133(2):160-4.
6. De Simone S, Vargas M, Servillo G. Organizational strategies to reduce physician burnout: a systematic review and meta-analysis. Aging Clin. Exp. Res.. 2021 Apr;33(4):883–94.
7. Salahuddin SM, Waheed S. Mindfulness in the Emergency Department (MED): An Asynchronous Learning Course to Practise Mindfulness and Resilience in the Emergency Room of Low Resource Setting. J. Coll. Physicians Surg. Pak. 2021 Oct;31(10):1242–3.
8. Barton MA, Lall MD, Johnston MM, Lu DW, Nelson LS, Bilimoria KY, Reisdorff EJ. Reliability and validity support for an abbreviated Copenhagen burnout inventory using exploratory and confirmatory factor analysis. Am. J. Emerg. Med. 2022 Aug 8;3(4).
9. Adebayo O, Kanmodi K, Olaopa O, Fagbule OF, Adufe I, Adebayo AM, Oduyemi I, Amoo A, Omololu A, Igbokwe M, Babalola R. Strategies for mitigating burnout among early career doctors in Nigeria: lessons learned from the qualitative CHARTING study. Global Psychiatry. 2020 Oct 22;3(1):97-103.
10. Maslach C, Leiter MP. Understanding the burnout experience: recent research and its implication for psychiatry. World Psychiatry. 2016 Jun;15(2):103-11.
11. Ahmad W, Ashraf H, Talat A, Khan AA, Baig, AA, Zia I, Sarfaraz Z, Hifsa S, Tahir M, Sadiq U, Imtiaz H. Association of burnout with doctor-patient relationship and common stressors among postgraduate trainees and house officers in Lahore-a cross-sectional study. PeerJ. 2018

Sep 10;6.

12. Rickwood D, Deane FP, Wilson CJ, Ciarrochi J. Young People's Help-Seeking for Mental Health Problems. Australian e-Journal for the Advancement of Mental Health. 2005 Jan 1;4(3):218-58.

13. Bagaajav A, Myagmarjav S, Nanjid K, Otgon S, Chae Y M. Burnout and Job Stress among Mongolian Doctors and Nurses. Ind. Health Rev. 2011 Aug 1;49(5):582–88.

14. Ratnakaran B, Prabhakaran A, Karunakaran V. Prevalence of burnout and its correlates among residents in a tertiary medical center in Kerala, India: A cross-sectional study. J. Postgrad. Med. 2016 Jun 20;62(3):157-61.

15. Milder MJ, Roser SM, Austin TM, Abramowicz S. Does Burnout Exist in Academic Oral and Maxillofacial Surgery in the United States? J. Oral Maxillofac. Surg. 2021 Aug 1;79(8):1602–10.

16. Iorga M, Socolov V, Muraru D, Dirtu C, Soponaru C, Ilea C. Factors Influencing Burnout Syndrome in Obstetrics and Gynecology Physicians. Biomed Res. Int.2017 Dec 5:1-10.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Gohar M	✓	×	✓	×	✓	×
Sayed H	✓	✓	×	✓	✓	×
Ayaz H	×	✓	×	×	✓	×
Tariq G	✓	✓	✓	×	✓	✓
Shahid M	✓	×	✓	×	✓	×
Anwar M	✓	✓	×	✓	✓	×
Fatima N	×	✓	×	×	✓	×
khan T	✓	✓	✓	×	✓	✓

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Committe of Hayatabad Medical Complex, Peshawar. Vide No. 1419. Dated: 22 06 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

ATTRIBUTES OF EVIDENCE-BASED PRACTICE DEMONSTRATED BY POSTGRADUATE RESIDENTS IN TERTIARY CARE HOSPITALS, KHYBER PAKHTUNKHWA

Hajra Imtiaz[1], Usman Mahboob[2], Naheed Mahsood[3], Brekhna Jamil[4], Humera Gabeen[5], Tilal Ahmad Raza[6]

[1]Department of Dermatology, Mercy Teaching Hospital, Peshawar - Pakistan

[2]Health Professions Education & Research (IHPER), Khyber Medical University, Peshawar - Pakistan

[3]Department of Medical Education, Khyber Girls Medical College, Peshawar - Pakistan

[4]Health Professions Education & Research (IHPER), Khyber Medical University, Peshawar - Pakistan

[5]Lecturer Saidu Medical College, Swat - Pakistan

[6]Department of General Surgery, Hayatabad Medical Complex, Peshawar - Pakistan

ABSTRACT

Objective: This study is designed to identify the attributes of Evidence-Based Practice demonstrated by postgraduate residents in tertiary care hospitals in KPK, Pakistan.

Material and Methods: A cross-sectional study was conducted at tertiary care government hospitals in the Khyber Pakhtunkhwa (KPK) province from March to August 2023. To achieve a 95% confidence level with a margin of error of 5%, the study aimed to collect data from a sample of 301 participants. This sample size was determined based on the assumption that the expected proportion of the population with the characteristic of interest is 31%. The instrument to assess healthcare professionals 'perceptions, behavior, self-efficacy, and attitudes toward evidence-based health

Practice (I-SABE) was used to collect data, and SPSS version 23 was used for data analysis.

Results: Nearly half, or 48.4% (152 respondents), of the overall sampled population identified as male. This is a little higher than the percentage of women, which was 38.9% (122), with the majority in their second residence year 29.6% (93 respondents). With an average age of 34, the three main specialties represented were medicine, surgery, and gynecology. Self-efficacy, attitude, behavior, and patient care outcome scores of 24.22, 14.35, 30.07, and 24.49 on average were reported by residents, showing a modest level of confidence in their EBP skills. Confidence intervals and clinical trial measures were unclear to 42% (132) of respondents. Insufficient data (8.9% or 28 respondents) and problems with resource availability and time restrictions (14.3% or 45) were obstacles to the deployment of EBPs. Despite widespread support for medical research methods, consistent implementation was absent. Residents' confidence grew as training continued, with little significant gender difference in self-efficacy scores. Increased confidence correlated with improved behavior.

Conclusion: Although medical research techniques are generally appreciated, their consistent implementation remains a challenge. The adoption of evidence-based practices (EBP) faces various obstacles, including limited resources and knowledge gaps. As residents progress through their program, their confidence and use of EBP concepts increase.

Key words Evidence-based Practice, postgraduate residents, tertiary care hospital.

This article may be cited as: Imtiaz H, Mahboob U, Mahsood N, Jamil B, Gabeen H, Raza TA. Attributes Of Evidence-Based Practice Demonstrated By Postgraduate Residents In Tertiary Care Hospitals, Khyber Pakhtunkhwa. J Med Sci 2024 July-September;32(3):232-237

Correspondence
Dr. Naheed Mahsood
Associate Professor
Department of Medical Education, Khyber Girls Medical College, Peshawar - Pakistan
Cell: +92-345-9405286
Email: drnaheed1@gmail.com
Date Received: 09/01/2024
Date Revised: 19/05/2024
Date Accepted: 04/09/2024

INTRODUCTION

Evidence-based practice, often abbreviated as EBP, is a methodology that is increasingly important in various fields, including healthcare and education. [1] EBP provides a structured process for making decisions and solving problems in today's information-rich and complex world. Evidence-Based Practice (EBP) is considered a vital component for improving healthcare outcomes and en-

suring their sustainability. [2, 3] Healthcare professionals who are involved in patient care must possess the key competency of Evidence-Based Practice. [4] This is a process that enables health professionals, policymakers, patients, and researchers to make informed decisions about health in any given context. It involves incorporating the best available evidence, along with clinical expertise and patient values and preferences. [5] Evidence-based practice (EBP) is a strategy that takes into account the latest research findings and the knowledge and preferences of individuals and communities in a specific setting. This approach not only ensures informed and effective practice but also promotes a dynamic interplay between research, clinical wisdom, and the values of patients or other stakeholders. As there is an increasing demand for transparency, accountability, and patient-centered care, EBP has become more important than ever before. Despite increasing efforts to promote and implement Evidence-Based Practice (EBP), healthcare practitioners are still not using it widely. [8] The understanding of EBP in theory and its practical execution differ greatly. This gap has been observed in various healthcare settings through different studies. [9-12] Bridging this gap is crucial to ensure clinical decisions are based on the best available evidence.

This research is motivated by the notion that implementing Evidence-Based Practice (EBP) effectively is important for providing high-quality healthcare. EBP has been widely recognized as significant, but there is a lack of research on its application in the healthcare system of KPK. This study aims to fill this knowledge gap by conducting a thorough assessment of EBP among healthcare practitioners, especially postgraduate residency students. The results of this study can pave the way for further research on implementing evidence-based practices among resident doctors in tertiary care hospital.

MATERIAL AND METHODS

A cross-sectional study was conducted from March to August 2023 at tertiary care government hospitals located in the province of Khyber Pakhtunkhwa (KPK). Ethical approval was obtained from the Ethics Committee of the Institute of Health Professions Education & Research Khyber Medical University, (Ref No: 1-11/IHPER/MHPE/KMU/23-57).

To achieve a 95% confidence level with a margin of error of 5%, A sample size of 301 was calculated using Open Epi software. The expected population proportion was 31%. [25] The tool used for the study was an Instrument for assessing healthcare professionals' perceptions, behavior, self-efficacy, and attitudes towards evidence-based health practice (I-SABE) which is a validated and reliable tool developed to assess the use of EBP by Brazilian medical practitioners. [23] The items in the questionnaire can be classified into several groups. The primary focus of items 1-5 and 6-8 pertains to the examination of self-efficacy and attitudes towards evidence-based practice (EBP). Concurrently, questions 9-15 and 16-20 are designed to collect data about the actions demonstrated by participants concerning evidence-based practice (EBP) and their beliefs regarding its advantages for patients.

The data was initially entered into a Microsoft Excel spreadsheet and then exported for analysis. The data were analyzed using the statistical software SPSS version 23. ANOVA test was utilized to assess the variation in self-efficacy across residents' years of residency. A P-value less than 0.05 was taken as significant.

RESULTS

Approximately 8.4% of the sampled population were male and about 38.9% were female. The self-efficacy score of around 24.22 indicates that the postgraduate residents at KPK hospitals have a moderate level of self-confidence in their competence to perform activities associated with evidence-based practice (EBP). The standard deviation of 4.13 suggests that there is a certain degree of variation in the self-efficacy ratings among the residents. The range of self-efficacy ratings among the residents, which is from 6 to 29, indicates a wide variation in their perceived ability to perform tasks and achieve desired outcomes. Similarly, the average attitude score of around 14.36 indicates that, on average, postgraduate residents at KPK hospitals have a fairly positive attitude towards evidence-based practice (EBP). The standard deviation of 2.76 suggests that there is variability in the sentiments among the people. The range of attitudes observed among the residents, which spans from 3 to 18, signifies a notable variation. The mean behavior score of approximately 30.08 suggests that, on average, postgraduate residents exhibit specific behaviors related to EBP. The standard deviation of 7.39 indicates a significant level of variability in the reported EBP-related behaviors among the residents. The range of reported behaviors, which spans from 7 to 42, highlights the considerable variability within the dataset. Finally, the average score for achieving patient care outcomes using EBP principles is around 24.49, which indicates that, overall, residents are capable of efficiently implementing EBP in their patient care. However, the standard deviation of 4.44 and a range of 5 to 30 highlight the diversity in these outcomes among the residents.

Postgraduate residents at KP tertiary care facilities differ in research and statistical knowledge for evidence-based practice. The wrong answer was given by 21.7%, whereas 64.3% understood observational studies and randomized controlled trials in treatment effectiveness as shown in Table 2.

The study conducted in KPK's tertiary care institutions highlighted varying levels of expertise among graduate residents regarding statistical concepts and research methodologies related to evidence-based practice (EBP). While most understood concepts like observational studies and randomized controlled trials, a significant portion struggled with confidence intervals and clinical trial treat-

ment numbers. Several barriers to EBP adoption were identified, including insufficient data, resource accessibility issues, lack of institutional support, and time constraints.

Despite agreeing with the importance of using medical research processes, many residents did not regularly implement them, indicating a gap in comprehension and application of EBP principles, particularly in systematic reviews. The study also examined the utilization of EBP platforms, noting varying levels of familiarity with platforms like Up-to-Date, Pubmed, Trip Database, BMJ Best Practice, and NICE Clinical Guidelines. Additionally, common resources mentioned included Google Scholar, Scopus, and Medline.

Furthermore, the research found that residents' confidence levels increased with more time spent in training, indicating a positive correlation between training duration and self-efficacy. Interestingly, there was no statistically significant difference in self-efficacy scores between male and female trainees, suggesting comparable levels of confidence regardless of gender. Additionally, trainees' behavior improved as their confidence grew, supported by strong evidence of this association. Residents' self-efficacy in EBP activities increases as they train. This is evidenced by a progressive increase in mean scores across residency years: first year (23.09 ± 4.01), second year (24.47 ± 3.96), third year (25.24 ± 4.48), and fourth year (25.65 ± 3.99). The F-statistic value of 4.97, with a significance threshold of $p < 0.01$, indicates substantial variations in self-efficacy ratings between residency years this research demonstrates that residents' self-efficacy in EBP activities increases as they train.

Table 5 shows a comparison between male and female postgraduate trainees on the Self-efficacy Scale (N = 314). The t-statistic (-0.60) suggests a possible difference between the groups, but the p-value (0.11) is greater than the conventional cutoff of 0.05. Therefore, we fail to reject the null hypothesis. There is not enough evidence to conclude a statistically significant difference at the 0.05 level.

DISCUSSION

Evidence-based practice (EBP) involves the transmission of knowledge between different generations of residents. Experienced residents teach younger ones how to apply EBP techniques, while younger residents can help senior residents stay up to date with the latest research methodology. Collaboration between different generations can lead to the development of EBP techniques that integrate both clinical experience and new scientific discoveries. To ensure effective EBP implementation, it is important to have a diverse range of experiences among the residents. EBP concepts and methods should be taught at different stages that are appropriate for each resident's experience level. The training must not be too simple for experts or too complicated for beginners. Moreover, facilitating collaborative learning among residents in the same training year can be beneficial. Peer-to-peer support can help residents learn EBP and discuss their training. It is crucial to tailor EBP training to each specialization. Collaborating with people from other professions is also important for successful EBP implementation. Doc-

Table No 1: Descriptive Statistics of Self-efficacy, Attitude, Behavior, and Results

Sub-Scale	N	M	S.D	Range
Self-Efficacy	314	24.21	4.13	29-6
Attitude	314	14.35	2.76	18-3
Behavior	314	30.07	7.38	42-7
Patient care	314	24.49	4.44	30-5

Table No 2: Responses to the Items of Knowledge/skill

S. No	Items	correct		I don't know		Incorrect	
		f	%	f	%	f	%
1	Effectiveness of a treatment	202	64.3	44	14	68	21.7
2	Publication bias in a meta-analysis represents selection bias.	201	64	76	24.2	37	11.9
3	Randomization in a clinical trial helps to reduce sample size.	297	62.7	54	17.2	63	20.1
4	Cross-sectional studies are the best designs to assess prognostic factors.	192	61.1	63	20.1	59	18.8
5	A recent randomized clinical trial found that 29% of diabetics with coronary needed to treat to prevent a recurrent event is 12.5	132	42	138	48.9	44	14
6	The recent HERS study compared women using estrogen replacement hormone versus that encompasses 2.89 and includes the 1.0 within the interval.	133	42.4	146	46.5	35	11.1

Table No 3: Evaluates residents' knowledge of EBP terminology

Items	correct		I don't know		Incorrect	
	f	%	f	%	f	%
Systematic review	175	55.7	41	13.1	98	31.2
Meta-analysis	124	39.5	82	26.1	108	34.4
Confidence interval	131	41.7	78	24.8	105	33.5
Grade	122	38.9	111	35.4	81	25.8
Odds ratio, Relative risk, Absolute risk	123	39.2	87	27.7	104	33.1
Number of patients needed to treat (NNT)	120	38.2	94	29.9	100	31.9
Likelihood ratio	102	32.5	110	35	102	32.5

Table No 4: ANOVA in self-efficacy across residents' years of residency

Measure	Year of residency of participants								F	p-value
	1st year		2nd year		3rd year		4th year			
	M	SD	M	SD	M	SD	M	SD		
Self-efficacy	23.09	4.01	24.47	3.96	25.24	4.48	25.65	3.99	4.97	<0.01

$p < 0.01$.

tors from different domains are more likely to collaborate and use EBP to handle complex patient problems when they work together. Trainees who work on EBP projects and discuss cases with individuals from diverse professions can benefit both patients and EBP.

A study conducted in Cuenca, Ecuador highlighted that physicians at José Carrasco Urteaga Hospital frequently use evidence-based medicine (EBM) strategies to address clinical queries. [13] A study from Mexico found that pediatric residents are favorable towards implementing evidence-based medicine (EBM). The healthcare field is complex and diverse, with a wide range of specializations, which require customized approaches to EBM. [14] This study, done in Pakistan's Khyber Pakhtunkhwa region, adds to that information. Even though both studies suggest residents might be open to EBM, the way healthcare works and how residents are trained in Pakistan might affect their experiences with EBM. This highlights the idea that EBM needs to be adjusted to work well in different places. [14] Different medical fields have their unique requirements and challenges when it comes to evidence-based practice (EBP). As a result, it is essential to customize EBP training to meet the specific needs of each specialization. Moreover, the integration of multiple disciplines is a crucial aspect of EBP. [15] The presence of residents from different specialties in a hospital environment encourages interdisciplinary communication and facilitates the use of evidence-based practice (EBP) in managing complex patient situations. Encouraging the active participation of residents in EBP initiatives and promoting multidisciplinary case discussions fosters a comprehensive approach to patient care and promotes effective treatment outcomes. [16]

The presence of a reasonable level of self-efficacy among postgraduate residents in hospitals located in the Khyber Pakhtunkhwa (KPK) province is a positive indication of their readiness to engage in evidence-based practice (EBP). Self-efficacy plays a crucial role in encouraging individuals to adopt EBP principles, as it reflects their confidence in their ability to perform tasks associated with EBP. However, it also highlights the potential for further expansion and improvement in their EBP competencies. A study evaluated research self-efficacy among physicians working in Qatari primary healthcare facilities and examined its determinants. The study discovered that many primary care doctors in Qatar lacked sufficient self-efficacy in their research abilities. [17]

The postgraduate residents show a moderate level of support for evidence-based practice (EBP), indicating that they recognize its importance in clinical decision-making and patient care. In this study, KPK residents had positive attitudes toward EBP that were comparable to those of their peers in the United Kingdom, Wuhan Germany France, and Switzerland. [18, 19, 20] Although there is a general positive attitude towards evidence-based practice (EBP), there is scope for improvement and consistency in attitudes. This is evident from the significant range and variability in attitude ratings. Similar results have been observed at the Loayza and Almenara National Hospitals in Lima. While most internists, specialists, and students had a positive outlook toward EBM, they also believed that it was not widely known among professionals, making it challenging to use. [21]

Postgraduate residents show a basic level of engagement in evidence-based practice (EBP)-related activities, which is a positive sign. However, the significant variation in documented behaviors highlights the need for tailored interventions to promote more consistent participation in EBP initiatives. For EBP to become more widespread and impactful across various care settings, it must be used consistently and in a coordinated manner. [22]

The study findings resonate strongly with recommendations from Gallagher-Ford et al. and Sackett et al. regarding enhancing evidence-based practice (EBP) adoption in KPK's tertiary care settings. It identifies knowledge gaps among postgraduate residents in research

methodology and statistical concepts, emphasizing the need to address these for evidence-based clinical decision-making, as suggested by Sackett et al. [24] Moreover, the study's emphasis on personalized training, collaborative learning, and curricular integration reflects strategies advocated by Gallagher-Ford et al. for bolstering EBP in postgraduate healthcare education. The discussion also stresses the importance of awareness campaigns for EBP platforms and a shift in institutional frameworks, echoing the need for robust support structures highlighted by both sets of authors. Without adequate resources and recognition, the integration of EBP principles may encounter significant barriers. [2]

It is important to note that the findings of this study, which was conducted in the KPK region, may not apply to other countries or regions with distinct healthcare systems or educational backgrounds. Furthermore, the study's results may not accurately reflect the diverse experiences and activities of all postgraduate residents in the area due to the sample size being limited. Additionally, the cross-sectional methodology employed in the study only allowed for data to be collected at a particular point in time, which may not capture any subsequent changes or advancements in the occupants' evidence-based practice (EBP) characteristics.

CONCLUSION

Attributes of evidence-based practice (EBP) as displayed by postgraduate residents in tertiary care institutions are thoroughly examined in this thesis, which concludes. The results demonstrate the different levels of EBP acceptance and comprehension among residents, highlighting both areas that can use improvement and those that do. Even though many residents demonstrated admirable skills in some areas of EBP, there were glaring gaps in their understanding and use of those concepts in other areas. The study underlines the crucial role that ongoing education, mentoring, and institutional support have in creating a culture where EBP is given top priority. Making sure postgraduate residents have the skills and knowledge necessary to implement EBP is crucial as healthcare continues to change.

REFERENCES

1. Gannon TA, Ward T. Where has all the psychology gone?: A critical review of evidence-based psychological practice in correctional settings. Aggression and Violent Behavior. 2014 Jul 1;19(4):435-46.
2. Saunders H, Gallagher-Ford L, Kvist T, Vehviläinen-Julkunen K. Practicing healthcare professionals' evidence-based practice competencies: An overview of systematic reviews. Worldviews on Evidence-Based Nursing. 2019 Jun;16(3):176-85.
3. Alabdullah, M.N., Alabdullah, H. & Kamel, S. Knowledge, attitude, and practice of evidence-based medicine among resident physicians in hospitals of Syria: a cross-sectional study. BMC Med Educ 22, 785 (2022). https://doi.org/10.1186/s12909-022-03840-7
4. Albarqouni L, Hoffmann T, Straus S, Olsen NR, Young T, Ilic D, Shaneyfelt T, Haynes RB, Guyatt G, Glasziou P. Core Competencies in Evidence-Based Practice for Health Professionals: Consensus Statement Based on a Systematic Review and Delphi Survey. JAMA Netw Open. 2018 Jun 1;1(2):180281. doi: 10.1001/jamanetworkopen.2018.0281.
5. ALruwaili, B.F.; Thirunavukkarasu, A.; Alsaidan, A.A.; AL-Ruwaili, A.M.; Alanazi, R.B.S.; Alruwaili, A.M.B.; Alruwaili, A.O.; Altaymani, A.M. Knowledge, Attitude, and Practice towards Evidence-Based Medicine among Northern Saudi Primary Care Physicians: A Cross-Sectional Study. Healthcare 2022, 10, 2285. https://doi.org/10.3390/healthcare10112285
6. Abdel-Kareem A, Kabbash I, Saied S, Al-Deeb A. Knowledge, practices and attitudes of physicians towards evidencebased medicine in Egypt. East Mediterr Health J. 2019 Mar 19;25(2):82-89. doi: 10.26719/emhj.18.010. PMID: 30942471.
7. Al-Kubaisi NJ, Al-Dahnaim LA, Salama RE. Knowledge, attitudes and practices of primary health care physicians towards evidence-based medicine in Doha, Qatar. East Mediterr Health J. 2010 Nov;16(11):1189-97. PMID: 21218744.
8. Bello S, Ajayi DT, Bamgboye EA, Mpama EA. Is evidence-based medicine a mirage in resource-constrained settings? A survey among resident doctors in selected teaching hospitals in Nigeria. J Evid Based Med. 2020 Feb;13(1):17-24. doi: 10.1111/jebm.12374
9. ussières AE, Terhorst L, Leach M, Stuber K, Evans R, Schneider MJ. Self-reported attitudes, skills and use of evidence-based practice among Canadian doctors of chiropractic: a national survey. J Can Chiropr Assoc. 2015 Dec;59(4):332-48. PMID: 26816412'
10. Capraş, RD., Bulboacă, A.E. & Bolboacă, S.D. Evidence-based medicine self-assessment, knowledge, and integration into daily practice: a survey among Romanian physicians and comparison between trainees and specialists. BMC Med Educ 20, 19 (2020). https://doi.org/10.1186/s12909-020-1933-z
11. Connor L, Dean J, McNett M, Tydings DM, Shrout A, Gorsuch PF, Hole A, Moore L, Brown R, Melnyk BM, Gallagher-Ford L. Evidence-based practice improves patient outcomes and healthcare system return on investment: Findings from a scoping review. Worldviews Evid Based Nurs. 2023 Feb;20(1):6-15. doi: 10.1111/wvn.12621. Epub 2023 Feb 8. PMID: 36751881.
12. Novack L, Jotkowitz A, Knyazer B, Novack V. Evidence-based medicine: assessment of knowledge of basic epidemiological and research methods among medical doctors. Postgrad Med J. 2006 Dec;82(974):817-22. doi: 10.1136/pgmj.2006.049262. PMID: 17148706; PMCID: PMC2653930.
13. Hong J, Chen J. Clinical Physicians' Attitudes towards Evidence-Based Medicine (EBM) and Their Evidence-Based Practice (EBP) in Wuhan, China. Int J Environ Res Public Health. 2019 Oct 7;16(19):3758. doi: 10.3390/ijerph16193758.
14. Hitch D, Nicola-Richmond K. Instructional practices for evidence-based practice with pre-registration allied health students: a review of recent research and developments. Adv Health Sci Educ Theory Pract. 2017 Oct;22(4):1031-1045. doi: 10.1007/s10459-016-9702-9.
15. Moosavi A, Sadeghpour A, Azami-Aghdash S, Derakhshani N, Mohseni M, Jafarzadeh D, Rezapour A. Evidence-based medicine among health-care workers in hospitals in Iran: A nationwide survey. J Educ Health Promot. 2020 Dec 29;9:365. doi: 10.4103/jehp.jehp_335_20.

16. Bello S, Ajayi DT, Bamgboye EA, Mpama EA. Is evidence-based medicine a mirage in resource-constrained settings? A survey among resident doctors in selected teaching hospitals in Nigeria. J Evid Based Med. 2020 Feb;13(1):17-24.

17. Connor L, Dean J, McNett M, Tydings DM, Shrout A, Gorsuch PF, Hole A, Moore L, Brown R, Melnyk BM, Gallagher-Ford L. Evidence-based practice improves patient outcomes and healthcare system return on investment: Findings from a scoping review. Worldviews Evid Based Nurs. 2023 Feb;20(1):6-15. doi: 10.1111/wvn.12621.

18. Ahmad Ghaus MG, Tuan Kamauzaman TH, Norhayati MN. Knowledge, Attitude, and Practice of Evidence-Based Medicine among Emergency Doctors in Kelantan, Malaysia. Int J Environ Res Public Health. 2021 Oct 27;18(21):11297. doi: 10.3390/ijerph182111297.

19. Unadkat, M.B., Mbuba, C.K., Ngugi, A.K. et al. Self-reported knowledge, attitudes, practices and barriers in use of evidence-based medicine among resident physicians in Kenya: a mixed methods study. BMC Med Educ 21, 537 (2021). https://doi.org/10.1186/s12909-021-02974-4

20. Unadkat, M. B., Mbuba, C. K., Ngugi, A. K., & Kamya, D. (2021). Self-reported knowledge, attitudes, practices and barriers in use of evidence-based medicine among resident physicians in Kenya: a mixed methods study. BMC Medical Education, 21(537)

21. Nalweyiso DI, Kabanda J, Mubuuke AG, Sanderson K, Nnyanzi LA. Knowledge, attitudes and practices towards evidence based practice: a survey amongst radiographers. Radiography. 2019 Nov 1;25(4):327-32.

22. Alakhras M, Al-Mousa DS, Al Mohammad B, Spuur KM. Knowledge, attitude, understanding and implementation of evidence-based practice among Jordanian radiographers. Radiography. 2023 Jul 1;29(4):760-6

23. Ruano AS, Motter FR, Lopes LC. Design and validity of an instrument to assess healthcare professionals Perceptions, behaviour, self-efficacy and attitudes towards evidence-based health practice: I-SABE. BMJ Open. 2022 Apr 1;12(4):e052767

24. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. BMJ. 1996 Jan 13;312(7023):71-72.

25. Cunningham CT, Quan H, et al. Exploring physician specialist response rates to web-based surveys. BMC Med Res Methodol. 2015;15:32.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Imtiaz H	✓	×	✓	×	✓	×
Mahboob U	✓	✓	×	✓	✓	×
Mahsood N	×	✓	×	×	✓	×
Jamil B	✓	✓	✓	×	✓	✓
Gabeen H	✓	✓	×	✓	✓	×
Raza TA	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of IHPER Khyber Medical University, Peshawar. Vide No. 1-11/ IHPER/MHPE/KMU/23-57. Dated: 31 10 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

BACTERIOLOGICAL PROFILE AND ANTIBIOGRAM OF BLOOD CULTURE ISOLATES IN TERTIARY CARE HOSPITAL IN ISLAMABAD

Shazia Tariq[1], Naima Tariq[2], Asim Ali Shah[3], Palwasha Amin[4], Haroon Tariq[5]

[1]Department of Microbiology, Gajju Khan Medical College, Peshawar - Pakistan

[2]Junior House Officer, Hayatabad Medical Complex Hospital, Peshawar - Pakistan

[3] Department of Microbiology, Gajju Khan Medical College, Swabi - Pakistan

[4]Senior House Officer, Hayatabad Medical Complex Hospital, Peshawar - Pakistan

[5]Final Year MBBS Student, Northwest School of Medicine, Peshawar - Pakistan

ABSTRACT

Objectives

1. To determine the etiological profile of suspected cases of bacteremia

2. To establish the antibiotic susceptibility pattern of bacterial isolates

Materials and Methods: The retrospective study was carried out from January 2022 to December 2022 at Islamabad International Hospital. A total of 639 blood culture isolates were processed manually onto blood agar, chocolate agar, MacConkey's agar, and bile-esculin agar and were identified on their morphological appearance using gram staining. Isolates were further identified at the species level using the Analytic Profile Index (API). Antibiotic susceptibility testing was performed using the Disk Diffusion method as per Clinical and Laboratory Standards Institute guidelines (M-100 Version 2021)

Results: Amongst 639 blood culture isolates, only 66 (10.32%) were culture-positive. Prevalent gram-negative bacilli included Salmonella typhi (n= 19) and Escherichia coli (n= 8) whilst Enterococcus (n=4), and Staphylococcus aureus (n=4) were the predominant gram-positive cocci. Salmonella typhi and S. aureus showed 100% resistance to ciprofloxacin whilst enterococcus displayed 75% resistance. Overall, all strains (n=6) of K. pneumoniae and 63% of E. coli showed resistance to over 4 antibiotics.

Conclusion: Gram-negative bacteria were the main cause of BSIs, where the predominant microorganism was S. typhi. Remarkably all S. typhi isolates were completely resistant to ciprofloxacin.

Key Words: Bacteraemia, Blood culture, Salmonella typhi

This article may be cited as: Tariq S, Tariq N, Shah AA, Amin P, Tariq H. Bacteriological Profile and Antibiogram of Blood Culture Isolates in Tertiary Care Hospital in Islamabad. J Med Sci 2024 July-September;32(3):238-243

INTRODUCTION

Bloodstream infections (BSIs) continue to form a major part of healthcare-associated infections and are responsible for both high mortality and morbidity. [1] Any age group can be affected but infants and children are at the most risk of contracting such infections. The clinical presentation of BSI ranges from transient asymptomatic bacteremia to life-threatening septic shock. [2] The common causative agents of bacteremia are staphylococci, streptococci, and Enterobacteriaceae such as Escherichia coli, Klebsiella pneumoniae, and Salmonella typhi species. The geographical distribution of these bacteria varies with, S. typhi bacteremia being predominant in the South Asian region. [3]

Blood culture remains the gold standard in diagnosing such infections, the pathogen and its antibiotic susceptibility pattern are identified. [4] While waiting for the lab results, empirical antibiotic therapy is commenced. [5] Due to the prevalence of over-the-counter antibiotics their sequential overuse, and inadequate antibiotic stewardship programs, there has been a persistent rise in antibiotic resistance in Pakistan and other countries. [6, 7] Not only are antibiotic stewardship and efficient blood culture systems required, but regular surveillance of the antibiogram of these causative agents of that local region is also necessary for the successful management of BSIs. [8] Research

Correspondence
Naima Tariq
Junior House Officer
Hayatabad Medical Complex, Peshawar, - Pakistan
Cell: +92-334-99793030
Email: ntariq209@gmail.com
Date Received: 06/09/2023
Date Revised: 22/05/2024
Date Accepted: 19/07/2024

into antimicrobial resistance will lead to better-targeted therapy, shorter, less severe disease course, and reduced healthcare costs. [9]

This study aimed to find the local etiological profile of BSIs and the antibiogram of these isolated strains to achieve effective empirical treatment, shorten disease course, lower financial burden, and reduce antibiotic resistance development.

MATERIALS AND METHODS

This was a retrospective data review where blood culture samples were collected from patients attending in-patient and out-patient departments at the 100-bed hospital in Islamabad during the study duration from Jan 2022 to Dec 2022.

Blood samples were collected in the following amounts: 10 ml from adults and 2.5 ml from pediatric patients. A strict aseptic technique was followed throughout. These samples were inoculated immediately in blood culture bottles containing Brain Heart Infusion and thioglycollate. These blood culture bottles were manually incubated at 35-37°C for 7 days and examined twice daily for turbidity. Once growth was observed, subculture was carried out on Blood agar and Chocolate agar plates, in aerobic and anaerobic environments, and on the MacConkey agar and Bile-esulin agar plates inoculated aerobically. These were manually incubated at 35-37C for up to 48 hours and then examined for growth. The bacteria were then identified by gram staining and biochemical tests using the Analytical Profile Index strips. (API 20E bioMerieux, France).

After taking inoculums of 0.5 density (McFarland Standard), antibiotic sensitivity testing was performed, using the Kirby-Bauer disk diffusion method and incubated at 35C overnight. Salmonella species were serotyped using specific antisera for O and H-specific antigens. All established S. aureus isolates were screened for methicillin resistance using a Fox (cefoxitin) disc. The MIC to vancomycin was measured by Vitek-2 (bioMerieux system). These results were then Interpreted using Clinical Laboratory Standard Institute (CLSI) guidelines 2021. For Gram-positive bacteria the following drugs were tested: Doxycycline 30ug, Erythromycin 15ug, Gentamicin 10ug, Penicillin 10units, Ciprofloxacin 5ug, Clindamycin 2ug, Ampicillin 10ug, Cefepime 30ug , Chloramphenicol 30ug, Vancomycin 5ug, Linezolid 30ug, Azithromycin 15ug, Levofloxacin 5ug, Teicoplanin 30ug, Minocycline 30ug

For Gram-negative bacteria the following drugs were tested: Azithromycin 15ug, Ampicillin 10ug, Amoxicillin- Clavulanic acid 20/10ug, Amikacin 30ug, Cefotaxime 30ug, Ceftriaxone 30ug, Ceftazidime 30ug, Chloramphenicol 10ug, Ciprofloxacin 5ug, Cefepime 30ug, Co-trimaxazole 25ug, Gentamicin 10ug, Levofloxacin 5ug, Meropenem 10ug, Piperacillin-Tazobactum 100/10ug. Descriptive statistical analysis was performed on Microsoft Excel Tool-Pack 2023.

RESULTS

Fifty-two blood samples belonged to male patients while 28% (n=20) were to females. According to age, 36% of the samples were less than 1 year old 30% were 1-12 years of age, remaining 34% were over 12.

Out of 639 cultures, 66 (10.32%) were culture-positive. Gram-negative rods (GNR) were 69% (n =53), out of which 58% (n=42) were Enterobacterciae and 11% (n=8) were non-fermenters, and 18% (n=13) were gram-positive cocci (GPC).

Among the 50 GNR isolated, 15% were Escherichia coli, 11% were Klebsiella spp. 10% were Pseudomonas spp., 9% were Enterobacter spp., 47% were Salmonella spp. and 4% were Burkholderia and Citrobacter spp. Among 13 GPC isolates, 16% were Staphylococcus aureus 38% were Streptococcus spp., 15% were MRSA spp. and 31% were Enterococcus spp.

The two isolates of Burkholderia ssp were 100% resistant to Ampicillin, Ceftriaxone, Co-trimoxazole, and Meropenem while they had 100% susceptibility to Amikacin, Ciprofloxacin, and Piperacillin-Tazobactam [See table 1]. All isolates of S. typhi were resistant to ciprofloxacin but all were susceptible to Meropenem (24mm zone diameter). Only 5% of isolates were resistant to the cephalosporins(see Fig.1). All six isolates of Klebsiella pneumonia showed resistance to Ceftriaxone and Cefepime. Pseudomonas aeruginosa showed 100% susceptibility to Meropenem, Piperacillin-Tazobactam and Amikacin. All isolates of S. paratyphi were 100% susceptible to Ampicillin, Ceftriaxone, Chloramphenicol, and Co-trimoxazole. Enterobacter species showed 100% susceptibility to Amikacin, Gentamicin, and Piperacillin-tazobactam (see Table 1).

With regards to GPC, Staphylococcus aureus shows 100% resistance to Erythromycin, Penicillin, and Ciprofloxacin and 100% susceptibility to Doxycycline, Minocycline, and Chloramphenicol (see Fig.2). Two S. aureus isolates showed FOX resistance were identified as MRSA. All MRSA isolates showed 100% susceptibility to Gentamycin, Clindamycin and Chloramphenicol. One MRSA isolates had vancomycin MIC of >16ug/ml while the other S. aureus isolates had <2ug/ml.

Enterococcus isolates showed 75% resistance to penicillin and were susceptible to several other antibiotics. S. pneumoniae showed 50% resistance to penicillin and erythromycin but was 100% sensitive to the other antibiot-

ics (see Table 2).

Moreover, all GPC showed 100% sensitivity to chloramphenicol and vancomycin except for one MRSA which showed 50% resistance to vancomycin. MRSA isolates were completely sensitive to Gentamicin, Linezolid, and Clindamycin [see Table 2].

Finally, we calculated the prevalence of multi-drug resistance of common pathogens. A substantial portion, 37%, of the isolates showed resistance to more than 4 antibiotics while 9% were susceptible to all.

DISCUSSION

Table No 1. Antibiotic resistance profile in gram negative bacilli isolated from positive blood culture

Antibiotics	B. cepacia n=2 (3.7%)	S.typhi (35.8%) n=19	E.coli (15.1%) n=8	K. pneumoniae (11.3%) n=6	P.aeruginosa (9.4%) n=5	Enterobacter (9.4%) n=5	S.paratyphi (11.3%) n=6	Citrobacter (3.7%) n=2
Amikacin	0.0	NT	1(13.0%)	5(83.0%)	0	0	NT	0
Amoxicillin-Clavulanic acid	50.0%	NT	7(88.0%)	5(83.0%)	NT	1(20%)	NT	2(100%)
Ampicillin	2(100.0%)	4(21.0%)	7(88.0%)	NT	NT	1(20%)	0	2(100%)
Azithromycin	NT	0%	1(13.0%)	NT	NT	1(20%)	1(17%)	NT
Cefotaxime	NT	NT	2 (25.0%)	NT	NT	2(40%)	NT	NT
Ceftriaxone	2(100.0%)	1 (5.0%)	6 (75.0%)	6 (100.0%)	NT	2(40%)	0	0
Ceftazidime	0	1(5.0%)	4(50.0%)	3(50.0%)	2(40.0%)	1(20%)	NT	0
Chloramphenicol	NT	2(11.0%)	NT	NT	NT	NT	0	NT
Ciprofloxacin	0	19 (100.0%)	4(50.0%)	5(83%)	1(20%)	2(40%)	5(83%)	NT
Cefepime	0	1(5.0%)	5(63.0%)	6(100%)	1(20%)	2(40%)	NT	0
Co-trimoxazole	2(100.0%)	4(21.0%)	7(88.0%)	4(66%)	NT	2(40%)	0	NT
Gentamicin	NT	NT	3(38.0%)	2(33%)	NT	0	NT	NT
Levofloxacin	NT	NT	5(63.0%)	3(50%)	NT	1(20%)	NT	0
Meropenem	2(100.0%)	0	1(13.0%)	4(66%)	0	20%	0	NT
Piperacillin- Tazobactum	0	NT	1(13.0%)	5(83%)	0	0	NT	NT

Table No 2: Antibiotic resistance profile in gram positive cocci isolated from positive blood culture

Antibiotics	S. aureus n=2 (15.4%)	MRSA n=2 (15.4%)	S.pneumoniae n=2(15.4%)	S. Viridans n=1(7.7%)	Streptococcus spp. (Others) n=2 (15.4%)	Enterococcus n=4 (30.8%)
Doxycycline	0	1(50%)	NT	NT	0	1(25%)
Erythromycin	2(100%)	1(50%)	1(50%)	1(50%)	1(50%)	1(25%)
Gentamycin	1(50%)	0	NT	NT	0	1(25%)
Penicillin	2(100%)	1(50%)	1(50%)	0	1(50%)	1(25%)
Ciprofloxacin	2(100%)	1(50%)	NT	NT	NT	3(75%)
Clindamycin	1(50%)	0	NT	1(50%)	1(50%)	NT
Ampicillin	NT	2(100%)	NT	1(50%)	1(50%)	NT
Cefepime	NT	NT	NT	1(50%)	1(50%)	NT
Chloramphenicol	0	0	0	NT	NT	0
Vancomycin	0	1(50%)	0	0	0	0
Linezolid	0	0	NT	NT	NT	0
Azithromycin	NT	2(100%)	NT	NT	NT	0
Levofloxacin	NT	NT	NT	2(100%)	NT	NT
Teicoplanin	0	NT	NT	NT	NT	0
Minocycline	0	2(100%)	NT	NT	NT	0

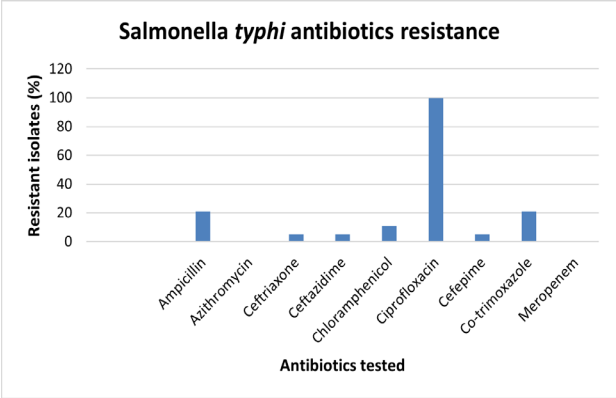

Fig 1: Salmonella typhi resistance (in %) to tested antibiotics

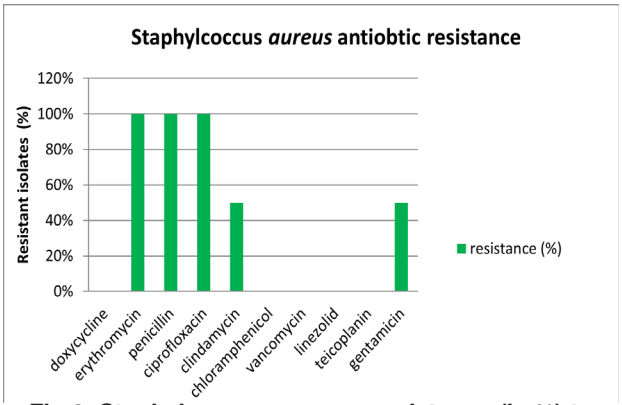

Fig 2: Staphylococcus aureus resistance (in %) to tested antibiotics

In this study, among the total positive blood cultures studied, 72% were from males and 28% were from females. Similarly, in a study done on pediatric BSIs in Pakistan, the male-to-female ratio was 64% to 36%.[10]

A higher rate of pediatric bloodstream bacterial isolation can be ascribed to the fact that the immune system of children is inadequately developed, making them most vulnerable to bacteremia and septicemia. The majority (66%) of the samples in this research were of children 12 years and under as other studies also quoted the majority of BSI samples were from children. [11,12,13]

In our study, 68% of isolates were gram-negative bacteria (GN) while 19% were Gram-positive (GP) bacteria. These figures are similar to another study that concluded GN bacteria to be the predominant cause of pediatric BSIs. [10] A study conducted in Lahore, however, had the same distribution of GP and GN: 42.95%.[10]

The predominant GN organism isolated was S. typhi (35.8%) while Enterococcus (30.8%) was the predominant GP bacteria. These pathogens, along with E. coli and Staphylococcus are frequently encountered in other studies in the South Asian region. [15] The predominance of S.typhi isolates is likely due to the endemicity of enteric fever in South Asia.

Another objective of this study was to find the antibiotic sensitivity pattern of these bacterial isolates. We found that S. typhi showed sensitivity to multiple first-line drugs, such as Ampicillin, Co-trimoxazole, Chloramphenicol as well as 3rd generation cephalosporins and Meropenem. Our study also showed that all isolates were resistant to Ciprofloxacin. Azithromycin is a last-resort antibiotic for which no resistance was found. In 2020, Iqbal et al, reported azithromycin resistant gene (acrB-R717) in S.typhi isolate in Karachi. [16] In the same year, in a study in India, the same gene was associated with azithromycin resistance. [7] In 2019, Hooda et al, in Bangladesh, reported 12 of such S. typhi strains. [18] A study in Singapore yet again detected the same gene mutation in azithromycin resistance isolates. [19] Muhammad A, et al. reported >77% ciprofloxacin resistance in Peshawar.[10] Another study reported 90% quinolone-resistance reported from regions all over the outbreak

An outbreak of Extensively drug-resistant (XDR) S. typhi was reported in Sindh in 2016. [21] In 2022, a study conducted in Lahore reported 52% of XDR-S. typhi. [12] We found that 5% of isolates were extensively drug-resistant in our study.

The second most prevalent pathogen, Enterococcus, showed 75% resistance to ciprofloxacin, and good susceptibility to other antimicrobials (see Table 2). The national systemic review also confirmed this with >73% resistance to fluoroquinolones but to tetracyclines and erythromycin –contrary to our study. [22] Fortunately, penicillins were more effective with 75% susceptibility in our study and 66% in the systemic review. There was 100% susceptibility to vancomycin compared to 10.5% in the national systemic review, and 0.6 – 29.1% in South Korea. [23]

Similarly, S. aureus showed zero resistance (see Table 2) to reserved antibiotics, such as linezolid, vancomycin, and teicoplanin, but showed considerable resistance to ciprofloxacin, erythromycin, and penicillin. The lack of hospital and laboratory antibiogram data has contributed to the indiscriminate use of these drugs and the development of resistance. [6] The figures reported in our study are consistent with those reported in other studies in Pakistan, China and South Korea. [10, 15, 23] Our study showed 100% sensitivity to doxycycline but this figure was reported to be far lower, 65%, in a Karachi study. [24] Generally, resistance to antibiotics is increasing in Pakistan; our figure for doxycycline may not be reliable due to the small sample size. [6, 10, 12, 22, 24]

Regarding methicillin-resistant S. aureus (MRSA), 50% were vancomycin-resistant (VRMRSA) but showed 100% sensitivity to linezolid. In Chi,na MRSA prevalence was 50% between 2009- 2017[1]. In Eygpt, this figure was 7.8%, although these figures are lower, they reflect a greater sample number and isolates from various body fluids rather than blood cultures alone like that of our study. [22, 25]

Another GLASS priority pathogen, E. coli, showed 23% resistance to amikacin, meropenem, and piperacillin/tazobactam whereas in China, a 20-year-old retrospective study found <10% resistance to amikacin and meropenem but <20% susceptibility to piperacillin. [6, 15] A study in India showed 72% resistance to third-generation cephalosporins whereas our study showed 25-75% resistance to 3rd and 4th generation cephalosporins.

Lastly, K. pneumoniae showed resistance to the highest number of antibiotics, with values of >83% to amikacin, penicillins, cephalosporins, and ciprofloxacin and meropenem with the least resistance, 33%, to gentamicin (see table 1). This is similar to the results of the Peshawar and Dhaka studies whereas, in China, it was found to have > 60% sensitivity to meropenem and amikacin. [3, 10] Other Pakistan-based studies have reported over 90% sensitivity to 'last-line' therapeutics like Colistin. [15, 22] Similarly, a study in India showed 98% susceptibility of K. pneumoniae to Colistin but showed high resistance to meropenem (58%), amikacin (53%), gentamicin (69%) and quinolones (76%). [20] The rise in multidrug resistance correlates with an increase in the acquisition of various resistant genes by these organisms. [22]

CONCLUSION

This study highlights that the predominant cause of BSIs was gram-negative organisms, especially Salmonella typhi, and enterococcus within GP bacteria. Both were found to be resistant against Ciprofloxacin which may no longer be deemed effective against them.

REFERENCES

1. Zhang Z, Sun Z, Tian L. Antimicrobial Resistance Among Pathogens Causing Bloodstream Infections: A Multicenter Surveillance Report Over 20 Years (1998-2017). Infect Drug Resist. 2022 Jan 25;15:249-260. doi: 10.2147/IDR.S344875. PMID: 35115793; PMCID: PMC8800585.
2. Holmes CL, Anderson MT, Mobley HL, Bachman MA. Pathogenesis of Gram-negative bacteremia. Clin. Microbiol. Rev.. 2021 Jun 16;34(2):e00234-20. doi: 10.1128/CMR.00234-20
3. Mia AR, Zerin T. Antibiogram of blood culture isolates of patients from a hospital in Dhaka, Bangladesh. Matrix Sci Med 2020;4:1-5. doi: 10.4102/ajlm.v11i1.1807
4. Verónica HA, Antonio del CPJ, Luis C-CJ, José CIM, Mario AM, Robert B, et al. Impact of Automated Blood Culture Systems on the Management of Bloodstream Infections: Results from a Crossover Diagnostic Clinical Trial. Microbiol Spectr 2022 Sep 12;10(5):e01436-22. Available from: https://doi.org/10.1128/spectrum.01436-22
5. Ahmed, D., Nahid, M. A., Sami, A. B., Halim, F., Akter, N., Sadique, T., Rana, M. S., Elahi, M. S., & Rahman, M. M. Bacterial etiology of bloodstream infections and antimicrobial resistance in Dhaka, Bangladesh, 2005–2014. Antimicrob Resist Infect Control, 6(2) (2017). https://doi.org/10.1186/s13756-016-0162-z
6. Saeed, D.K., Farooqi, J., Shakoor, S. et al. Antimicrobial resistance among GLASS priority pathogens from Pakistan: 2006–2018. BMC Infect Dis 21, 1231 (2021). https://doi.org/10.1186/s12879-021-06795-0
7. Chokshi A, Sifri Z, Cennimo D, Horng H. Global Contributors to Antibiotic Resistance. J Glob Infect Dis. 2019 Jan-Mar;11(1):36-42. doi: 10.4103/jgid.jgid_110_18. Erratum in: J Glob Infect Dis. 2019 Jul-Sep;11(3):131. PMID: 30814834; PMCID: PMC6380099.
8. Uddin TM, Chakraborty AJ, Khusro A, Zidan BR, Mitra S, Emran TB, Dhama K, Ripon MK, Gajdács M, Sahibzada MU, Hossain MJ. Antibiotic resistance in microbes: History, mechanisms, therapeutic strategies, and prospects. J. Infect. Public Health. 2021 Dec 1;14(12):1750-66. doi: 10.1016/j.jiph.2021.10.020.
9. Ahmad M, Khan AU. GlobalThe globalmic impact of antibiotic resistance: A review. Antimicrob. Resist. Infect. Control. 2019 Dec 1;19:313-6. doi: 10.1016/j.jgar.2019.05.024.
10. Muhammad A, Khan SN, Jamal T, Haq IU, Jabbar A, Ihsan AN. Bacterial Spectrum and Antimicrobial Profile of Pediatric Blood Stream Infection at a Tertiary Care Hospital in Pakistan. Chin Med Sci J. 2020 Dec 1;35(4):315-22. doi: 10.24920/003675.
11. Pankaj, Panchal, et al. Bacterial Spectrum and Antibiotic Sensitivity Patterns of Isolates from Blood Culture 1 MedDocs Publishers. 2020. DOI:10.4314/ajcem.v12i1.61037
12. Chaudhry AR. Clinical SpectrBacteriologicalical Profil,e and Antibiogram of Culture Proven Enteric Fever in a Private Sector Hospital in Lahore. InMed. Forum 2022 Feb (Vol. 33, No. 2, p. 34).
13. Namhata A, Sarkar S, Gupta MS. Reviewing antibiogram of salmonella typhi as blood culture isolates in a tertiary care hospital, Kolkata-reverting susceptibility profile. J. Evol. Med. Dent. Sci. 2019 Jul 15;8(28):6808-12. DOI:10.14260/jemds/2019/497
14. Ejaz A, Khawaja A, Arshad F, Tauseef A, Ullah R, Ahmad I. Etiological Profile and Antimicrobial Patterns in Blood Culture Specimens in a Tertiary Care Setting. Cureus. 2020 Oct. 17;12(10):e11000. doi: 10.7759/cureus.11000. PMID: 33209556; PMCID: PMC7669249. Accessed: 20 Mar 2022
15. Tian, L., Zhang, Z. & Sun, Z. Antimicrobial resistance trends in bloodstream infections at a large teaching hospital in China: a 20-year surveillance study (1998-2017). Antimicrob Resist Infect Control 8, 86 (2019). https://doi.org/10.1186/s13756-019-0545-z
16. Iqbal J, Dehraj IF, Carey ME, Dyson ZA, Garrett D, Seidman JC, Kabir F, Saha S, Baker S, Qamar FN. A Race against Time: Reduced Azithromycin Susceptibility in Salmonella enterica Serovar Typhi in Pakistan. mSphere. 2020 Jul 22;5(4):e00215-20. doi: 10.1128/mSphere.00215-20.
17. Katiyar A, Sharma P, Dahiya S, Singh H, Kapil A, Kaur P. Genomic profiling of antimicrobial resistance genes in clinical isolates of Salmonella Typhi from patients infected with Typhoid fever in India. Sci Rep.

2020;10:8299. 10.1038/s41598-020-64934-0

18. Hooda Y, Sajib MSI, Rahman H, Luby SP, Bondy-Denomy J, Santosham M, Andrews JR, Saha SK, Saha S. 2019. Molecular mechanism of azithromycin resistance among typhoidal Salmonella strains in Bangladesh identified through passive pediatric surveillance. PLoS Negl Trop Dis 13:e0007868. Doi: 10.1371/journal. and.0007868
19. Octavia S, Chew KL, Lin RTP, Teo JWP. Azithromycin-Resistant Salmonella enterica Serovar Typhi AcrB-R717Q/L, Singapore. Emerg Infect Dis. 2021 Feb;27(2):624-627. doi: 10.3201/eid2702.203874.
20. Wattal, C., Goel, N. Pediatric Blood Cultures and Antibiotic Resistance: An Overview. Indian J Pediatr 87, 125–131 (2020). https://doi.org/10.1007/s12098-019-03123-y
21. Qamar FN, Yousafzai MT, Khalid M, Kazi AM, Lohana H, Karim S, Khan A, Hotwani A, Qureshi S, Kabir F, et al. An outbreak investigation of ceftriaxone-resistant Salmonella enterica serotype Typhi and its risk factors among the general population in Hyderabad, Pakistan: a matched case-control study. Lancet Infect Dis. 2018;18(12):1368–76. doi: 10.1016/S1473-3099(18)30483-3.
22. Bilal, H., Khan, M.N., Rehman, T. et al. Antibiotic resistance in Pakistan: a systematic review of the past decade. BMC Infect Dis 21, 244 (2021). https://doi.org/10.1186/s12879-021-05906-1
23. Lee H, Yoon EJ, Kim D, Jeong SH, Won EJ, Shin JH, Kim SH, Shin JH, Shin KS, Kim YA, et al. Antimicrobial resistance of major clinical pathogens in South Korea, May 2016 to April 2017: first one-year report from Kor-GLASS. Euro Surveill. 2018;23(42). doi: 10.2807/1560-7917.ES.2018.23.42.1800047
24. Bushra, R., Rizvi, M., Shafiq, Y., Khan, M., Zafar, F., & Ali, H. (2020). Resistance emergence of doxycycline against Staphylococcus aureus and Streptococcus pneumoniae. PAFMJ, 70(Suppl-1), S188-92. Retrieved from https://www.pafmj.org/index.php/PAFMJ/article/view/3990
25. Taha, Ahmed E., et al. "Prevalence and Antimicrobial Susceptibility of Methicillin-Resistant Staphylococcus aureus in an Egyptian University Hospital." J Pure Appl Microbiol, vol. 13, no. 4, Dec. 2019, pp. 2111+. GaleAcademicOneFile, link.gale.com/apps/doc/A674565438/AONE?u=anon~96338cc3&sid=-googleScholar&xid=f889c53b. Accessed 20 Mar. 2023. DOI:10.22207/JPAM.13.4.23

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Tariq S	✓	×	✓	×	✓	×
Tariq N	✓	✓	×	✓	✓	×
Shah AA	×	✓	×	×	✓	×
Amin P	✓	✓	✓	×	✓	✓
Tariq H	✓	✓	×	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Advanced International Hospital, Islamabad. Dated: 16 08 2022

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

EXPLORING THE USE OF ONLINE TECHNOLOGY FOR PROFESSIONAL EXAMINATION PREPARATION AMONG MEDICAL COLLEGE STUDENTS IN SWAT, PAKISTAN

Rahman Syed[1], Ameer Afzal khan[2], Bilal Iqbal[3]

[1]Medical student, Swat Medical College, Swat - Pakistan

[2]Medical student, Saidu Medical College, Swat - Pakistan

[3]Department of Pathology, Swat Medical College, Swat - Pakistan

ABSTRACT

Objectives: To explore the use of online technology for professional examination preparation among medical college students in Swat.

Material and methods: This cross-sectional survey was conducted on 194 students enrolled in two medical colleges present in Swat. Data was collected through an online questionnaire and analyzed through different computer databases. The descriptive analysis of continuous variables was represented using the median, while categorical variables were presented through frequency and proportion.

Results: It was observed that 37.1% of students use online technology for professional exam preparation very frequently, and 43.3% use it frequently. The different devices used by students for accessing online resources for exam preparation were reported as smartphones 83.4%, laptops 54.9%, tablets 12.4%, and computers 3.1%. 86.5% of the students reported that their exam performance improved with the use of online technology, 10.8% of students reported that their exam performance did not change with the use of online technology, and 1.5% reported that their exam performance declined with the use of online technology. Regarding the use of online technology for exam preparation effect on stress levels, 3% of the students reported that the use of online technology reduces stress significantly, 9.3% reported that it reduces stress moderately, 16% reported that it has no significant impact on stress, 45.9% reported that it increases stress moderately, while 25.8% reported that it increases stress significantly.

Conclusion: The majority of medical college students utilize online technology for examination preparation, reporting improved performance. They perceive that online methods are more effective than traditional teaching. However, challenges like digital distractions, stress, and sleep disturbances accompany this shift. Despite these issues, there is evident potential for further enhancing exam preparation through increased online technology utilization.

Keywords: Online technology, professional examination preparation, medical college students

This article may be cited as: Syed R, Khan AA, Iqbal B. Exploring The Use of Online Technology for Professional Exam Preparation Among Medical College Students in Swat. J Med Sci 2024 July-September;32(3):244-249

INTRODUCTION

The use of online technology has become increasingly prevalent in various educational settings, including medical colleges. Online technology refers to the use of digital tools and platforms that enable communication, collaboration, and access to information over the Internet. Medical students are utilizing online platforms and resources for professional exam preparation to enhance their learning experience and improve their academic performance. This shift towards online technology in medical education has been influenced by various factors, including the COVID-19 pandemic and the need for remote learning options.[1,2]

Several studies have investigated the impact of online learning on exam performance. A study found that Iranian dental students showed positive results in learning through online methods.[3] Similarly, a study reported that medical laboratory science students participating in online video formats achieved better practical examination scores and final grades compared to the control group.[4] However, a study cautioned that the findings could be influenced by confounding factors, such as exam structure

Correspondence
Dr. Bilal Iqbal
Assistant professor
Department of Pathology, Swat Medical College, Swat - Pakistan
Email: bilaliqbal4124@gmail.com
Date Received: 12-12-2023
Date Revised: 29-04-2024
Date Accepted: 20-06-2024

and difficulty level, rather than the virtual teaching itself, highlighting the need for further research.[5] Additionally, a retrospective study conducted at Dow International Medical College, Karachi found significantly higher scores achieved by the online learning group. [6] In contrast, a study observed non-significantly lower scores on course tests and the final exam for online psychology students.[7]

Previous studies have shown that online exams provide students with the flexibility to complete exams at their convenience, potentially enhancing their performance.[8] Research also highlighted the significance of online exams in contributing to degree outcomes, accreditation requirements, and workplace safety issues, underscoring the importance of maintaining the integrity of online assessments.[9] Studies have also compared students' satisfaction with online versus traditional examinations at the postgraduate level.[10]

However, the use of online technology for exam preparation also presents challenges and concerns. One prominent issue of concern is the widespread occurrence of digital distraction, a factor that detracts students from their academic endeavors and negatively influences their educational achievements. Previous studies have elucidated that a subset of students encounters distractions when participating in online learning.[11]

Furthermore, the shift towards online exam preparation has implications for students' mental health and well-being. The pressure and stress associated with exam preparation have a negative impact on the students. Research from Indonesia demonstrates a notable increase in the prevalence of moderate stress associated with the use of online learning.[12] Medical colleges need to provide support and counseling services to address the mental health needs of students during this period.

While there is existing research on the use of online technology for exam preparation in medical colleges, most of the studies have been conducted in different contexts and settings.[1] Therefore, there is a need to investigate the experiences and perspectives of medical college students in Swat regarding the use of online technology for exam preparation.

MATERIAL AND METHODS

A quantitative, cross-sectional survey design was used to explore the use of online technology for professional exam preparation among medical college students in Swat. The study was conducted in two medical colleges present in Swat that are Saidu Medical College, a public medical college in Swat, and Swat Medical College, a private medical college in Swat. The sample size was calculated using the WHO sample size calculator, which estimated a required sample size of 194 participants based on population size and desired level of precision. The participants included in the study were students from the second year to final year from both medical colleges. The participants excluded from the study were students in their first year from both medical colleges. The duration of the study was four months, from August to November 2023.

The questionnaire was prepared with the help of literature using Google Forms (A web-based survey tool provided by Google). The questionnaire was initially pilot-tested for reliability with fifteen randomly selected students from the participating students. The study was approved by the Ethical review board of both medical colleges (reference number:160-ERB/023)

A written informed consent was taken after which a link to the questionnaire was sent to the students of both medical colleges. The questionnaire consisted of two sections. The first section was about demographic information, including the participant's name, age, gender, and year of study in medical college. The second section aimed to assess the student's use of online technology for their professional exam preparation with the main focus on (A) Finding how frequently students use online technology for exam preparation. (B) To find which type of online resource they use for their exam preparation. (C) To identify challenges students, face when using online technology for exam preparation. (D) To find any changes they have noticed in exam performance since using online technology for preparation. (F) To find the impact of online technology usage on student's stress levels and sleep disturbances.

The data from the filled-out questionnaires were inputted into the SSPS version 22 for analysis. The descriptive analysis of continuous variables was represented using the median, while categorical variables were presented through frequency and proportion.

RESULTS

A total of 194 students participated in the study. Among the participants, the majority were male 68.6% (133) while the remaining 31.4% (61) were female. Stu-

Table No 1. Frequency of use of online technology for exam preparation by the students

Variables	Frequency (n)	Percentage (%)
Use of online technology for exam preparation		
Very frequently	72	37.1%
Frequently	84	43.3%
Occasionally	22	11.3%
Rarely	15	7.7%
Never	1	0.6%
Exam preparation improvement with the use of online technology		
Significantly improved	98	50.5%
Improved	73	37.6%
No significant impact	22	11.3%
Hindered	1	0.5%
Exam performance improvement with the use of online technology		
Improved	170	87.6%
No change	21	10.8%
Declined	3	1.5%
Quality of online resources available for exam preparation		
Excellent quality	42	21.6%
Good quality	62	31.9%
Average quality	39	20.1%
Below average quality	37	19.1%
Poor quality	14	7.2%
Role of traditional teaching methods (lectures and textbooks) in comparison to online technology for exam preparation		
Traditional methods are more effective	51	26.3%
Online technology is more effective	118	60.8%
Both equally effective	25	12.9%
Digitally distracted while using online technology for exam preparation		
Yes	165	85%
No	29	15%
Management of digital distractions while using online technology for exam preparation		
Set specific study hours	42	21.6%
Use website blockers	20	10.3%
Turn off notifications	34	17.5%
Practice self-discipline	14	7.2%
I don't actively manage distractions	84	43.3%
The use of online technology for exam preparation affects your stress level		
Reduces stress significantly	06	3%
Reduces stress moderately	18	9.3%
Has no significant impact on stress	31	16%
Increases stress moderately	89	45.9%
Increases stress significantly	50	25.8%
The use of online technology contributes to sleep disturbances or irregular sleep patterns during exam preparation		
Significantly contributes	40	20.6%
Moderately contributes	65	33.5%
Has no significant impact	37	19.1%
Reduces sleep disturbances	15	7.7%
I am not sure	37	19.1%

Recommendations for improving the accessibility and quality of online resources for exam preparation		
Provide better internet infrastructure	40	20.6%
Distribute devices to students	35	18%
Offer more online courses	61	31.4%
Train instructors in digital pedagogy	38	19.6%
Others	20	10.3%

dents have a median age of 22.2 ± 1.2 years. Students from second year were 23.7% (46), third year 28.9% (56), fourth year 23.7% (46), and final year 23.7% (46). Students who participated from Saidu Medical College were 98(50.5%) and from Swat Medical College were 96(49.5%).

The different devices used by students for accessing online resources for exam preparation were reported as smartphones 83.4%(161), laptops 54.9%(106), tablets 12.4%(24), and computers 3.1%(6).

The most common places of study using online technology for professional exam preparation were reported as home 51.3%(99), library 28%(54), hostel 12.5%(24), and anywhere 8.2% (17).

The different online resources used by students for their professional exam preparation were reported as online lectures 90.7%(176), educational websites 54.6%(106), E-books 9.8%(19), medical forums or discussion groups 9.3%(18), flash card apps 16.5%(32), practice question websites 17.5%(34), social media study groups 21.6%(42), U world 1.5% (3), and Google 1.8%(4). See Table 1 for details.

DISCUSSION

This study has offered valuable insights into several aspects, including the frequency of students using online technology for exam preparation, the correlation between student's exam performance and online technology usage, the variety of devices students employ for online technology in exam preparation, a comparison between traditional teaching and online technology for exam preparation, the presence of digital distractions associated with online technology, and the stress and sleep disturbances linked to the use of online technology in exam preparation.

The study findings reveal that a significant number of students utilize online technology for professional exam preparation, with most (88.1%) reporting improved exam readiness and performance. The study results are per the previous studies. A study conducted in Australia also shows similar results with 75% of the students reporting that their performance improved with the use of online learning.[13] Similarly, a study found that Iranian dental students showed positive results in learning through online methods.[3] Hence, these findings indicate that utilizing online technology for exams leads to improved exam performance.

A majority of students, specifically 60.8%, expressed a preference for online technology as an effective method for exam preparation, while 26.3% reported that they found traditional teaching methods to be more effective. However, findings from a previous study indicate that students attending traditional classes generally attained slightly superior grades and assignment scores in comparison to their counterparts involved in online learning.[14,15]

The increased preference among students for online technology over traditional teaching methods in our research can be attributed to the expanding range of learning platforms available through online technology and the heightened levels of engagement and enjoyment it provides for exam preparation.

According to our study, the smartphone (83.4%) was the most frequently used device for exam preparation on online technology followed by laptop (54.9%), tablet (12.4%), and computer (3.1%). A previous study observed that the most utilized gadget by the students was a laptop (90%), followed by a smartphone (60%), and a tablet (16%).[14] Our study demonstrates a notable upswing in the adoption of smartphones for online technology, a trend closely linked to the increasing availability of these devices to a broad spectrum of users in recent times.

Our study findings unveil a substantial elevation in students' stress levels, with 25.8% experiencing a significant increase and 45.9% reporting a moderate rise, attributed to their engagement with online technology. An earlier study carried out in Indonesia reported that a significant 48.9% of students encountered mild stress, with 4% experiencing severe stress during their engagement

in online learning.[12] Our study also brings to light the fact that a significant number of students, comprising 33.5% to a moderate degree and 20.6% to a significant extent, link the disruption of their sleep patterns to their engagement with online technology. Thus, these findings indicate that the use of online technology for exam preparation can contribute to heightened stress and disruption in sleep patterns among students.

Our research findings also unveil that a significant 85% of students grapple with digital distractions, while the remaining 15% manage to remain undistracted. A previous research study also demonstrated that a significant 20.9% of students engage with digital devices for non-academic activities.[11] Our research reveals a rise in digital distractions among students, which can be attributed to the increased prevalence of social media usage by students in recent years.

Our study compilation of suggestions for enhancing the accessibility and quality of online resources for exam preparation yielded significant insights. Notably, 20.6% of participants advocated for improvements in internet infrastructure, 18% emphasized the distribution of devices to students, 31.4% encouraged the expansion of online course offerings, and 19.6% stressed the importance of instructing educators in digital pedagogy.

CONCLUSION

A majority of medical college students utilize online technology for exam preparation, with a significant number reporting improved exam performance through its usage. The prevalent belief among students is that online technology is more effective than traditional teaching methods for their professional exam preparation. Despite these advantages, challenges such as digital distractions, increased stress, and sleep disturbances are associated with online technology use for exam preparation. Nonetheless, the potential for further utilization of online technology to enhance professional exam preparation remains evident.

ACKNOWLEDGMENTS

We would like to acknowledge students of both medical colleges for participating in the study.

REFERENCES

1. Ziehfreund S, Reifenrath J, Wijnen-Meijer M, Welzel J, Sauter F, Wecker H, et al. Considering medical students' perception, concerns and needs for e-exams during COVID-19: a promising approach to improve subject-specific e-exams. Medical Education Online. 2022 Aug 21;27(1). 2114131
2. Younas A, Ashraf MN, Ashraf S, Malik RM, Pasha N, Naeem H. Online assessments during COVID-19 pandemic - A paradigm shift in educational strategy. JRMC. 2022 Jun 30;26(2):295-300.
3. Moazami F, Bahrampour E, Azar MR, Jahedi F, Moattari M. Comparing two methods of education (virtual versus traditional) on learning of Iranian dental students: a post-test only design study. BMC Medical Education. 2014 Mar 5;14(1). 1-5
4. Donkin R, Askew E, Stevenson H. Video feedback and e-learning enhance laboratory skills and engagement in medical laboratory science students. BMC Medical Education. 2019 Aug 14;19(1).1-12
5. Ishak A, AlRawashdeh MM, Meletiou-Mavrotheris M, Nikas IP. Virtual Pathology Education in Medical Schools Worldwide during the COVID-19 Pandemic: Advantages, Challenges Faced, and Perspectives. Diagnostics. 2022 Jun 29;12(7):1578.
6. Abbas U, Parveen M, Ashfaque A, Naz R, Zaheer S, Amjad Z. Online versus Traditional Learning: Outcomes of First Online Learning Experience. Pakistan J Medical and Health Sciences [Internet]. 2021 Sep 30 [cited 2021 Oct 30];15(9):2248–50. Available from: https://pjmhsonline.com/2021/sep/2248.pdf
7. Waschull SB. The Online Delivery of Psychology Courses: Attrition, Performance, and Evaluation. Teaching of Psychology. 2001 Apr;28(2):143–7
8. Schmidt SJ. Make It Stick: The Science of Successful Learning. Journal of Food Science Education. 2015 Sep 29;14(4):142–4
9. Linden K, Gonzalez P. Zoom invigilated exams: A protocol for rapid adoption to remote examinations. British J Educational Technology. 2021 May 20;52(4):1323–37
10. Ali IL, Iftikhar M. Comparative Analysis of Students' Satisfaction Regarding Online Vs Traditional Examination at Postgraduate Level in the University of Agriculture Faisalabad. International J Social Studies. 2021 Oct 15;1(1):09-13
11. Mccoy BR. Digital distractions in the classroom phase II: Student classroom use of digital devices for non-class related purposes part of the communication commons, instructional media design commons, and the Scholarshi. J Media Education. 2016;7(1):5–32
12. Wahyu A, Simanullang RH. Student stress due to online learning during the COVID-19 pandemic. J Aisyah J Ilmu Kesehat [Internet]. 2020;5(2):153–7. Available from: http://dx.doi.org/10.30604/jika.v5i2.346
13. Warnecke E, Pearson S. Medical students' perceptions of using e-learning to enhance the acquisition of consult-

ing skills. The Australasian Medical J [Internet]. 2011 Jun 30 [cited 2021 Jun 18];4(6):300–7. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3562947/

14. Schulz P, Sagheb K, Affeldt H, Klumpp H, Taylor K, Walter C, et al. Acceptance of E-Learning Devices by Dental Students. Medicine 20 [Internet]. 2013 Aug 14 [cited 2023 Jan 11];2(2):e6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4084775/#__ffn_sectitle

15. Hurlbut AR. Online vs. traditional learning in teacher education: a comparison of student progress. American J Distance Education. 2018 Oct 2;32(4):248–66.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Syed R	✓	×	✓	×	✓	×
Khan AA	✓	✓	×	✓	✓	×
Iqbal B	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Saidu Medical College, Swat. Vide No. 160/ERB/023. Dated: 18 12 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

FREQUENCY OF VENTRICULAR TACHYCARDIA IN PATIENTS WITH ACUTE CORONARY SYNDROME DURING THE FIRST 24 HOURS OF ADMISSION

Atif Kamal, Muhammad Faheem

[1]Department of Cardiology, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: To determine the frequency of ventricular tachycardia in patients with acute coronary syndrome (ACS) during the first 24 hours of admission

Material And Methods: This descriptive study was conducted at the coronary care unit of Khyber Teaching Hospital Peshawar from July 2020 to January 2021. Using a non-probability consecutive sampling technique, 169 patients of either gender aged between 30 and 70 years with ACS were included. Patients were monitored for any arrhythmias e.g., Ventricular tachycardia by a monitor (Nihon Kohden) and on 12 lead ECG (Cardio flex II) when needed. All the data was noted in a proforma.

Results: A total of 169 patients comprising of male 121 (71.6%) and 48 (28.4%) female patients were included in this study. The mean age was 57.45±7.69 years. Patients in the age group 30-50 years were 45 (26.6%) while 124 (73.4%) patients were in the age group 51-70 years. The mean duration of symptoms was 8.99 ± 4.740 hours. Out of 169 patients, 48 (28.4%) patients presented with unstable angina, 91 (53.8%) patients had NSTEMI and 30 (17.8%) patients with STEMI. A total of 22 (13.0%) patients were found to have hypokalemia and 23 (13.6%) patients with hypoglycemia. Patients who were diagnosed to have ventricular tachycardia were 12 (7.1%).

Conclusion: In our study, ventricular tachycardia occurred in 7% of patients in the first 24 hours of admission who presented with Acute Coronary Syndrome.

Keywords: Ventricular tachycardia, Acute coronary syndrome.

This article may be cited as: Kamal A, Faheem M. Frequency Of Ventricular Tachycardia In Patients With Acute Coronary Syndrome During The First 24 Hours Of Admission. J Med Sci 2024 July-September;32(3):250-254

INTRODUCTION

Acute Coronary Syndrome, including Unstable angina, STEMI, and NSTEMI can lead to different electrical or mechanical complications. The electrical complications range from premature ventricular depolarization, and accelerated idioventricular rhythm, to non-sustained ventricular tachycardia, sustained V.T., and even ventricular Fibrillation. [1] Sustained VT occurs in 20% of myocardial infarctions and is associated with higher mortality. [2]

Different mechanisms are involved in the generation of these arrhythmias, including the changes in electrophysiological properties of myocardial cells, reentry, increased automaticity, and reperfusion arrhythmias. Acute myocardial ischemia leads to cellular hypoxia that badly affects cellular ion channels. It results in disruption in the normal balance of potassium, sodium, and calcium across cell membranes.

This can lead to alteration in conduction, refractoriness, and automaticity. The Resting membrane potential increases from -80 mv to -60 mv. [3] Another mechanism of VT development is reentry circuits within the ischemic myocardium. Because of the reduction in conduction velocity and delayed recovery of excitability in myocardial cells, transient reentry circuits develop, which serve as foci for ventricular tachycardia.[4]

Reperfusion arrhythmias are also common in acute Myocardial ischemia. The changes in Potassium, sodium, and calcium across cell membranes due to ischemia, are normalized after reperfusion. [5]

But this occurs in-homogeneously, because of the heterogenicity of regional blood flow restoration within the ischemic zone, leading to the development of transient re-

Correspondence
Dr. Muhammad Faheem
Department of Cardiology, Khyber Teaching Hospital, Peshawar - Pakistan
Cell: +92-333-9202002
Email: drfaheem@live.com
Date Received: 12-12-2023
Date Revised: 29-04-2024
Date Accepted: 20-06-2024

entrant circuits. Other factors like increased levels of CRP and uric acid have also been associated with high incidences of cardiac arrhythmias. [6]

VT in ACS can often lead to hemodynamic compromise and may be fatal.[7] They must be managed promptly by DC Cardioversion.

For recurrent episodes of V.T. strategies include urgent revascularization, drug therapy (Beta-Blockers, amiodarone, and lignocaine), Catheter ablation, and implantable cardioverter defibrillator. The rationale of this study is to provide recent local data on the frequency of ventricular tachycardia in patients with acute coronary syndrome during the first 24 hours of admission.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted from 24 July 2020 to 24 January 2021 at the coronary care unit (CCU), Department of Cardiology of Khyber Teaching Hospital, after approval from the hospital's ethical committee (Vide no. 466/DME/KMC dated 25/02/2020) using a nonprobability consecutive sampling technique and taking the frequency of VT in ACS of 5.7% (ref 5) with a margin of error of 3.5% and a confidence level of 95%, 169 patients of either gender aged between 30 to 70 years.

with ACS were included. Informed consent was taken from all the patients. ACS was defined per ACC criteria and included patients with Unstable angina, Non-ST elevation Myocardial Infarction (NSTEMI), and ST elevation Myocardial Infarction (STEMI). Ventricular tachycardia was defined as ECG showing QRS wider than >180 msec (>3 small squares) at the rate of 120 beats per minute or more with AV dissociation (no regular rhythm with absent P wave) on a standard ECG.

Detailed history and physical examination of each patient were performed. Data like name, gender, and age were noted. All the patients were managed according to hospital protocol. Baseline investigations, such as blood sugar, potassium, and ECG, were done. Patients admitted to CCU with ACS were monitored for any arrhythmias e.g., Ventricular tachycardia by monitor (Nihon Kohden) and on 12 lead ECG (Cardio flex II) when needed. All the data was collected and noted on a proforma.

Patients with a documented history of ischemic heart disease, cardiomyopathies, heart failure, or congenital heart diseases were excluded from the study. patients with other arrhythmias like, atrial fibrillation, Bundle Branch block, or permanent pacemaker rhythm were also excluded. Statistical Package for Social Sciences version 23 was used for data analysis.

Mean ± SD was calculated for quantitative variables like age and duration of symptoms. Frequency and percentages were presented for categorical variables like type of Acute Coronary Syndrome, Ventricular tachycardia, hypoglycemia (<60mg/dl), and hypokalemia (<3.5 m Eq/L). Post-stratification Chi-square test was applied and a p-value of ≤0.05 was taken as significant. All the results were presented using graphs and tables.

RESULTS

A total of 169 patients comprising 121 (71.6%) male and 48 (28.4%) female patients were included in this study. The mean and SDs for age were 57.45+/-7.69 years. Patients in the age group 30-50 years were 45 (26.6%) while 124 (73.4%) patients were in the age group 51-70 years. Mean and SDs for the duration of symptoms were 8.99+/-4.740 hours.

Out of 169 patients, 48 (28.4%) patients presented with unstable angina, 91 (53.8%) patients had NSTEMI and 30 (17.8%) patients with STEMI. Out of 169 patients, 22 (13.0%) patients were found to have hypokalemia, and 23 (13.6%) patients with hypoglycemia.

Patients who were diagnosed to have ventricular tachycardia were 12 (7.1%) Patients were stratified according to age, gender, hypokalemia, hypoglycemia, and type of ACS based on the presence/absence of ventricular tachycardia is shown in Table No. 1 to 5 respectively. There was no statistical difference between the groups.

DISCUSSION

Among many other complications of ACS, VT carries a high mortality risk and shall be promptly diagnosed

Table No 1. Stratification of Ventricular Tachycardia with Age Groups (n=169)

		Age Groups		Total	P Value
		30-50 Years	51-70 Years		
Ventricular Tachycardia	Yes	5	7	12	0.221
		11.1%	5.6%	7.1%	
	No	40	117	157	
		88.9%	94.4%	92.9%	
Total		45	124	169	
		100.0%	100.0%	100.0%	

Table No 2: Stratification of Ventricular Tachycardia with Gender (n=169)

		Gender		Total	P Value
		Male	Female		
Ventricular Tachycardia	Yes	9	3	12	0.786
		7.4%	6.3%	7.1%	
	No	112	45	157	
		92.6%	93.8%	92.9%	
Total		121	48	169	
		100.0%	100.0%	100.0%	

Table No 3: Stratification of Ventricular Tachycardia with Hypokalemia (n=169)

		Hypokalemia (mEq/L)		Total	P Value
		Yes	No		
Ventricular Tachycardia	Yes	1	11	12	0.617
		4.5%	7.5%	7.1%	
	No	21	136	157	
		95.5%	92.5%	92.9%	
Total		22	147	169	
		100.0%	100.0%	100.0%	

Table No 4: Stratification of Ventricular Tachycardia with Hypoglycemia (n=169)

		Type of ACS			Total	P Value
		Unstable Angina	NSTEMI	STEMI		
Ventricular Tachycardia	Yes	6	4	2	12	0.580
		12.5%	4.4%	6.7%	7.1%	
	No	42	87	28	157	
		87.5%	95.6%	93.3%	92.9%	
Total		48	91	30	169	
		100.0%	100.0%	100.0%	100.0%	

Table No 5: Stratification of Ventricular Tachycardia Type of ACS (n=169)

		Type of ACS			Total	P Value
		Unstable Angina	NSTEMI	STEMI		
Ventricular Tachycardia	Yes	6	4	2	12	0.208
		12.5%	4.4%	6.7%	7.1%	
	No	42	87	28	157	
		87.5%	95.6%	93.3%	92.9%	
Total		48	91	30	169	
		100.0%	100.0%	100.0%	100.0%	

and treated. Many international and national studies have previously been done to find the occurrence of VT in the setting of ACS. OUR study will add to the data already available at the national level. In our study, the mean age was inconsistent with the findings of Gabet A and Danchin N and Khani QZ et al. [8, 9] However, our findings are consistent with a study by Lashari NA, and Lakho NI. [10] The Mean and SDs for the duration of symptoms were 8.99±4.74 hours. This is in agreement with findings from Allana S et al. [11] They also showed that in women, the presentation of ACS is more delayed than in men.

In our study, 22 (13.0%) patients were recorded with hypokalemia, and 23 (13.6%) patients were recorded with hypoglycemia. These findings are consistent with the findings of Jabbari R & Engstrøm Regarding the type of ACS, our findings are consistent with the findings are

comparable to the findings of Ahmadi A, Soori H. [13]. In another local study it was o served that 131/280 (46.8%) of patients with chest pain had Acute coronary syndrome, out of these 131 patients, 55% had NSTMI, 28.2% had Unstable angina and 16.8% had STEMI. [10,14]

As per our main outcome variable, 12 (7.1%) patients with ACS were recorded with ventricular tachycardia in the first 24 hours of their admission, which is almost in comparison to the findings of Almani B also similar to the findings of an Iranian population where the incidence of VT in ACS patients was 5.7%. [13, 15]

However, these findings were in contrast to the findings concluded by Bhar-Amato J, Davies W.[16] and by Wilmé V. [17] Similarly in another study Jonathan P et al. monitored patients for 48 hours but still showed a low incidence of VT (0.9 %). [18] It has been shown that among 3,602 patients with STEMI, 108 patients (3.0%) had early VT/VF. [19] On the other, Hanada K studied STEMI patients undergoing primary PCI and followed them for 3.7 years. [20] They found the occurrence of VT/VF during hospitalization did not affect the mid-term clinical outcomes.

Previous studies show that ventricular tachycardia after ACS is more common in men, in higher age groups, and in patients with STEMI. [21] We did stratification of VT according to age, gender, and type of ACS, but the difference between groups was not statistically significant. This may be due to the low sample size of our study.

CONCLUSION

In our study, Ventricular tachycardia occurred in 7% of patients with acute coronary syndrome in the first 24 hours of admission into a CCU. As it carries high mortality, all those patients admitted with ACS should be evaluated and monitored properly for timely diagnosis and management of arrhythmic complications to avoid poor outcomes.

REFERENCES

1. Hai JJ, Tam E, Chan PH, Lau CP, Siu CW, Tse HF. Incidence and predictors of sudden arrhythmic death or ventricular tachyarrhythmias after acute coronary syndrome: An Asian perspective. Heart Rhythm. 2017;14(1):81-87. doi:10.1016/j.hrthm.2016.09.011
2. Newby KH, Thompson T, Stebbins A, Topol EJ, Califf RM, Natale A. Sustained ventricular arrhythmias in patients receiving thrombolytic therapy: incidence and outcomes. The GUSTO Investigators. Circulation. 1998;98(23):2567-2573. doi:10.1161/01.cir.98.23.256
3. Kléber AG, Janse MJ, van Capelle FJ, Durrer D. Mechanism and time course of S-T and T-Q segment changes during acute regional myocardial ischemia in the pig heart determined by extracellular and intracellular recordings. Circ Res. 1978;42(5):603-613. doi:10.1161/01.res.42.5.6034.
4. Allessie, MA, FI Bonke, and FJ Schopman. Circus movement in rabbit atrial muscle as a mechanism of tachycardia. III. The “leading circle” concept: a new model of circus movement in cardiac tissue without the involvement of anatomical obstacle. Circ. Res. 1977. 41: 9-18.
5. Hariman RJ, Louie EK, Krahmer RL, et al. Regional changes in blood flow, extracellular potassium and conduction during myocardial ischemia and reperfusion. J Am Coll Cardiol. 1993;21(3):798-808. doi:10.1016/0735-1097(93)90114-g
6. Karthika A, Babu CN, Subbiah J, Ramesh N. A study of arrhythmias during the first 48 hours of hospitalization in acute coronary syndrome and its correlation with serum uric acid and CRP. Int J Acad Med Pharm. 2023;5(2):166-71.
7. Orvin K, Eisen A, Goldenberg I, et al. Outcome of contemporary acute coronary syndrome complicated by ventricular tachyarrhythmias. Europace. 2016;18(2):219-226. doi:10.1093/europace/euv027
8. Gabet A, Danchin N, Juillière Y, Olié V. Acute coronary syndrome in women: rising hospitalizations in middle-aged French women, 2004-14. Eur Heart J. 2017;38(14):1060-1065. doi:10.1093/eurheartj/ehx097
9. Khani QZ, Soomro ZZ, Naz K, Soomro TH, Korejo AA, Hussain F. Ventricular Arrhythmias in Patients Undergoing Primary Percutaneous Coronary Intervention (PCI) for ST-Segment Elevation Myocardial Infarction (STEMI). Pak J Med Health Sci. 2022 Nov 14;16(09):667-667
10. Lashari NA, Lakho NI, Memon SA, Ahmed A, Waseem MF. Acute coronary syndrome. Prof Med J. 2017;24(03):409-13.
11. Allana S, Khowaja K, Ali TS, Moser DK, Khan AH. Gender Differences in Factors Associated with Prehospital Delay Among Acute Coronary Syndrome Patients in Pakistan. J. Transcult. Nurs. 2015;26(5):480-490. doi:10.1177/1043659614524787
12. Jabbari R, Engstrøm T, Glinge C, Risgaard B, Jabbari J, Winkel BG, et al. Incidence and Risk Factors of Ventricular Fibrillation Before Primary Angioplasty in Patients With First ST Elevation Myocardial Infarction: A Nationwide Study in Denmark. J Am Heart Ass. 2015;4(1):e001399.
13. Ahmadi A, Soori H, Mehrabi Y, Etemad K, Khaledifar A. Epidemiological pattern of myocardial infarction and modelling risk factors relevant to in-hospital mortality: the first results from the Iranian Myocardial Infarction Registry. Kardiol Pol. 2015;73(6):451-7.

14. Bhatti U, Khan KA, Khan MN, Soomro NA, Naseeb K, Ahmed S, Ashraf T, Moazzam A, Bashir S, Karim M. Arrhythmias in patients with acute coronary syndrome. Pak Heart J. 2021 May 26;54(1):90-6.

15. Almani B, Rathi N, Kumar J, Sahito AA. Incidence of arrhythmia and associated patients' outcome in hospitalized acute coronary syndrome patients. Professional Med. J. 2020 Sep 10;27(09):1790-4.

16. Bhar-Amato J, Davies W, Agarwal S. Ventricular Arrhythmia after Acute Myocardial Infarction: 'The Perfect Storm'. Arrhythm Electrophysiol Rev. 2017;6(3):134-9.

17. Wilmé V, Harscoat S, Séverac F, Carmona A, Le Borgne P, Bilbault P, Morel O, Kepka S. Occurrence of severe arrhythmias in patients with Non-St elevation acute coronary syndrome (NSTE-ACS): A retrospective study. J. Clin. Med. 2023 May 14;12(10):3456.

18. Jonathan P, Jennifer A., Rajendra H. M, Yuliya L, Sana M., Pierluigi, et al. Sustained Ventricular Tachycardia and Ventricular Fibrillation Complicating Non–ST-Segment–---elevation acute Coronary Syndromes. Circulation. 2012; 126:41–49

19. Kosmidou I, Embacher M, McAndrew T, Dizon JM, Mehran R, Ben-Yehuda O, et al. Early ventricular tachycardia or fibrillation in patients with st elevation myocardial infarction undergoing primary percutaneous coronary intervention and impact on mortality and stent thrombosis (from the harmonizing outcomes with revascularization and stents in acute myocardial infarction trial). Am J Cardiol. 2017;120(10):1755-60.

20. Hanada K, Kinjo T, Yokoyama H, Tsushima M, Senoo M, Ichikawa H, Nishizaki F, Shibutani S, Yokota T, Okumura K, Tomita H. Incidence, predictors, and outcome associated with ventricular tachycardia or fibrillation in patients undergoing primary percutaneous coronary intervention for acute myocardial infarction. Circulation Journal. 2023 Sep 28: CJ-23

21. Asim NC, Kathleen S, Michele P, Alan H, and Jeffrey JG. Non-sustained ventricular tachycardia in the setting of acute myocardial infarction tachycardia characteristics and their prognostic implications. Circulation. 1998; 98:2030–2036.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Kamal A,	✓	✓	×	×	✓	×
Faheem M	✓	✓	×	✓	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 466/DME/KMC. Dated: 25 02 2020

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

ENHANCING SELECTIVE ATTENTION: A COMPARATIVE STUDY OF MODERATE-INTENSITY EXERCISE AND HIGH-INTENSITY INTERVAL EXERCISE IN YOUNG ADULTS

Farida Ahmad[1], Musarrat Zahra[1], Ushna Zoofeen[2], Zubia Shah[1], Afsheen Mahmood[1], Ambreen Afridi[3], Fatma Zulfiqar[3]

[1]Department of Physiology, Khyber Girls Medical College, Peshawar - Pakistan

[2]Department of Physiology, Gajju Khan Medical College, Swabi - Pakistan

[3]Department of Community Medicine, Khyber Girls Medical College, Peshawar - Pakistan

ABSTRACT

Objectives: The principal aim of this study was to determine the impact of moderate-intensity exercise and high-intensity interval exercise on selective attention.

Materials and Methods: This experimental study transpired at Khyber Girls Medical College Peshawar from August 2020 to March 2021. Thirty-four young adults were enlisted, participating in two sequential experimental sessions. In the initial session, subjects engaged in a 20-minute session of moderate-intensity exercise, with forward digit span tests administered both pre and post-exercise. Following a one-week interval, the second session involved the same procedures, with participants undertaking high-intensity interval exercise characterized by alternating one-minute intervals of low and high-intensity activities. Selective attention was re-evaluated within 5 minutes of completing the exercise. Participants were then scheduled for a follow-up session one week later, where the same procedures were replicated. SPSS version 20 was used for Data analysis, with statistical significance set at $P < 0.05$. Shapiro-Wilk test was used to assess the normality of the data.

Results: thirty-four participants with a mean age of 21 ± 2 years, a body mass index (BMI) of 23 ± 4 kg/m2, and a mean waist-hip ratio of 0.81± 0.05 were included in the study. After fifteen minutes of high-intensity interval exercise, a noteworthy improvement in selective attention was observed ($P = 0.001$).

Conclusion: A single session of high-intensity interval exercise exhibited greater efficacy in enhancing selective attention as compared to moderate exercise.

Keywords: High-intensity interval exercise, Selective attention, Young adults

This article may be cited as: Ahmad F, Zahra M, Zoofeen U, Shah Z, Mahmood A, Afridi A, et al. Enhancing Selective Attention: A Comparative Study Of Moderate-Intensity Exercise And High-Intensity Interval Exercise In Young Adults. J Med Sci 2024 July-September;32(3):255-259

INTRODUCTION

Physical exercise (PE) is described as an organized and repetitive component of physical activity with the ultimate or intermediate goal of preserving or enhancing physical fitness. [1]

Various forms of physical exercise exist, categorized based on the percentage of maximum heart rate (HR max) at which they are conducted. Specifically, exercises executed at 50 - 63%, 64 - 76%, and 77 – 95% of HR max is designated as low, moderate, and high-intensity exercises, respectively. Furthermore, high-intensity exercise can be subcategorized into continuous, high-intensity interval training (HIIT) and sprint interval training. HIIT is a form of physical exercise distinguished by brief intervals of intense exercise interspersed with equal durations of rest or lower-intensity physical activity. [2]

While physical exercise has a beneficial impact on selective attention and consequently memory. Regrettably, a substantial portion of the global population does not maintain an adequate level of physical activity. According to a survey conducted by the World Health Organization, 23% of males and 32% of females worldwide fall short of engaging in the recommended amount of physical activity. Furthermore, merely 5% of the adult population worldwide adheres to the fundamental guidelines for regular physical exercise. [3]

Correspondence
Afsheen Mahmood
Department of Physiology, Khyber Girls Medical College, Peshawar - Pakistan
Cell: +92 346-9370321
Email: afsheenmahmood66@gmail.com
Date Received: 23/01/2024
Date Revised: 21/07/2024
Date Accepted: 21/08/2024

Top of Form In the context of Pakistan, the situation is grim, with 24.4% of males and 43.3% of females having lower than required level exercise. The cited reasons for noncompliance with exercise and the prevalence of sedentary behavior include perceived time constraints and the extensive use of internet-enabled devices such as cell phones and computers. [4] Fortuitously, HIIT requires less time investment in comparison to sustained moderate exercise, rendering it a preferred choice for a majority of individuals. [5] Top of FormIt has recently surfaced as an efficacious exercise paradigm conducive to cognitive well-being. [6]

The principal benefit of High-Intensity Interval Training (HIIT) lies in its capacity to offer a robust stimulus for neuronal growth. HIIT, notably, proves advantageous in regulating attention and facilitating the selective filtering of irrelevant information during the execution of cognitive tasks. [7]

Selective attention enables the discernment and filtration of irrelevant information, facilitating concentration on pertinent stimuli. Additionally, it constitutes a foundational element for the acquisition of complex knowledge. Few studies aim to investigate the impact of High-Intensity Interval Training (HIIT) on selective attention. Further exploration is justified to delineate the effects of HIIT on brain health. [8, 9] Top of Form Our research endeavors to contribute to the extended body of knowledge by examining HIIT on selective attention in the young adult population.

MATERIALS AND METHODS

This experimental study was conducted at the Physiology Department, Khyber Girls Medical College Peshawar. The sample size for the within-subject design was determined through power analysis and effect size, drawing from previous findings by Labban et al. [10] The power analysis was computed using an effect size of 0.50 for a power of 0.80 and, a sample size of 34 participants was chosen.

After being approved by the ethical committee of Khyber Medical University, volunteers were registered through notices, personal contacts, and circulars. Young female adults aged 18–25 were chosen, ensuring they had no history of psychiatric medications, psychiatric illnesses, smoking, or musculoskeletal and neurological disorders. Additionally, all participants met the exercise fitness criteria, assessed through the Physical Activity Readiness Questionnaire. [11]

Upon obtaining informed consent, anthropometric measurements, including weight, height, waist circumference, and hip circumference, were recorded for all participants. The intensity of exercise i.e. low, moderate, and high was determined based on individual age. Maximum heart rate (HR max) was calculated for each participant with the help of formula 220 – age. [12] The percentage of HR max was used to categorize exercise into low, moderate, and high intensity levels and the range of HR max was 50-63%, 64-76%, and 77-95%, respectively. High-intensity interval exercise involved alternating one-minute bouts of high-intensity exercise with equal durations of low-intensity exercise. [13] Body mass index (BMI) was calculated using Quetelet's formula, according to which weight in kilograms is divided by the square of height in meters to get BMI. [14] A within-group study design was used, according to which, all the participants were scheduled for 2 experimental sessions. Participants were given instructions that they should not consume any drink that contains caffeine including tea for at least 24 hours before the experiment.

On the first experimental day, pre-exercise selective attention was evaluated using the Forward Digit Span Test (FDST). This test is widely employed in clinical and research settings, demonstrating high validity and reliability among healthy adults. It serves as a subset of Wechsler's Adult Intelligence Scale. [15] Following the initial test, participants engaged in 15 minutes of moderate exercise on the treadmill (American Fitness, LK700T CORE) tailored to their intensity levels.

Continuous monitoring ensured that their heart rates remained within the specified ranges for moderate exercise. Selective attention was re-evaluated within 5 minutes of completing the exercise, using the Digit Span Forward Test. Participants were then scheduled for a follow-up session one week later, where the same procedures were replicated. However, during this second session, participants performed a 15-minute bout of high-intensity interval exercise.

SPSS version 20 was used for Data analysis, with statistical significance set at $P < 0.05$. Shapiro-Wilk test was used to assess the normality of the data.

RESULTS

The participants had a mean age of 20 ± 1 SD, a mean BMI of 23 ± 4 (kg/m2), and a mean waist-hip circumference ratio of 0.81 ± 0.05. During moderate exercise, the average heart rate ranged from 122 to 152

beats per minute, while for high intensity, most participants achieved a heart rate between 153 and 190 beats per minute. Forward Digit Span Test (FDST), the Wilcoxon signed-rank test indicated a positive significant change with a z-value of -1.422, p = 0.15, and a small effect size (r = .1) for moderate-intensity exercise (MIE). For high-intensity interval exercise (HIIE), the Wilcoxon signed-rank test showed a z-value of -3.182, p = 0.001, with a medium effect size (r = .4).

Table No 1: Forward Digit Span Test Scores After Exercise

Type of exercise	Forward Digit Span Test Scores		P value
	Mean ± SD (n = 34)	Effect size	
M1	8.41 ± 2	.1	0.15
M2	8.86 ± 2		
H1	8.86 ± 1	.4	0.001
H2	9.86 ± 1		

M1= before moderate exercise, M2 = after moderate exercise, H1=before high intensity interval exercise, H2 = after high intensity interval exercise, P < 0.05*, P < 0.01**

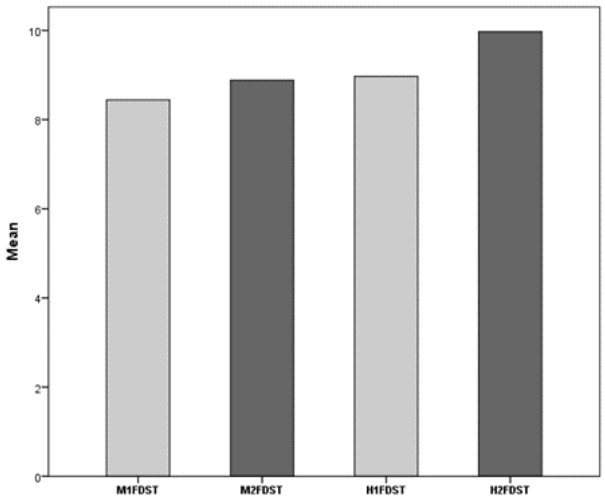

Fig 1: Forward Digit Span Test Scores pre and post-exercise FDST = Forward digit span test, M1=pre moderate exercise, M2 = post-moderate exercise, H1= pre high-intensity interval exercise, H2 =post high-intensity interval exercise

DISCUSSION

The objective of the study was to determine the impact of an acute High-Intensity Interval Training (HIIT) session on a specific cognitive function, namely selective attention, in young adults. Selective attention was assessed using the Digit Span Forward Test (FDST). According to the results, there was no significant effect of moderate exercise on attention (P = 0.15). On the other hand, there was a significant effect of HIIT on attention (P = 0.001).

Our results are consistent with previous research, which demonstrated that there was a positive influence of High-Intensity Interval Training (HIIT) on cognitive functions, including attention. The various tests and measures utilized by these studies were Victoria Stroop test, Reaction Time test, and Digit Span tests, all of which have demonstrated improvements in cognitive performance following HIIT. [16-18]

In a similar study conducted by Walsh et al. (2018) on university students, the effect size analysis unveiled a moderate effect size of 0.459 in favor of High-Intensity Interval Exercise (HIIE), which was statistically significant with a P-value of 0.01. [19] Our study reported similar results with an effect size of 0.486 and a statistically significant P-value of 0.001, which indicates a substantial impact. Moreover, our results are also consistent with a study done at the University of Boston, which evaluated declarative memory, selective attention, and inhibitory control. The uniformity in these studies indicates a strong relationship between cognitive processes and high-intensity interval exercise. [17] On the contrary to these studies, the results of a study done by Alves et al. (2014) were different from our results as no significant effect was found on Forward Digit Span Test (FDST). This difference could be attributed to older age group as mean age of participants in their study was 53 years, which might suggest that age-related factors may play a role in the cognitive response to HIIT. This highlights how crucial it is to take in account the demographics of participants while analyzing the effect of HIIT on cognitive function. [20]

The benefits of HIIT on cognition are further supported by a study by Kao et al, who demonstrated the advantages of HIIT on inhibitory control in both young adult females and males. This highlights the uniqueness of the effect of HIIT on cognition, supporting the theory that different cognitive domains may respond to it differently. [17] Results of another study conducted on individuals aged eight to ten years also contribute to evidence that HIIT effects cognition positively.

In this particular study, Stroop performance was significantly improved just one minute after HIIE (P < 0.01). Furthermore, these improvements were sustained for up to 30 minutes after the cessation of exercise. This suggests that the cognitive benefits of HIIE may manifest rapidly and endure beyond the exercise session, particularly in the context of children in this age group. [21]

The study conducted by Tsukamoto, involving 10 male participants evaluated the arousal level of participants by using the Felt Arousal Sale and for measuring attention they used the Color Word Stroop Task. The results revealed a significant increase in attention levels after High-Intensity Interval Exercise (HIIE). This further supports the notion that HIIE can have a positive impact on cognitive functions, including attention, as evidenced by changes in arousal and performance on cognitive tasks.[22]

Previously, it was believed that the impact of exercise intensity on cognition follows a U-shaped pattern, where moderate intensity improves cognitive function, but cognition declines at high intensity. [23] Contrary to the previous hypothesis, our recent research, along with other studies, does not support the idea of a U-shaped relationship between exercise intensity and cognition. [20]

In our study, high-intensity exercise improved selective attention compared to moderate exercise. This improvement in attention could be explained by psychophysiological mechanisms, including enhanced cerebral blood flow, which ensures an adequate supply of glucose and oxygen to the brain, and an overall improvement in psychological well-being. [8] It is further proposed that heightened levels of epinephrine and norepinephrine contribute to increased arousal, consequently leading to enhanced attention. [24]

CONCLUSION

Our study confirmed previous findings and demonstrated that even a single session of 15 minutes of High-Intensity Interval Training (HIIT) enhances selective attention. Moreover, our results indicate that HIIT improved selective attention to a greater extent as compared to moderate exercise of the same duration.

ACKNOWLEDGEMENTS

We acknowledge our laboratory team and the students who contributed to our study.

REFERENCES

1. Dasso NA, editor. How is exercise different from physical activity? A concept analysis. Nursing forum; 2019: Wiley Online Library.
2. Kenney WL, Wilmore JH, Costill DL. Physiology of sport and exercise: Human kinetics; 2021.
3. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1· 9 million participants. The lancet global health. 2018;6(10):e1077-e86.
4. Fisher G, Brown AW, Brown MMB, Alcorn A, Noles C, Winwood L, et al. High intensity interval-vs moderate intensity-training for improving cardiometabolic health in overweight or obese males: a randomized controlled trial. PloS one. 2015;10(10):e0138853.
5. Heisz JJ, Tejada MGM, Paolucci EM, Muir C. Enjoyment for high-intensity interval exercise increases during the first six weeks of training: implications for promoting exercise adherence in sedentary adults. PloS one. 2016;11(12):e0168534.
6. Lucas SJ, Cotter JD, Brassard P, Bailey DM. High-intensity interval exercise and cerebrovascular health: curiosity, cause, and consequence. Journal of Cerebral Blood Flow & Metabolism. 2015;35(6):902-11.
7. Shah Z, Ahmad F, Zahra M, Zulfiqar F, Aziz S, Mahmood A. Effect of single bout of moderate and high intensity interval exercise on brain derived neurotrophic factor and working memory in young adult females. Brain Plasticity. 2022;8(1):35-42.
8. Calverley TA, Ogoh S, Marley CJ, Steggall M, Marchi N, Brassard P, et al. HIITing the brain with exercise: mechanisms, consequences and practical recommendations. The Journal of Physiology. 2020.
9. Martland R, Mondelli V, Gaughran F, Stubbs B. Can high-intensity interval training improve physical and mental health outcomes? A meta-review of 33 systematic reviews across the lifespan. Journal of sports sciences. 2020;38(4):430-69.
10. Labban JD, Etnier JL. Effects of acute exercise on long-term memory. Research quarterly for exercise and sport. 2011;82(4):712-21.
11. Warburton DE, Jamnik V, Bredin SS, Shephard RJ, Gledhill N. The 2020 physical activity readiness questionnaire for everyone (PAR-Q+) and electronic physical activity readiness medical examination (ePARmed-X+): 2020 PAR-Q+. The Health & Fitness Journal of Canada. 2019;12(4):58-61.
12. ACSM S. American College of Sports Medicine Position Stand. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness, and flexibility in healthy adults. Med Sci Sports Exerc. 1998;30(6):975-91.
13. Medicine ACoS. ACSM's guidelines for exercise testing and prescription: Lippincott Williams & Wilkins; 2013.
14. Lim JU, Lee JH, Kim JS, Hwang YI, Kim T-H, Lim SY, et al. Comparison of World Health Organization and Asia-Pacific body mass index classifications in COPD patients. International journal of chronic obstructive pulmonary disease. 2017;12:2465.
15. Wechsler D. Wechsler memory scale (WMS-III): Psychological corporation San Antonio, TX; 1997.
16. Bahdur K, Gilchrist R, Park G, Nina L, Pruna R. Effect of HIIT on cognitive and physical performance. Apunts Medicina de l'Esport. 2019;54(204):113-7.
17. Kao S-C, Drollette ES, Ritondale JP, Khan N, Hillman CH. The acute effects of high-intensity interval training and moderate-intensity continuous exercise on declarative memory and inhibitory control. Psychology of Sport and Exercise. 2018;38:90-9.

18. Bullock T, Giesbrecht B. Acute exercise and aerobic fitness influence selective attention during visual search. Frontiers in Psychology. 2014;5:1290.

19. Walsh JJ, Dunlap C, Miranda J, Thorp DB, Kimmerly DS, Tschakovsky M, et al. Brief, high-intensity interval exercise improves selective attention in university students. International Journal of Exercise Science. 2018;11(5):152-67.

20. Alves CR, Tessaro VH, Teixeira LA, Murakava K, Roschel H, Gualano B, et al. Influence of acute high-intensity aerobic interval exercise bout on selective attention and short-term memory tasks. Perceptual and motor skills. 2014;118(1):63-72.

21. Lambrick D, Stoner L, Grigg R, Faulkner J. Effects of continuous and intermittent exercise on executive function in children aged 8–10 years. Psychophysiology. 2016;53(9):1335-42.

22. Tsukamoto H, Suga T, Takenaka S, Tanaka D, Takeuchi T, Hamaoka T, et al. Repeated high-intensity interval exercise shortens the positive effect on executive function during post-exercise recovery in healthy young males. Physiology & behavior. 2016;160:26-34.

23. Kashihara K, Maruyama T, Murota M, Nakahara Y. Positive effects of acute and moderate physical exercise on cognitive function. Journal of physiological anthropology. 2009;28(4):155-64.

24. McMorris T, Collard K, Corbett J, Dicks M, Swain J. A test of the catecholamines hypothesis for an acute exercise–cognition interaction. Pharmacology Biochemistry and Behavior. 2008;89(1):106-15.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Ahmad F	✓	×	✓	×	✓	×
Zahra M	✓	✓	×	✓	✓	×
Zoofeen U	×	✓	×	×	✓	×
Shah Z	✓	✓	✓	×	✓	✓
Mahmood A	✓	×	✓	×	✓	×
Afridi A	✓	✓	×	✓	✓	×
Zulfiqar F	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Girls Medical College, Peshawar. Vide No. 6065/ PGMED/KGMC. Dated: 20 09 2020

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

AN UPDATE ON CURRENT STATUS OF ANTIBIOTIC RESISTANCE IN SALMONELLA TYPHI: A RETROSPECTIVE ANALYSIS OF BLOOD CULTURE REPORTS FROM A TERTIARY CARE HOSPITAL, PAKISTAN

Mashal Khan[1], Muhammad Idrees[2], Manzoor Ur Rehman[3], Muhammad Osama[4], Pordil Khan[2], Hamza Ali Khan[5]

[1]Final Year MBBS Student, Khyber Medical College, Peshawar - Pakistan

[2]Department of Pathology, Khyber Medical College, Peshawar - Pakistan

[3]Medical Officer, Fauji Foundation Hospital, Lakki Marwat, Peshawar - Pakistan

[4]House Officer, Khyber Teaching Hospital, Peshawar - Pakistan

[5]Department of Medicine, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: Pakistan bears most of the burden of drug-resistant typhoid, challenging its healthcare systems with substantial cost. This study's purpose is to investigate resistance in community-acquired salmonella typhi to guide its evidence-based empiric treatment.

Material & Methods: This study used retrospective data from the microbiology laboratory, Khyber Teaching Hospital, Peshawar (September 2022-March 2023). Data of routine diagnostic samples for typhoid was retrieved from the database. Kirby–Bauer disk diffusion method was employed to determine the sensitivity of S. Typhi against a panel of 21 selected antibiotic discs (not exclusively for each isolate).

Results: Among 1742 suspected patients, 239 (13.92%) were positive for S. Typhi with 212/238 (89.1%), 227/233 (97.4%), and 196/239 (82.0%) isolates resistant to chloramphenicol, ampicillin, and trimethoprim-sulfamethoxazole, respectively. High resistance (88.0% to ciprofloxacin) was detected against fluoroquinolones. Third-generation cephalosporins also showed poor activity with 144/158 (91.1%) and 120/136 (88.2%) resistance towards ceftriaxone and cefixime, respectively, except for cefoperazone/sulbactam (2/123, 1.6%). Among 157 tested isolates, 3 (1.9%), 9 (5.7%), and 123 (78.3%) were labeled as non-resistant, MDR, and XDR strains, respectively. XDRs were less resistant to azithromycin (1/114), piperacillin/tazobactam (1/123), carbapenems (0/123), and tigecycline (0/123).

Conclusion: XDR S. Typhi was observed as the dominant strain in Peshawar regions for which azithromycin is still the drug of choice. With emerging resistance, azithromycin safety should be ensured through antibiotic stewardship principles. An interesting finding was the enhanced activity of cefoperazone/sulbactam, suggesting future studies. Alternative options are expensive antibiotics which can be used as a last resort.

Keywords: Typhoid, Antibiotic resistance, Extensive drug-resistant (XDR) S. Typhi, Pakistan.

This article may be cited as: Khan M, Idrees M, Rehman MU, Osama M, Khan P, Khan HA. An Update On Current Status Of Antibiotic Resistance In Salmonella Typhi: A Retrospective Analysis Of Blood Culture Reports From A Tertiary Care Hospital, Pakistan. J Med Sci 2024 July-September;32(3):260-266

INTRODUCTION

Salmonella enterica serotype Typhi (S. Typhi), a rod-shaped gram-negative bacterium, is the causative organism of enteric fever, commonly known as typhoid fever. It spreads through the fecal-oral route and more frequently affects the pediatric population in the developing world. [1] Nonavailability of clean water and an unhygienic environment have been attributed to its widespread prevalence among poor countries. [2] Lack of adequate diagnostic tools and the spread of resistant strains in such countries make it even more challenging. According to a 2019 report by the Institute for Health Metrics and Evaluation (IHME), each year across the globe approximately 9 million cases and 110,000 deaths occur due to typhoid. [3]

The rapid but obsolete serological tests for typhoid fever diagnosis such as Widal and Typhidot are already banned in Pakistan because of their diagnostic inaccu-

Correspondence
Dr. Muhammad Idrees
Department of Pathology, Khyber Medical College, Peshawar - Pakistan
Cell: +92-334-9153079
Email: dr.idreeskhan2036@gmail.com
Date Received: 04/05/2024
Date Revised: 12/07/2024
Date Accepted: 20/08/2024

racy. [4] The gold standard is the blood culture test which makes it even more important to curb inappropriate use of antibiotics. Additionally, current automated blood culture systems are preferred now for their enhanced sensitivity, rapidity, and less contamination over conventional methods. [5, 6] Among the available tests to check in vitro resistance such as disk diffusion, broth microdilution, or agar dilution methods, keeping in view the cost, speed, and convenience of equipment, the disc diffusion method is employed in our setup. [7]

Antibiotics serve as the mainstay treatment for typhoid. The popular approach in the endemic regions is that these cases are dealt with in outpatient settings while only a few needs hospitalization. [8] Traditionally, chloramphenicol, ampicillin, and trimethoprim-sulfamethoxazole have been used as the first-line treatment for S. typhi. [9] They were rendered ineffective in the 1990s when multidrug-resistant (MDR) strains emerged in South-East Asia. Fluoroquinolones became the preferred therapeutic agents for MDR. [10] But soon in 1997, such MDR strains were isolated that had acquired resistance to ciprofloxacin as well. Third-generation cephalosporins became widely used as a drug of choice for fluoroquinolones non-susceptible MDRs. [11] In 2016, several years after its usage, Pakistan detected isolates in a typhoid outbreak which were more powerfully resistant even to ceftriaxone named as extensively drug-resistant (XDR) S. typhi. [12] Resistance to third-generation cephalosporins is attributed to salmonella acquisition of ESBLs (CTX-M genes). [13] Although, there are propositions about independent multi-centric origin of the XDR strains in Pakistan, Nepal, and Bangladesh. [14] XDRs have not only been endemic in Pakistan [15] since then but also have spread beyond borders to USA [15, 16], Canada [17], Italy [18,] and other Asian countries. [19] The last resort and remaining options for XDR strains are oral azithromycin or intravenous carbapenem [9] which are already prescribed as empiric treatment in endemic regions. [4]

XDR emergence is marked as a crucial event in the evolution of anti-microbial resistance (AMR). These strains are already challenging healthcare systems across the globe with substantial cost, pushing for more expensive antibiotics and complicated management of a former easily treatable illness. [20] The Strategic Advisory Group of Experts (SAGE) of WHO has endorsed conjugated typhoid vaccines for several population groups. Pakistan has taken the lead in this regard by initiating vaccination campaigns in the endemic parts of the country in 2019. [21]

Our hospital is a sentinel site for AMR surveillance. The purpose of this study is to investigate the current status of antibiotic resistance in community-acquired S. Typhi in the blood cultures of typhoid fever suspected patients in Khyber Teaching Hospital, Peshawar. These results will consequently guide evidence-based empiric treatments for typhoid fever and will further improve typhoid-control practices.

MATERIALS AND METHODS

This study was carried out on the retrospective data in the microbiology laboratory, department of Pathology of Khyber Teaching Hospital (KTH) Peshawar which serves as a tertiary care hospital. Seven months` data was retrieved from the laboratory database which was generated as a result of active surveillance of the resistance of the pathogen from the community it serves between the duration of September 2022 to March 2023. At the time of the commencement of this study, reports of the samples were already completed which were collected for the diagnosis and treatment purpose. The microbiology laboratory of KTH is a biosafety level 2 (BSL 2) public health laboratory and provides clinical services to promote evidence-based medicine in the hospital. It has the facility of an automated blood culture system (Versa Trek, USA). The hospital also serves as a sentinel site for monitoring resistance patterns of different pathogens.

Documented histories of patients` illnesses were recovered from clinical records as taken by their dealing physician. Patients whose culture yielded positive results for pathogens other than S. Typhi were excluded.

The 21 antibiotics checked for their sensitivity towards S. Typhi were; Chloramphenicol (30ug), amoxicillin (10µg), Trimethoprim-Sulfamethoxazole (25ug), Ciprofloxacin (5ug), Moxifloxacin (5ug), Levofloxacin (5ug), Ceftriaxone (30µg), Cefixime (30µg), Cefoperazone/sulbactam (75/30µg), Cefotaxime (30µg), Ceftazidime (30µg), Azithromycin (15µg), meropenem (10µg), Doripenem (10µg), Imipenem (10µg), Ertapenem (10µg), Piperacillin/tazobactam (110µg), Tigecycline (15µg), Gentamicin (10µg), Amoxicillin/clavulanic acid (30µg), and Cefepime (10µg). All of the isolates were not checked exclusively for all the antibiotics mentioned.

The World Health Organization (WHO) criteria [22] were used to interpret non-resistant, MDR, and XDR strains as shown in Table 1. Age and gender data were also obtained from the database. Duration of illness, outcome, and any prior use of antibiotics were not taken into account. The study was approved by the Institutional Research and Ethical Review Board (IREB) of Khyber Medical College Peshawar under reference number 408/DME/KMC dated; 13/7/2023.

After data acquisition from the laboratory database, it was entered into S.P.S.S version 24.0 for Windows (SPSS Inc., Chicago, IL, USA). Cases with only positive cultures for S. Typhi were considered for analysis. After careful examination, subsequently, any missing values were identified and endorsed in the analysis. Quantitative data i.e., age was presented as mean ± SD while qualitative data such as gender and resistance status were presented as frequencies and percentages.

RESULTS

A total blood samples of 1742 typhoid-suspected patients of which 949 (54.5%) were males and 793 (45.5%) females, were received in the microbiology laboratory during the study period. Their mean age was 17.64 ± 15.68 (years). After the isolation process, 239 samples were found positive for S.Typhi with a positivity rate of 13.92%. The majority of isolates were detected in males (147, 61.5%) as compared to females (92, 38.5%). The age distribution of the diagnosed patients was positively skewed with a mean of 12.33 ± 10.32 (years) and a median of 9 years (Range = 0-70 years). Due to the high positivity rate among younger patients, 93.7% (223/239) of the confirmed cases were up to 30 years (Range = 0-70 years) while only 81.68% (1422/1742) of all the combined suspected cases were up to 30 years (Range = 0-100 years).

Among the tested isolates, high resistance was seen against the first-line, second-line, and third-line agents, as shown in Figure 1.

Of the 239 positive isolates, 232 had been tested for all three first-line antibiotics. Only 180/232 (77.6%) were found to be resistant to all three antibiotics.

Further, 157/239 were tested for the three first-line agents plus fluoroquinolones and third-generation cephalosporins. Among them, only 3/157 (1.9%) were susceptible to all the first-line agents plus third-generation cephalosporins and labelled as non-resistant. Additionally, 9/157 (5.7%) were resistant to all first-line antibiotics and susceptible to third-generation cephalosporins and were labeled as multiple drug-resistant (MDR). While 123/157 (78.3%) were resistant to all of the five classes of drugs and labeled as extensively drug-resistant (XDR) (Table 2).

All of the labeled MDRs (n = 9) were found susceptible to fluoroquinolones (9/9 ciprofloxacin, 3/3 moxifloxacin, 4/4 levofloxacin). The susceptibility of XDRs is given in Table 3.

DISCUSSION

The current study yields very concerning data about the newly evolved resistances in S. Typhi from a tertiary care hospital in Pakistan. Over three-quarters of isolates were found resistant to all three first-line agents. Almost 90% were resistant to all fluoroquinolones and the

Table No 1: WHO criteria for Non-resistant, MDR and XDR Salmonella Typhi

Non-resistant	If the isolates are sensitive to first-line antibiotics (ampicillin, chloramphenicol, and trimethoprim-sulfamethoxazole) as well as to third-generation cephalosporins (ceftriaxone and cefixime), with or without resistant to second-line antibiotics (quinolones and fluoroquinolones).
Multi drug-resistant	If the isolates are resistant to first-line antibiotics but sensitive to third-line antibiotics (third-generation cephalosporins), with or without resistant to second-line antibiotics.
Extensively drug-resistant	If S. typhi is resistant to all three lines of antibiotics (ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole, ceftriaxone, cefixime, quinolones, and fluoroquinolones) but still sensitive to few antibiotics like azithromycin and carbapenems.

Table No 2: Classification of Salmonella Typhi isolates by Antibiotic resistance status (Data from Khyber Teaching Hospital Peshawar, Pakistan during Sep 01, 2022 to Mar 31, 2023, N = 157*)

Status	n (%)
Non-resistant	3 (1.9)
Multi drug-resistant (MDR)	9 (5.7)
Extensively drug-resistant (XDR)	123 (78.3)
Footnote: * Tested for first, second and third-line antibiotics exclusively	

Table No 3: Extensively drug-resistant (XDR) Salmonella Typhi isolates susceptibility to tested antibiotics (N = 123)

Antibiotics	No. of XDRs tested	Sensitive, n (%)	Resistant, n (%)
Cefoperazone/sulbactam	123	121 (98.4)	2 (1.6)
Cefotaxime	27	1 (3.7)	26 (96.3)
Ceftazidime	36	2 (5.6)	34 (94.4)
Azithromycin	114	113 (99.1)	1 (0.9)
Meropenem	123	123 (100.0)	0 (0.0)
Doripenem	31	31 (100.0)	0 (0.0)
Imipenem	36	36 (100.0)	0 (0.0)
Ertapenem	36	36 (100.0)	0 (0.0)
Piperacillin/tazobactam	123	122 (99.2)	1 (0.8)

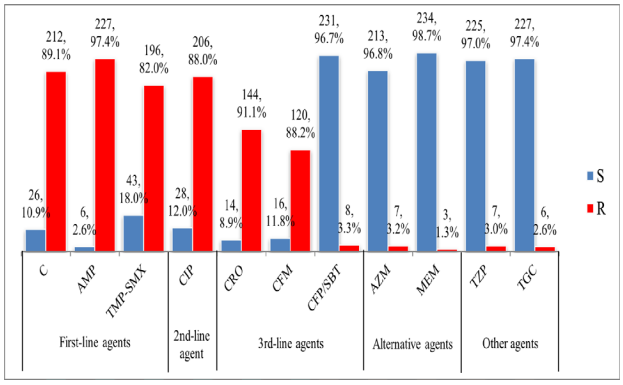

Fig 1: Antibiotic susceptibility of Salmonella Typhi isolates (Data from Khyber Teaching Hospital Peshawar, Pakistan from September 01, 2022, to March 31, 2023, N = 239)

(S = Sensitive, R = Resistant, C = Chloramphenicol, AMP = amoxicillin, TMP-SMX = Trimethoprim-Sulfamethoxazole, CIP = Ciprofloxacin, CRO = Ceftriaxone, CFM = Cefixime, CFP/SBT = Cefoperazone/sulbactam, AZM = Azithromycin, MEM = Meropenem, TZP = Piperacillin/tazobactam, TGC = Tigecycline).

same percentage had acquired resistance to third-generation cephalosporins (ceftriaxone and cefixime). Among the limited number of choices left for the treatment, carbapenems, and Tigecycline were found as superior choices for the XDR strains. Azithromycin, cefoperazone/sulbactam, and piperacillin/tazobactam combinations were also found to have excellent activity with minimum resistance.

In our results, we saw positive isolates of S. Typhi to be predominant among male and younger patients. The majority of the articles encountered during the literature search have obtained consistent findings like ours for both gender and age except for a single study which showed female predominance. [23-26, 27] A possibility for increased incidence among males would be that males spend more time outside the home and observe more unhygienic practices. [28] Likewise, a weak immune system in childhood could be the leading factor that predisposes them to infections more compared to other age groups. [29]

A high resistance against the three first-line agents which makes its usage obsolete has already been reported by many authors during the past years. Khan M et al. (2020-2021) showed absolute resistance to chloramphenicol and ampicillin. [24] Another study by Hussain A. et al. found 80% resistance to all three agents. [25] These and other studies [13, 30] further reinforce the contraindication of the first-line agents anymore for typhoid treatment. In addition, our findings about fluoroquinolone resistance are also closely aligned with the past study in Karachi, which showed 89% resistance to ciprofloxacin [30] while another reported 100% resistance to it [24], slightly higher than our findings thus making this class of drug a poor choice for the prevalent strains.

Many past national studies have shown the prevalence of XDR strains to be 5% (Islamabad) [31], 9% (Karachi) [23], 40% (Lahore) [13], and 48% (Karachi) [25, 30] while only a bunch of cases have been reported in other countries. [14, 16] In comparison to these studies, our data shows 78% prevalence of XDRs proving that alarmingly it has now taken over as the dominant strain in Peshawar region as well. Third-generation cephalosporins which have long been the drug of choice and still are in non-endemic countries are also demonstrated in our study to have high resistance against it i.e., 91.1% to ceftriaxone and 88.2% to cefixime. Past studies indicate a progressive rising trend in their resistance with time after XDR's emergence in 2016 as an epidemic in Sindh. Fatima G et al. in 2017-18 found a resistance of 55% and 50%, respectively [30] while later in 2019, a resistance of 63% and 71%, respectively were observed for these two agents. [23] Our findings in this regard are coherent with this rising trajectory and suggest that as no longer an option for treatment. Further, the majority of our data come from winter months i.e., September to March, depicting that XDR cases are no longer appearing based on seasonality, i.e., post-rainy months but also in winter as endorsed by other studies. [24, 30]

In our study, resistance against azithromycin was detected in 7 (3.2%) isolates overall while only 1 was XDR as well. Meropenem had on the other hand 3 resistant strains, imipenem and ertapenem 1 each while all carbapenems were the most stable with 100% sensitivity against XDRs. Similar results have been obtained by other studies that show 100% sensitivity of these two classes of drugs towards XDR. [23, 24, 30] Then there are others where resistance has been detected to azithromycin in Karachi [25], Lahore [13], and Nepal [32]. Similarly, there are now case reports of meropenem resistance as well. [15, 33] Resistance to azithromycin and carbapenems is a new emerging problem where we have already started heading. While azithromycin resistance has increased across Southeast Asian countries during these years after its emergence in Bangladesh in 2019, [34] a contributing factor to it was its injudicious use during the COVID-19 pandemic. A multi-national study across 71 countries found that most sold broad-spectrum antibiotics during the pandemic were macrolides. [35] The rate of bacterial co-infection is only 8% with COVID-19 [36], but an Egyptian study estimated 75% of them receive antibiotics with azithromycin being on the top of the list. [37] It is noteworthy that although carbapenem resistance is lowest at this point, its resistance has been witnessed in non-typhoidal salmonella, and soon, it is feared that it will spread to S. Typhi thus marking the emergence of pan-drug resistant strains [38] as 14 of its cases are previously reported from Pakistan. [39] Our study is based on in vitro activity and not on clinical experience. The clinical response to these last-resort drugs might not be as anticipated.

Many studies have proposed the importance of multi-drug regimens for XDR typhoid and its control. The regimen of azithromycin (bactericidal) plus meropenem (bacteriostatic) has been suggested by a study at Aga Khan University Hospital (AKUH), Karachi, to have superior activity with better clinical outcomes than azithromycin

alone. [40] Even before the emergence of XDR, a comparative study by Zmora N et al. in Nepal showed the superiority of azithromycin plus ceftriaxone over either alone because of their synergistic mechanism of action. It reduced the time to defervescence, hospital stay, decreased chronic carrier state, and hence the chance of resistance. [41] But the reason why carbapenems could not be prescribed to the large scale population is that the per day cost of azithromycin is just US$5.87 whereas for meropenem it is US$88.46 in Pakistan. [40] At present, due to its low cost, oral azithromycin is still the preferred optimal treatment and not intra-venous meropenem in countries with poor socioeconomic status like ours.

XDR has spread to other countries from Pakistan through travelers. Data from the Centre for Disease Control (CDC's) Surveillance system from 2018 to 2021 regarding XDR typhoid cases reported that 88% of the patients had travel history to or from Pakistan. While all were susceptible to azithromycin and meropenem. [27] A review article about the history of XDR S. Typhi has concluded that 2018 and 2019 as the years when intercontinental transmission of XDR typhoid cases occurred to the USA, UK, and Canada from Pakistan. [38] Keeping that in mind, the right empiric treatment choice for cases of typhoid among travelers to XDR endemic regions would be azithromycin, a carbapenem, or both.

One of our significant findings was the astonishing activity of cefoperazone combination with a beta-lactamase inhibitor, salbactam. We could not find an article looking into the details of this third-generation cephalosporin therapeutic function against XDR S. typhi strains but previously rather poor sensitivity has been reported. [42] Due to our compelling results, its curative potential should be explored by other such studies to ascertain its clinical capability. Among the other drugs tested, we found good in vitro activity of the piperacillin/tazobactam combination (with only one XDR as resistant) and Tigecycline. The piperacillin/tazobactam effectiveness has been proven in the past by Jabeen K et al. with 98% sensitivity [13] and others with 100% sensitivity against XDR. [27, 30] Similarly, the excellent activity of Tigecycline has also been repeatedly reported. [43, 44] But like carbapenems, the impediment to their clinical application is cost and affordability.

Apart from active treatment for XDR containment, vaccine campaigns have been carried out in endemic regions of the country which have yielded success to an extent. [45] Other prevention strategies, including mass hygiene awareness, sanitation, and provision of clean drinking water have been conducted that had a positive impact in this regard. [46] But given the worsening situation, for such activities to have a meaningful impact, they should be encouraged on a national scale in a pro-active approach, instead of being limited to only endemic parts.

This study has several limitations. Firstly, the data retrieved from the laboratory had only two categories (sensitive/resistant) without including the intermediate category for the resistance status. Secondly, all isolates were not tested against the full panel of 21 antibiotics. Hence care should be taken while interpreting resistance to individual antibiotics with attention to their percentage and isolates tested. Thirdly, since our study used the disc diffusion method, which could only provide qualitative data about the resistance, we could not obtain minimum inhibitory concentration (MIC) values which are more important to see the true quantitative extent of resistance. Another limitation is that it is not a multi-centric study and could not reflect the situation in the rest of the country.

CONCLUSION

XDR salmonella typhi has taken over as the dominant strain in the Peshawar regions as well. Oral azithromycin is still the drug of choice for empiric treatment of typhoid in endemic regions. A more proactive approach is necessary to ensure the safety of this drug. Moreover, enhanced surveillance of the pathogen resistance patterns and prescribing antibiotics only after culture and sensitivity (C/S) reports are recommended for all the suspected cases. The catastrophe of azithromycin resistance is already upon us. Other viable but expensive treatment options left are carbapenems, tigecycline, and piperacillin/tazobactam which should be provided by the government looking at its cost. We should start looking into alternative cheap treatment options and observe their clinical outcomes for the XDR strains.

REFERENCES

1. Mukhopadhyay B, Sur D, Gupta SS, Ganguly NK. Typhoid fever: Control & challenges in India. Indian J Med Res. 2019 Nov 1;150(5):437-47.
2. Stanaway JD, Reiner RC, Blacker BF, Goldberg EM, Khalil IA, Troeger CE et al. The global burden of typhoid and paratyphoid fevers: A systematic analysis for the Global Burden of Disease Study 2017. Lancet Infect Dis. 2019 Apr 1;19(4):369-81.
3. Institute for Health Metrics and Evaluation. Typhoid fever–level 4 cause. Seattle, WA: Institute for Health Metrics and Evaluation, Global Burden of Disease Collaborative Network; 2020. Available from: http://www.healthdata.org/results/gbd_summaries/2019/typhoid-fever-4-cause.
4. Medical Microbiology & Infectious Diseases Society of Pakistan. Typhoid Management Guidelines – 2022. Available from: https://www.mmidsp.com/guidelines/
5. Ahmad A, Iram S, Hussain S, Yusuf NW. Diagnosis of paediatric sepsis by automated blood culture system and conventional blood culture. J Pak Med Assoc. 2017 Feb:67(2):192-195.
6. Shahid S, Mahesar M, Ghouri N, Noreen S. A review of clinical profile, complications and antibiotic susceptibility pattern of extensively drug-resistant (XDR) Salmonella Typhi isolates in children in Karachi. BMC Infect Dis. 2021 Dec;21:1-9.
7. Balouiri M, Sadiki M, Ibnsouda SK. Methods for in vitro evaluating antimicrobial activity: A review. J Pharm Anal. 2016 Apr 1;6(2):71-9.

8. Crump JA, Sjolund-Karlsson M, Gordon MA, Parry CM. Epidemiology, clinical presentation, laboratory diagnosis, antimicrobial resistance, and antimicrobial management of invasive Salmonella infections. Clin Micro Rev 2015; 28:901–37.
9. Marchello CS, Carr SD, Crump JA. A systematic review on antimicrobial resistance among Salmonella Typhi worldwide. Am J Trop Med Hyg. 2020 Dec;103(6):2518.
10. Bhutta ZA. Current concepts in the diagnosis and treatment of typhoid fever. BMJ. 2006 Jul 6;333(7558):78-82.
11. Parry CM, Qamar FN, Rijal S, McCann N, Baker S, Basnyat B. What should we be recommending for the treatment of enteric fever? Open Forum Infect Dis. 2023 June 2;10(Suppl 1):S26-S32.
12. Qamar FN, Yousafzai MT, Khalid M, Kazi AM, Lohana H, Karim S et al. Outbreak investigation of ceftriaxone-resistant Salmonella enterica serotype Typhi and its risk factors among the general population in Hyderabad, Pakistan: A matched case-control study. Lancet Infect Dis. 2018 Dec 1;18(12):1368-76.
13. Jabeen K, Saleem S, Jahan S, Nizamudin S, Arshad F, Huma ZE et al. Molecular characterization of extensively drug resistant salmonella enterica serovar typhi clinical isolates from Lahore, Pakistan. Infect Drug Resist. 2023 May 12:2987-3001.
14. Tanmoy AM, Westeel E, De Bruyne K, Goris J, Rajoharison A, Sajib MS et al. Salmonella enterica serovar typhi in Bangladesh: Exploration of genomic diversity and antimicrobial resistance. mBio. 2018 Dec 21;9(6):10-128.
15. Caravedo MA, Kaura A, Reynoso D. Extensively drug-resistant salmonella typhi in a patient returning from Pakistan, complicated by relapse with meropenem monotherapy. IDCases. 2021 Jan 1;23:e01048.
16. Watkins LK, Winstead A, Appiah GD, Friedman CR, Medalla F, Hughes MJ et al. Update on extensively drug-resistant Salmonella serotype Typhi infections among travelers to or from Pakistan and report of ceftriaxone-resistant salmonella serotype typhi infections among travelers to Iraq—United States, 2018–2019. Morb Mortal Wkly Rep. 2020 May 5;69(20):618.
17. Eshaghi A, Zittermann S, Bharat A, Mulvey MR, Allen VG, Patel SN. Importation of extensively drug-resistant salmonella enterica serovar typhi cases in Ontario, Canada. Antimicrob Agents Chemother. 2020 Apr 21;64(5):10-128.
18. Chirico C, Tomasoni LR, Corbellini S, De Francesco MA, Caruso A, Scaltriti E et al. The first Italian case of XDR salmonella typhi in a traveler returning from Pakistan, 2019: An alert for increased surveillance also in European countries? Travel Med Infect Dis. 2020;36:101610.
19. Argimón S, Nagaraj G, Shamanna V, Sravani D, Vasanth AK, Prasanna A et al. Circulation of third-generation cephalosporin resistant Salmonella Typhi in Mumbai, India. Clin Infect Dis. 2022 Jun 15;74(12):2234-7.
20. Khanam F, Ross AG, McMillan NA, Qadri F. Toward typhoid fever elimination. Int J Infect Dis. 2022 Jun 1; 119:41-3.
21. Nampota-Nkomba N, Carey ME, Jamka LP, Fecteau N, Neuzil KM. Using typhoid conjugate vaccines to prevent disease, promote healthy equity, and counter drug-resistant typhoid fever. Open Forum Infect Dis 2023 June 2;10(Suppl 1):S6-S12.
22. World Health Organization. Typhoid outbreak in Pakistan. Disease outbreak News. 2018 Dec 27. Available from: http://www.who.int/emergencies/disease-outbreak-news/27-december-2018-typhoid-pakistan-en
23. Hasan SM, Razzak S, Shabbir A, Hasan SM, Husain M. Extensively drug-resistant typhoid: Antibiotic susceptibility pattern of an emerging menace in Karachi. Pak J Med Dent. 2023:18-23.
24. Khan M, Tu-Zahra F, Gul A, Saleem MZ, Riaz M, Gul W. Extensively drug-resistant salmonella enterica serovar typhi in pediatric population during COVID-19 pandemic. Int J Infect Dis. 2022 Mar 1;116:S4.
25. Hussain A, Satti L, Hanif F, Zehra NM, Nadeem S, Bangash TM et al. Typhoidal salmonella strains in Pakistan: An impending threat of extensively drug-resistant salmonella typhi. Eur J Clin Microbiol Infect Dis. 2019 Nov;38:2145-9.
26. Khadka S, Shrestha B, Pokhrel A, Khadka S, Joshi RD, Banjara MR. Antimicrobial resistance in salmonella typhi isolated from a referral hospital of Kathmandu, Nepal. Microbiol Insights. 2021 Dec;14:11786361211056350.
27. Hughes MJ, Birhane MG, Dorough L, Reynolds JL, Caidi H, Tagg KA et al. Extensively drug-resistant typhoid fever in the United States. Open Forum Infect Dis. 2021 Nov 16;8(12): ofab572.
28. Vighio A, Syed MA, Hussain I, Zia SM, Fatima M, Masood N et al. Risk factors of extensively drug resistant typhoid fever among children in Karachi: Case-control study. JMIR Public Health and Surveill. 2021 May 11;7(5):e27276.
29. Simon AK, Hollander GA, McMichael A. Evolution of the immune system in humans from infancy to old age. Proc R Soc B: Biol Sci. 2015 Dec 22;282(1821):20143085.
30. Fatima G, Kazmi SS, Kainat S. XDR/MDR Salmonella: An experience from a tertiary care hospital, Karachi, Pakistan. Int J Infect Dis. 2020 Dec 1;101:37.
31. Saeed N, Usman M, Khan EA. An overview of extensively drug-resistant Salmonella Typhi from a tertiary care hospital in Pakistan. Cureus. 2019 Sep 16;11(9).
32. Duy PT, Dongol S, Giri A, Nguyen To NT, Dan Thanh HN, Nhu Quynh NP et al. The emergence of azithromycin-resistant salmonella typhi in Nepal. JAC Antimicrob Resist. 2020 Dec;2(4):dlaa109.
33. Blumentrath CG, Müller G, Teichmann D, Tiesmeier J, Petridou J. Relapse of typhoid fever following delayed response to meropenem: A case report and review of previously published cases indicating limited clinical efficacy of meropenem for the treatment of typhoid fever. Ger Med Sci. 2019;17.
34. Sajib MS, Tanmoy AM, Hooda Y, Rahman H, Andrews JR, Garrett DO et al. Tracking the emergence of azithromycin resistance in multiple genotypes of typhoidal salmonella. MBio. 2021 Feb 23;12(1):10-128.
35. Nandi A, Pecetta S, Bloom DE. Global antibiotic use during the COVID-19 pandemic: Analysis of pharmaceutical sales data from 71 countries, 2020–2022. Eclinicalmedicine. 2023 Mar 1;57.
36. Lai CC, Chen SY, Ko WC, Hsueh PR. Increased antimicrobial resistance during the COVID-19 pandemic. Int J

Antimicrobial Agents. 2021 Apr 1;57(4):106324.

37. Elsayed AA, Darwish SF, Zewail MB, Mohammed M, Saeed H, Rabea H. Antibiotic misuse and compliance with infection control measures during COVID-19 pandemic in community pharmacies in Egypt. Int J Clin Pract. 2021 Jun;75(6):e14081.
38. Akram J, Khan AS, Khan HA, Gilani SA, Akram SJ, Ahmad FJ et al. Extensively drug-resistant (XDR) typhoid: evolution, prevention, and its management. BioMed Res Int. 2020 May 2;2020.
39. Ain Q, Tahir M, Sadaqat A, Ayub A, Awan AB, Wajid M et al. First detection of extensively drug-resistant salmonella typhi isolates harboring VIM and GES genes for carbapenem resistance from Faisalabad, Pakistan. Microbial Drug Resist 2022; 28:1087–98.
40. Qureshi S, Naveed AB, Yousafzai MT, Ahmad K, Ansari S, Lohana H et al. Response of extensively drug resistant salmonella typhi to treatment with meropenem and azithromycin, in Pakistan. PLoS Negl Trop Dis. 2020 Oct 15;14(10):e0008682.
41. Zmora N, Shrestha S, Neuberger A, Paran Y, Tamrakar R, Shrestha A et al. Open label comparative trial of mono versus dual antibiotic therapy for typhoid fever in adults. PLoS Negl Trop Dis. 2018 Apr 23;12(4):e0006380.
42. Zakir M, Khan M, Umar MI, Murtaza G, Ashraf M, Shamim S. Emerging trends of multidrug-resistant (MDR) and extensively drug-resistant (XDR) salmonella typhi in a tertiary care hospital of Lahore, Pakistan. Microorganisms. 2021 Nov 30;9(12):2484.
43. Butt MH, Saleem A, Javed SO, Ullah I, Rehman MU, Islam N et al. Rising XDR-typhoid fever cases in Pakistan: Are we heading back to the pre-antibiotic era? Front Public Health. 2022 Jan 17;9:794868.
44. Dyson ZA, Klemm EJ, Palmer S, Dougan G. Antibiotic resistance and typhoid. Clin Infect Dis. 2019 Mar 7;68(Supplement_2):S165-70.
45. Qamar FN, Batool R, Qureshi S, Ali M, Sadaf T, Mehmood J et al. Strategies to improve coverage of typhoid conjugate vaccine (TCV) immunization campaign in Karachi, Pakistan. Vaccines. 2020 Nov 19;8(4):697.
46. Yousafzai MT, Qamar FN, Shakoor S, Saleem K, Lohana H, Karim S et al. Ceftriaxone-resistant salmonella typhi outbreak in Hyderabad City of Sindh, Pakistan: High time for the introduction of typhoid conjugate vaccine. Clin Infect Dis. 2019 Feb 15;68(Supplement_1): S16-21.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Khan M	✓	×	✓	×	✓	×
Idrees M	✓	✓	×	✓	✓	×
Rehman MU	×	✓	×	×	✓	×
Osama M	✓	✓	✓	×	✓	✓
Khan P	✓	✓	×	✓	✓	×
Khan HA	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 408/DME/KMC. Dated: 13 07 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

UNVEILING TRENDS; SELF-MEDICATION WITH ANTIBIOTICS AND ITS ASSOCIATED FACTORS IN THE ADULT POPULATION OF SOUTH WAZIRISTAN

Rubeena Gul[1], Muhammad Haroon[2], Muhammad Saleh Faisal[3], Salahuddin Zeb Khan[4], Aimeen Zeb Khan[5], Naveeda Sarwar[6]

[1]Department of Community Medicine, Khyber Medical College, Peshawar - Pakistan

[2]Department of Public Health, Institute of Management Sciences, Peshawar - Pakistan

[3]Department of Pharmacology, Khyber Medical College, Peshawar - Pakistan

[4]Department of Prosthodontics, Sardar Begum Dental College, Peshawar - Pakistan

[5]Department of Prosthodontics, Rehman College of Dentistry, Peshawar - Pakistan

[6]Department of Community Medicine, Pak International Medical College, Peshawar - Pakistan

ABSTRACT

Objectives: To determine the frequency of self-medication with antibiotics and its causative factors in South Waziristan.

Material and Methods: A cross-sectional study was conducted in the Tehsil Wana of South Waziristan, Khyber Pakhtunkhwa. A total of 400 participants were selected using a convenient random sampling technique. Data was collected by using a structured questionnaire after obtaining informed consent. The questionnaire included demographics, socioeconomic variables, and information on self-medication with antibiotics i.e. reason for self-medication, source of procurement, symptoms that lead to self-medication, and type of antibiotic used.

Results: Of 400 subjects, 373 (93.25%) agreed to participate. The frequency of antibiotic self-medication in the study area was 84.5%. The most common reason for self-medication with antibiotics was saving money (38%). The common antibiotic used by most study participants was Amoxicillin/Clavulanic acid (42%) with respiratory tract infections as the most common indication for their usage (62%). A significant association between self-medication of antibiotics was observed with age, marital, education, and economic status of the respondents ($p<0.05$). No significant association of self-medication was found with gender distribution (p-value 0.438).

Conclusion: The study showed a significantly high prevalence of self-medication practices with antibiotics, revealing a strong association with socio-demographic factors. A multi-sectoral approach is needed to deal with this alarming situation in this war-affected underdeveloped district of Khyber Pakhtunkhwa.

Keywords: Self-medication, Antibiotics, Adult population, Waziristan, Khyber Pakhtunkhwa

This article may be cited as: Gul R, Haroon M, Faisal MS, Khan SZ, Khan AZ, et al. Unveiling Trends; Self-Medication With Antibiotics And Its Associated Factors In The Adult Population Of South Waziristan. J Med Sci 2024 July-September;32(3):267-271

INTRODUCTION

"Self-medication is the self-use of any pharmaceutical product for the treatment of any self-diagnosed experience and symptoms without consultation with a health care provider". [1] It is a public health concern across the world. Reports suggest that the prevalence of self-medication in northern Europe is 3% as compared to 4 to 75% in Asia. In Pakistan, few studies are conducted in this regard revealing a higher prevalence of self-medication i.e. 61.2% in the rural population of Islamabad and 80.4% in Karachi. [2] Among the self-medication of drugs, self-medication of antibiotics is of more concern because its irrational use causes the development of antibiotic resistance strains, resulting in the treatment failure of previously treatable bacterial diseases. In this regard, the United Nations General Assembly passed a declaration of global cooperation for fighting against anti-microbial resistance in 2016. [3]

The prevalence of antibiotic self-medication in underdeveloped countries is much higher. Factors like lack of awareness, health care facilities, high cost of health, and irrational prescription of antibiotics by health profes-

Correspondence
Dr. Muhammad Saleh Faisal
Assistant Professor
Department of Pharmacology, Khyber Medical College, Peshawar - Pakistan
Cell: +92-347-5244271
Email: drsalehfaisal@gmail.com
Date Received: 16-05-2024
Date Revised: 02-8-2024
Date Accepted: 27-8-2024

sionals contribute to this ill practice. [4] Despite the efforts of global and regional health authorities, the purchase of antibiotics without prescription is an increasing trend globally. It is reported to be 47% in Southern Europe, 30% in Eastern Europe, 25% in South America, 39% in the Middle East, and 58% in Asia. [5] Pakistan, being an underdeveloped country, has a similar position. The irrational use of antibiotics leads to complications like drug interactions, under or over-drug dosing, incorrect diagnosis, and delays in appropriate treatment. All these factors contribute to the emergence of antibiotic-resistant strands of bacteria. In 2014, WHO published a report declaring this serious issue an emergency where we are heading towards an antibiotic-resistant era. [6]

In another WHO report, more than 50% of antibiotics are used irrationally, while 50% of the patients do not follow the recommended dosage and duration. [7] Most people treat illness through self-medication, to save time and money, long distances from medical facilities, and lack of health care system. [8] To determine the magnitude of this serious problem of self-medicated antibiotics, several studies have been conducted in different parts of the world reporting the prevalence range from 26 to 81.25% including big cities in Pakistan. [9-13] This study was an attempt to determine the prevalence of self-medication of antibiotics in the tehsil Wana, a completely rural area of South Waziristan with having population of 152,881. It is a war-torn area lacking basic healthcare services with no available literature on the topic. We also intended to evaluate the associated factors leading to self-medication of antibiotics among the adult population of this region.

MATERIAL AND METHODS

A cross-sectional study was carried out in the Tehsil Wana of South Waziristan, Khyber Pakhtunkhwa from June 2023 to December 2023. A sample size of 400 subjects was calculated using the OpenEpi website, with a 95% confidence interval and 45% frequency of antibiotic self-medication as reported in Punjab.[14] After approval from the Institutional Research and Ethical Review Board (IREB) vide letter number 295/DME/KMC, residents of both genders aged 18 years & above were included in the study. The study excluded respondents under 18 years old, critically ill patients (due to their complex medical conditions and poly-pharmacy which could confound the study results regarding the use of antibiotics), and mentally disabled subjects (to ensure the reliability of data, preventing potential stress, particularly for those who might have difficulty providing informed consent or understanding study procedures).

The study was conducted in the community rather than in a hospital or healthcare facility. The data was collected using a convenient random sampling technique ensuring all outcomes are given equal chance of getting selected in the sample. After informed consent, the participants were interviewed and a close-ended structured questionnaire was administered for data collection. The questionnaire included demographics, socioeconomic variables, reasons, and information on self-medication with antibiotics during the last six months i.e. source of procurement, symptoms that lead to self-medication, types of antibiotics used, and their frequency.

The data collected was entered and analyzed in SPSS version 22. Descriptive statistics such as frequencies and percentages were calculated for categorical variables. The chi-square test was used to determine the association between socio-demographic variables and self-medication practice of antibiotics.

RESULTS

In this cross-sectional study, 400 subjects were enrolled having a mean age of 43±5 years with 78% male and 22% female. The response rate of study participants was 93.25% of which 29.8% (111) respondents were illiterate, 36.4% (136) were primary, 22.5% (84) high school, and 11.3% (42) were bachelor or above. Most of the respondents belonged to the occupation of farming (33.8%), 8.6% were students, 18% were housewives, 8.8% were businessmen, 7.8% were drivers, 2.9% were government employees, and 20.1% were unemployed. About 80% of subjects had low socioeconomic status with a total family income of less than 45000 PKR.

In the study area, 315 (84.5%) respondents admitted self-medication with antibiotics. Most of them got information about these antibiotics from family and friends (48.9%), 37.1% from old prescriptions for the same illness, and 14% received information from pharmacy shops. Common reasons identified by the study population for self-medication with antibiotics are shown in Figure I. Most of the participants used them to save money (38%) while some considered their illness too minor for consultation (35%). Few respondents mentioned other factors like avoiding the hassle of going to the doctor, previous experience with the same illness, and urgency of the problem.

As depicted in Figure 2, respiratory tract infections were the leading cause of self-medication with antibiotics (62%), followed by gut-related infections. Other important symptoms for which drugs were self-administered included generalized body aches, fever, wounds, skin, ear, and eye-related problems, and urinary tract symptoms. The type/category of self-medicated antibiotic was also determined as shown in Figure 3. Amoxicillin/clavulanic acid was the most commonly used antibiotic (42%) followed by

Amoxicillin, Metronidazole, Ciprofloxacin, Erythromycin, and Azithromycin. A few participants also identified Ampicillin, Co-trimoxazole, and Cefixime as the antibiotics of choice for their illness. Only 2% of respondents have used topical ophthalmic drugs like polymyxin B sulfate and bacitracin zinc (Polyfax).

The association of self-medication practice of antibiotics with different socio-demographic variables is displayed in Table I. A significant association was observed between self-medication practice and the age, education, economic, and marital status of the respondents ($p<0.05$). With increasing age, the likelihood of self-medication with antibiotics increased whereas the practice of self-medication among respondents with better education and income status was significantly low. Moreover, those who were married were more exposed to self-medication with antibiotics as compared to those who were unmarried. No significant association was found between gender and self-medication (p-value 0.438).

Table No 1: Association of self-medication with different socio-demographic variables

VARIABLES	ANTIBIOTIC USE		P-VALUE (Chi-Square)
	Yes	No	
AGE (Years)			
18-28	88 (23.6%)	28 (7.8%)	0.009
29-38	108 (29.0%)	18 (4.8%)	
39-48	69 (18.5%)	9 (2.4%)	
49 & above	50 (13.4%)	3 (0.8%)	
Total	315 (84.5%)	58 (15.5%)	
GENDER			
Male	248 (66.5%)	43 (11.4%)	0.438
Female	67 (18%)	15 (4%)	
MARITAL STATUS			
Married	278 (74.5%)	42 (11.3%)	0.001
Unmarried	37 (9.9%)	16 (4.3%)	
EDUCATION			
Illiterate	105 (28.2%)	6 (1.6%)	0.000
Primary	120 (32.2%)	16 (4.3%)	
High school	62 (16.6%)	22 (5.9%)	
Bachelor/ above	28 (7.5%)	14 (3.8%)	
INCOME (PKR)			
≤15000	33 (8.8%)	29 (0.5%)	0.006
15000-30000	104 (27.9%)	10 (2.7%)	
30000-45000	124 (39.4%)	28 (48.3%)	
45000-60000	41 (11%)	16 (4.3%)	
60000≥	13 (3.5%	2 (0.5%)	

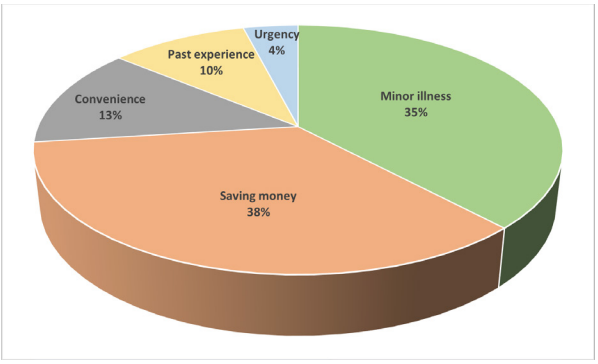

Fig 1: Reasons for self-medication with antibiotics

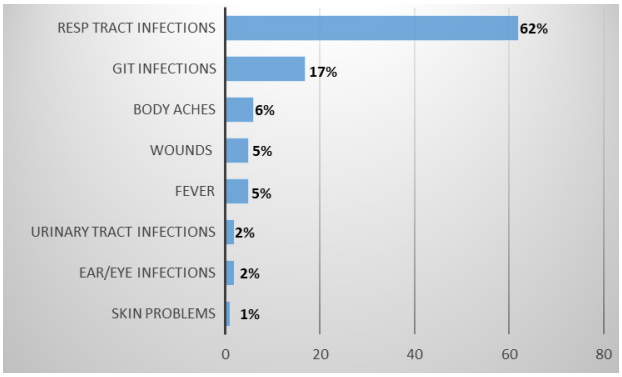

Fig 2: Disease/Symptoms leading to self-medication

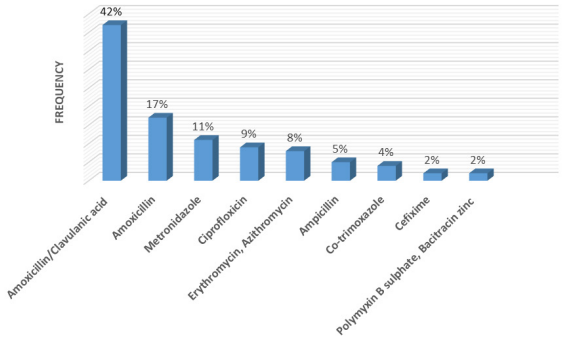

Fig 3: Categories of self-medicated antibiotics

DISCUSSION

Self-medication is a burning public health issue because the use of antibiotics without the prescription of qualified health professionals is a common practice globally. It is reported more in underdeveloped countries. This study was conducted in the Tehsil Wana of South Waziristan revealing an 84.5% prevalence of self-medication with antibiotics. Though, it is less than the prevalence reported in Peshawar (100%), it is higher than rural dwellers of Punjab (45%), Sindh (81.25%), and many neighboring countries like Bangladesh (23.55) and India (57%). [9, 14-16]

In the current study, saving money was the main reason (37.8%) for self-medication with antibiotics. The same reason was identified in other studies conducted

in Pakistan and Malaysia. [2,17] Most respondents identified their family or friends as the leading source of information about these antibiotics (48.9%), resembling the results of a study conducted in Uttar Pradesh, India. [18] However, in studies conducted in Greece and Cameroon, a maximum number of respondents received information from pharmacy shops unlike our study i.e. 14%. [19, 20] As reported in various studies conducted in the Hamdard University of Karachi[21], Qom state of Iran[10] and Southern Iran,[22] we have also observed respiratory tract infections as the common illnesses (61.9%) which compelled respondents to take antibiotics without consulting health professionals. This also indicates a high prevalence of respiratory microbes in these areas causing such infections which need to be addressed with proper surveillance.

The current study revealed Amoxicillin/Clavulanic acid (Augmentin) as the most frequently used category of antibiotics (42.2%) among the respondents followed by Amoxicillin. The same category was also determined in the urban areas of Peshawar[15] whereas Metronidazole (Flagyl) was reported as the most common category in Karachi.[2]

Association between socio-demographic variables and self-medication practices were also measured in this study. No significant association was found between gender and self-medication, which aligns with the results of a study conducted in rural Bengaluru, India.[23] Moreover, self-medication practices were more common in the married respondents, contradicting the findings of a similar study conducted in Cameroon. [20] The probable cause could be an increase in financial liabilities after marriages in developing countries like Pakistan.

A significant association was observed between self-medication practices and the age, education, and economic status of the respondents i.e. chances of self-medication increased with increasing age, and decreased with increasing education and economic status. Similar results were measured in a study conducted among university students in southern China. [11] This is because age and education tend to increase awareness among respondents while better economic conditions enable them to approach healthcare facilities and prevent irrational use of drugs.

Lack of awareness regarding rational use of antibiotics and poor healthcare facilities were detected to be the major reasons for such alarmingly high prevalence of self-medication with antibiotics in tehsil Wana. The data will serve as a piece of useful evidence for policymakers to make timely decisions and discourage self-medication practices in the region by providing quality and affordable healthcare services. Most importantly, bringing awareness in the local population regarding the consequences of self-medication with antibiotics should be incorporated into the agenda.

CONCLUSION

Self-medication practice with antibiotics is highly prevalent in the Tehsil Wana of South Waziristan. Poverty was found to be the major associated reason, beta-lactam was the commonest self-medicated antibiotic, and respiratory tract infection was the most common indication for use in this war-torn area.

REFERENCES

1. Khan H, Maheen S, Alamgeer GA, Mahmood A, Sarfraz RM, Ashraf Z, et al. Determinants of the increasing trend of self-medication in a Pakistani community. Tropical Journal of Pharmaceutical Research. 2014;13(3):437-43.
2. Shah SJ, Ahmad H, Rehan RB, Najeeb S, Mumtaz M, Jilani MH, et al. Self-medication with antibiotics among non-medical university students of Karachi: a cross-sectional study. BMC Pharmacology and Toxicology. 2014;15(1):1-7.
3. Wang X, Lin L, Xuan Z, Li L, Zhou X. Keeping antibiotics at home promotes self-medication with antibiotics among Chinese university students. International journal of environmental research and public health. 2018;15(4):687.
4. Albawani SM, Hassan YB, Abd-Aziz N, Gnanasan S. Self-medication with antibiotics in Sana'a City, Yemen. Tropical J Pharmaceutical Research. 2017;16(5):1195-9.
5. Alghadeer S, Aljuaydi K, Babelghaith S, Alhammad A, Alarifi MN. Self-medication with antibiotics in Saudi Arabia. Saudi Pharmaceutical Journal. 2018;26(5):719-24.
6. Organization WH. Antimicrobial resistance global report on surveillance: 2014 summary. World Health Organization, 2014.
7. Faizullah M, Umar MI, Anwar M, Sarfraz MK. A cross-sectional study on knowledge, attitude, and practices of medical doctors towards antibiotic prescribing patterns and resistance in Khyber Pakhtun Khawah, Pakistan. 2017;7(12):38-46.
8. Seam M, Reza O, Bhatta R, Saha BL, Das A, Hossain M, et al. Assessing the perceptions and practice of self-medication among Bangladeshi undergraduate pharmacy students. Pharmacy. 2018;6(1):6.
9. Bilal M, Haseeb A, Khan MH, Arshad MH, Ladak AA, Niazi SK, et al. Self-medication with antibiotics among people dwelling in rural areas of Sindh. Journal of clinical and diagnostic research: JCDR. 2016;10(5):OC08.
10. Heidarifar R, Koohbor M, Kazemian Mansourabad M, Mikaili P, Sarahroodi S. Self-medication with antibiotics among Iranian population in Qom state. J Sci Innov Res. 2013;2(4):785-9.
11. Pan H, Cui B, Zhang D, Farrar J, Law F, Ba-Thein W. Prior knowledge, older age, and higher allowance are risk factors for self-medication with antibiotics among university students in southern China. PloS one. 2012;7(7):e41314.
12. Biswas M, Roy MN, Manik MIN, Hossain MS, Tapu S, Moniruzzaman M, et al. Self-medicated antibiotics in Bangladesh: a cross-sectional health survey conducted in the Rajshahi City. BMC Public Health. 2014;14(1):1-7.
13. Ahmad H, Sherwani SK, Nisar W, Ahmad T, Shah S, Ahmad W, et al. Self-medication with antibiotics: General perspective among people in Peshawar and Mardan (two most populated cities of Khyber Pukhtoonkhwa-Pakistan). International Journal of Pharmaceutical Sciences

and Research. 2013;4(5):1809.

14. Gillani AH, Ji W, Hussain W, Imran A, Chang J, Yang C, et al. Antibiotic self-medication among non-medical university students in Punjab, Pakistan: a cross-sectional survey. International journal of environmental research and public health. 2017;14(10):1152.
15. Khan SJ, Khan S, Shah N. Self-medication with antibiotics in urban areas of Peshawar. Gomal Journal of Medical Sciences. 2011;9(1).
16. Machado-Alba JE, Echeverri-Cataño LF, Londoño-Builes MJ, Moreno-Gutiérrez PA, Ochoa-Orozco SA, Ruiz-Villa JO. Social, cultural, and economic factors associated with self-medication. Biomédica. 2014;34(4):580-8.
17. Hassali MA, Arief M, Saleem F, Khan MU, Ahmad A, Mariam W, et al. Assessment of attitudes and practices of young Malaysian adults about antibiotics use: a cross-sectional study. Pharmacy Practice (Granada). 2017;15(2).
18. Ahmad A, Parimalakrishnan S, Patel I, Kumar N, Balkrishnan T, Mohanta G. Evaluation of self-medication antibiotics use pattern among patients attending community pharmacies in rural India. Journal of Pharmacy Research. 2012;5(2):765-8.
19. Skliros E, Merkouris P, Papazafiropoulou A, Gikas A, Matzouranis G, Papafragos C, et al. Self-medication with antibiotics in a rural population in Greece: a cross-sectional multicenter study. BMC family practice. 2010;11(1):1-3.
20. Ngu RC, Feteh VF, Kika BT, Ayeah CM, Chifor T, Njim T, et al. Prevalence and determinants of antibiotic self-medication among adult patients with respiratory tract infections in the Mboppi Baptist Hospital, Douala, Cameroon: a cross-sectional study. Diseases. 2018;6(2):49.
21. Hanif A, Ashar SM, Rabnawaz R, Yasmeen S. Self-medication of antibiotics among the students of Hamdard University, Pakistan. Journal of Public Health in Developing Countries. 2016;2(1):145-8.
22. Sarahroodi S, Arzi A, Sawalha A, Ashtarinezhad A. Antibiotics self-medication among southern Iranian university students. IJP-International Journal of Pharmacology. 2010;6(1):48-52.
23. Saba H, Shivananda K, Jayan M, Hussain C. Prevalence of self-medication practices and its associated factors in rural Bengaluru, Karnataka, India. Int J Commun Med Public Health. 2017;3(6):1481-6.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Gul R	✓	×	✓	×	✓	×
Haroon M	✓	✓	×	✓	✓	×
Faisal MS	×	✓	×	×	✓	×
Khan SZ	✓	✓	✓	×	✓	✓
Khan AZ	✓	✓	×	✓	✓	×
Sarwar N	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 295/DME/KMC.

Dated: 19 05 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

RELATIONSHIP BETWEEN ASTHMA CONTROL SCORE AND SMALL AIRWAY DYSFUNCTION IN PATIENTS WITH BRONCHIAL ASTHMA

Hussain Ahmad, Rukhsana Javed Farooqi, Saadia Ashraf

Department of Pulmonology, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: To determine the correlation between asthma control score and small airway dysfunction.

Material and methods: Patients presenting to the OPD of Pulmonology with a diagnosis of asthma were enrolled in the study. Their asthma control was assessed via a validated scale rating from 5-25 (Asthma control test) and their spirometry was performed. Mid-expiratory flow (FEF25-75%) was taken to measure small airway dysfunction. All the spirometric parameters including FEV1, FVC, FEV1/FVC, PEFR, and FEF25-75% were obtained. The data was analyzed via SPSS 22. Pearson's correlation between ACT score and FEF25-75% was calculated. A p-value of <0.05 was taken as significant.

Results: A total of 78 adult patients were enrolled of which 42.3% were males. The Mean age of them was 46.79 (±17.7), BMI 26.86 (± 7.2), and FEV1 was 53.1% predicted (± 20.7). Five percent of patients had normal FEV/FVC but low FEF25-75%. The Pearson's correlation between ACT score and FEF25-75% was 0.289 (p=008). After linear regression analysis, an R2 of 0.11 was obtained.

Conclusion: We found a statistically significant but weak correlation between asthma control score and small airway dysfunction. FEF25-75% may be of value in the diagnosis of asthma when the patient has symptoms and conventional spirometry is normal.

Keywords: Asthma, Asthma Control Test, Small Airway Dysfunction

This article may be cited as: Ahmad H, Farooqi RJ, Ashraf S. Relationship Between Asthma Control Score And Small Airway Dysfunction In Patients With Bronchial Asthma. J Med Sci 2024 July-September;32(3):272-275

INTRODUCTION

Asthma is a common respiratory disorder affecting all age groups. It is characterized by remissions and exacerbations of respiratory symptoms like cough, chest tightness, and difficulty breathing. It affects approximately 300 million people in the world resulting in high morbidity and mortality. The estimated prevalence ranges from 1-18% of the population among different countries. [1] The exact prevalence of asthma in Pakistan is not known but it is estimated to be 4.3%. [2]

The GINA guidelines recommend Spirometric indices like FEV1 and FEV1/FVC to diagnose the disease and monitor the response to treatment. It correlates well with the severity of the disease. [3.] However normal values of these indices cannot exclude asthma mainly because alteration of FEV1 is observed only in overt airflow limitation. The reason behind this is that FEV1 represents mainly the obstruction in major airways while asthma affects small airways as well. Small airways are affected in about 65% of patients with asthma. [4] Small airway disease is related to more severe asthma. [5] FEF25%-75% as compared to FEV1 is more sensitive in detecting small airway dysfunction as theoretically, it is less effort dependent and it does not include airflow at high lung volumes as compared to FEV1. [6]

The utility of FEF25%-75% can be of value in detecting diseases of small airways that can be an important target for various inhaled medicines with ultrafine particles. Whether determination and interpretation of FEF25%-75% has any added value to FEV1 in asthma management is a matter of debate. A study conducted by Quanjer et al. (2014) reported only 3% of the study population with normal FEV1 and FVC had a decreased FEF25%-75% and concluded that the determination of FEF25-75% does not contribute to clinical decision-making. [7] On the other hand, a more recent study (retrospective) conducted by Qin et al. (2021) using a dataset of 1801 patients with confirmed asthma enrolling adult patients (18-65years) has shown FEF25%-75% as a better index of severity of asthma and airway hyperresponsiveness than FEV1. [8]

The rationale of our study was that the literature

Correspondence
Dr. Rukhsana Javed Farooqi
Assistant Professor
Department of Pulmonology, Khyber Teaching Hospital, Peshawar, Pakistan
Email: rukhsanafarooqi1995@gmail.com
Phone: +92-333-9125203
Date Received: 20/05/2024
Date Revised: 01/08/2024
Date Accepted: 01/08/2024

about small airway dysfunction and its relationship with pulmonary functions is limited, focused mainly on FEV1 and the results are conflicting. This study was designed to determine the correlation between asthma control score and small airway dysfunction which may be helpful regarding treatment particularly targeting small airways to achieve better asthma control.

MATERIALS AND METHODS

This cross-sectional descriptive study was performed over patients presenting to the Outpatient Department of Pulmonology of Khyber Teaching Hospital with a diagnosis of asthma were enrolled in the study. Their asthma control was assessed via a validated scale rating from 5-25 (Asthma control test) and their spirometry was performed. Mid-expiratory flow (FEF25-75%) was taken to measure small airway dysfunction. [10] All the spirometric parameters including FEV1, FVC, FEV1/FVC, PEFR, and FEF25-75% were obtained. Patients with acute severe asthma, when spirometry could not be performed or contraindicated, and patients with associated pneumonia, angina, Pneumothorax, bronchiectasis, cardiac or respiratory failure were excluded. A Sample size of 78 was calculated via OpenEPI, keeping the confidence level of 97%, and a proportion of 4.3%. data was collected through convenient nonprobability sampling.

After approval from IREB of the hospital (No: 401/DME/KMC, dated: 11/7/2023), all patients fulfilling the inclusion criteria were assessed via ACT as part of the management protocol. A trained respiratory technician performed the spirometry to determine FEF25-75% and asthma control score. The latest model of computer-based spirometer (spirolab III) was used. A hospital MR number, gender, Age, weight, and height of the patients were noted. Spirometry readings of FEV1 and FEF25-75% were recorded in a proforma.

The data was analyzed via SPSS 22. Mean, and std deviation was calculated for age, FEV1, PEFR, FEF25-75%, and Asthma control score. Frequency and percentages were calculated for gender. Pearson correlation was applied to determine the correlations between FEV1, FEF25-75%, and Asthma control scores. A p-value of < 0.05 was taken as significant. Linear regression analysis was performed to determine the true relationship between these variables.

RESULTS

A total of 78 adult patients were enrolled, 42.3% of these were males. Mean age was 46.79 (± 17.7), BMI=26.86 ± 7.2, FEV1 53.1% predicted (± 20.7), mean FEV1/FVC 64 (± 9. 6). Five percent of patients had normal FEV/FVC but low FEF25-75%. The Pearson's correlation between FEF25-75% and ACT was 0.289 (p=008). After linear regression analysis, R2 of 0.11 was obtained (Figure: 01). There was a significant correlation between FEV1 (% predicted) and FEF25-75% with R2 0.74 (shown in Figure: 02)

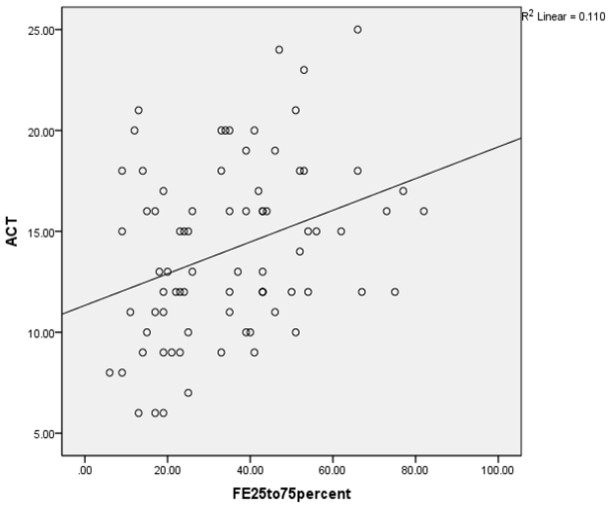

Fig 1: Correlation between FEF25-75% and Asthma Control Test score.

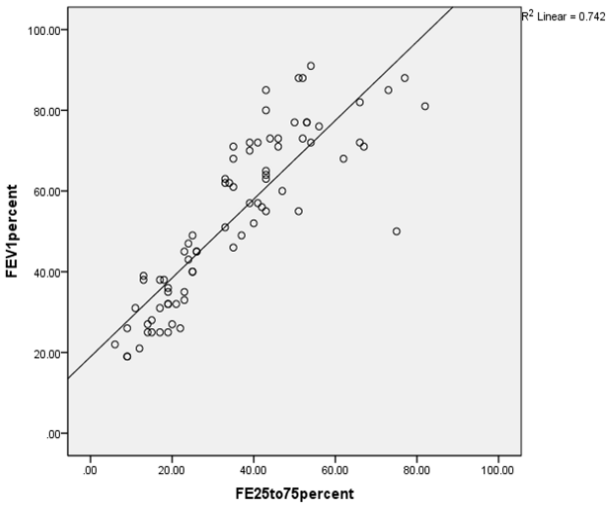

Fig 2: Correlation between FEV1% predicted and FEF25-75% predicted.

DISCUSSION

Chronic airway inflammation is one of the main characteristics of bronchial asthma. It involves both small and large airways. Small airways are rather affected earlier in the course of the disease. Small airway dysfunction can be seen even in patients with mild asthma who have normal traditional spirometric indices.[11] Although FEV1 is the established parameter for diagnosis and grading the severity of bronchial asthma, it can be normal in some patients particularly those with a milder form of the disease or cough variant asthma. Further investigations are

required in such patients to confirm the diagnosis. Studies suggest that asthmatic patients may have normal FEV1, FVC, and still an abnormally low FEF25-75% that is a measure of small airway dysfunction. [12] Small airway dysfunction (FEF25-75%) is related to asthma symptoms, its long-term persistence, and poor outcomes independent of large airway involvement.[13]

Our study found that FEF25-75% has a weak correlation with Asthma control test scores, which may indicate that both clinical parameters and pulmonary functions need to be assessed separately. FEF25-75% has been suggested as an additional tool for the assessment of asthma control.[14]

The second conclusion of our study was that FEF25-75% was low in 5% of our study population in whom conventional spirometric indices were normal. A study conducted by Quin et al has revealed that FEF_{25-75}% represents small airway function and it is more sensitive at reflecting bronchial hyperresponsiveness, and disease severity as compared to FEV_1% in asthmatic patients. The authors suggested further assessment of FEF25-75% in asthma management, particularly for those with small airway dysfunction who present with normal FEV_1%. [8] Hence, measuring FEF25-75% may be a more sensitive parameter in diagnosing bronchial asthma, particularly the milder form of the disease.

Lastly, FEF25-75% was found to be strongly correlated with FEV1. Similar results have been shown by a post-hoc analysis of a tiotropium-based trial showing a moderate to high correlation between FEV1 and FEF25-75% (r =0.73-0.80) and the later was shown to be a more sensitive measure of the treatment response. [15]

A retrospective analysis of spirometry data obtained from 22767 patients by Quanjer et al. concluded that Measurements of maximum mid-expiratory flow (FEF25–75%) and FEF75% are highly correlated with conventional spirometry indices, which are in contrast to our results. Moreover, this analysis suggested that these maneuvers (FEF25-75, FEF75%) provide little or no additional information over and above the traditional spirometry indices. The main logic behind their conclusion was that a decrease in FEF25-75% in those patients having normal FEV1 and FEV1/FVC can occur because of a reduction in volume rather than lung function impairment by itself. However, this study included small children of age as low as 3 years and analyzed retrospective spirometry data and not the real patient symptoms. [7]

The therapeutic significance of small airway dysfunction in asthma has been explored in another study, concluding that delivering inhaled corticosteroid medicines to distal airways via HFA-based formulation may have the potential to treat bronchial asthma more effectively with lower steroid dose as compared to CFC formulations. [16]

Small airways may be a potential target for the treatment of airway diseases including asthma. Further research is needed to confirm whether the assessment of small airway function has a clinical impact and is placed in routine clinical practice.

A single parameter (FEF25-75%) taken to measure small airway dysfunction limits the efficacy of this study. Further large-scale experimental studies are needed to strengthen the evidence in this regard.

CONCLUSION

The study concludes that there was a significant but weak correlation between asthma control score and small airway dysfunction but a strong correlation between FEV1 and FEF25-75% predicted (R2=0.74). Clinical variables (ACT) cannot reliably be predicted from spirometric variables (FEF25-75%) in these patients, hence both need to be assessed separately. Moreover, the FEF25-75% may be of value in diagnosing asthma when the patient has symptoms and conventional spirometry is normal.

REFERENCES

1. Levy ML, Bacharier LB, Bateman E, Boulet LP, Brightling C, Buhl R, et al. Key recommendations for primary care from the 2022 Global Initiative for Asthma (GINA) update. NPJ Prim Care Respir Med. 2023 Feb 8;33(1):7.
2. Khan MA. Monthly and seasonal prevalence of asthma and chronic obstructive pulmonary disease in the District Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. The Egyptian Journal of Bronchology. 2022 Dec 3;16(1):63.
3. Aburuz S, McElnay J, Gamble J, Millership J, Heaney L. Relationship Between Lung Function and Asthma Symptoms in Patients with Difficult to Control Asthma. Journal of Asthma. 2005 Jan 2;42(10):859–64.
4. Usmani OS, Singh D, Spinola M, Bizzi A, Barnes PJ. The prevalence of small airways disease in adult asthma: A systematic literature review. Respir Med. 2016 Jul;116:19–27.
5. Carr TF, Altisheh R, Zitt M. Small airways disease and severe asthma. World Allergy Organization Journal. 2017;10:20.
6. Rao DR, Gaffin JM, Baxi SN, Sheehan WJ, Hoffman EB, Phipatanakul W. The Utility of Forced Expiratory Flow between 25% and 75% of Vital Capacity in Predicting Childhood Asthma Morbidity and Severity. Journal of Asthma. 2012 Aug 28;49(6):586–92.
7. Quanjer PH, Weiner DJ, Pretto JJ, Brazzale DJ, Boros PW. Measurement of FEF25-75% and FEF75% does not contribute to clinical decision making. European Respiratory Journal. 2014 Apr 1;43(4):1051–8.
8. Qin R, An J, Xie J, Huang R, Xie Y, He L, et al. FEF25-75% Is a More Sensitive Measure Reflecting Airway Dysfunction in Patients with Asthma: A Comparison

Study Using FEF25-75% and FEV1%. J Allergy Clin Immunol Pract. 2021 Oct;9(10):3649-3659.e6.

9. Nathan RA, Sorkness CA, Kosinski M, Schatz M, Li JT, Marcus P, et al. Development of the asthma control test-A survey for assessing asthma control. Journal of Allergy and Clinical Immunology. 2004 Jan;113(1):59–65.
10. Pellegrino R. Interpretative strategies for lung function tests. European Respiratory Journal. 2005 Nov 1;26(5):948–68.
11. Carr TF, Altisheh R, Zitt M. Small airways disease and severe asthma. World Allergy Organization Journal. 2017 Dec;10:1-9.
12. Pisi R, Aiello M, Frizzelli A, Feci D, Aredano I, Manari G, Calzetta L, Pelà G, Chetta A. Detection of small airway dysfunction in asthmatic patients by spirometry and impulse oscillometry system. Respiration. 2023 Jul 26;102(7):487-94.
13. Siroux V, Boudier A, Dolgopoloff M, Chanoine S, Bousquet J, Gormand F, Just J, Le Moual N, Nadif R, Pison C, Varraso R. Forced midexpiratory flow between 25% and 75% of forced vital capacity is associated with long-term persistence of asthma and poor asthma outcomes. Journal of Allergy and Clinical Immunology. 2016 Jun 1;137(6):1709-16.
14. Dang P, The, Van TT, Duong-Quy S. Study of forced expiratory flow of 25% - 75% values (FEF25-75) in the control of asthma according to GINA. J Func Vent Pulm 2020;33(11):42-6..
15. Szefler SJ, Goldstein S, Vogelberg C, Bensch GW, Given J, Jugovic B, Engel M, Moroni-Zentgraf PM, Sigmund R, Hamelmann EH. Forced Expiratory Flow (FEF 25–75%) as a Clinical Endpoint in Children and Adolescents with Symptomatic Asthma Receiving Tiotropium: A Post Hoc Analysis. Pulmonary Therapy. 2020 Dec;6:151-8.
16. Martin RJ. Therapeutic significance of distal airway inflammation in asthma. Journal of Allergy and Clinical Immunology. 2002 Feb 1;109(2):S447-60.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Ahmad H	✓	×	✓	×	✓	×
Farooqi RJ	✓	✓	×	✓	✓	×
Ashraf S	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 401/DME/KMC. Dated: 11 07 2023

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

ORIGINAL ARTICLE

CORRELATION OF LENGTH OF UMBILICAL CORD WITH FETOMATERNAL OUTCOMES IN TERM PREGNANCIES

Naheed Akhtar, Mahjabina S.Ghayur, Arzoo Gul Bangash, Zubaida Akhtar, Ambreen Samad, Sajida Riaz

Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: To determine the association between umbilical cord length and feto-maternal outcomes in term pregnancies

Materials and Methods: This cross-sectional study was carried out at Khyber Teaching Hospital Peshawar Pakistan from March 2023 to September 2023 involving 153 pregnant women aged 18-40 with a fetus of 37 to 42 weeks of gestation and with spontaneous labor. Labor was monitored using a partogram and frequent fetal heart rate auscultation. Abnormal fetal heart rate was detected on CTG. Fetal cord length was measured and categorized into long, normal, and short cords. Maternal and fetal outcomes were noted. Data analysis was performed using SPSS version 23 and the Chi-square test with a p-value of ≤ 0.05 was considered significant.

Results: The study found that the mean maternal age was 29.30±8.48 years, the mean gestational age was 38.098±4.19 years, and the mean cord length was 53.75 ± 21.79 cm. The majority of cases were in the normal cord category (72.55%), followed by long cords (17.65%) and short cords (9.8%). Abnormal APGAR score was observed in 4.5%, 40%, and 25.9% of infants in normal, short, and long cords groups respectively. Stillbirths were observed in 4.6%, 26.67%, and 18.52% of infants in normal, short, and long cords groups respectively. Normal vaginal deliveries were observed in 87.38%, 53.33%, and 62.97% of mothers with infants in normal, short, and long cords groups respectively, while forceps delivery was performed in 5.4%, 2%, and 7.4% in normal, short, and long cords groups respectively. Cesarean section was performed in 16.22%), 26.67%, and 29.63% of mothers with infants in normal, short, and long cords groups respectively.

Conclusion: The current study concludes that there is an association between umbilical cord length and fetal outcome. With abnormal umbilical cord length, the possibility of fetal asphyxia i.e., decreased APGAR score and fetal mortality increases. However, the umbilical cord length is not significantly associated with maternal outcomes.

Key Words: Apgar score, Feto-maternal outcome, Umbilical cord

This article may be cited as: Akhtar N, Ghayur MS, Bangash AG, Akhtar Z, Samad A, Riaz S. Correlation Of Length Of Umbilical Cord With Fetomaternal Outcomes In Term Pregnancies. J Med Sci 2024 July-September;32(3):276-280

INTRODUCTION

The umbilical cord serves as a connection between the fetus and the placenta. It is the exclusive pathway for the passage of materials between the mother and the fetus. It grows from the remains of the yolk sac and allantois. [1] It has several critical roles, including providing oxygen-rich blood and nutrients to the fetus. [2] It also transports waste materials and deoxygenated blood from the fetus to the maternal circulatory system, where they can be eliminated. [3] The cord ranging in length from 40 to 300 cm, ensures safe movement for the infant without harming the cord or placenta. Usually, an umbilical cord is considered short when it is less than 30 centimeters in length while a long umbilical cord is more than 70 cm in length. [4]

Umbilical cords may be extremely long or short. These differences have generated concerns about their possible influence on fetal well-being and growth. [5] Research studies have looked into the link between the length of the umbilical cord and fetal development.

Too long cords are possibly linked to a higher possibility of fetal growth retardation since the excessive length of the fetal cord might impede blood supply to the fetus. [6] On the other hand, too short cords could hinder fetal activity and perhaps impair fetal development. However, the relationships discovered in these investigations aren't constantly constant, and other factors, such as the existence of knots in the cord, might play an important part in fetal development.

Cord constriction can cause fetal distress, which is characterized by abnormalities in the fetal heart rate and blood oxygen levels. [7-9] Fetal distress can be a serious

Correspondence
Dr. Mahjabina S.Ghayur
Assistant Professor
Department of Gynecology and Obstetrics, Khyber Teaching Hospital, Peshawar - Pakistan
Cell: +92-300-8597676
Email: msghayur@gmail.com
Date Received: 16/05/2024
Date Revised: 22/08/2024
Date Accepted: 02/09/2024

problem at delivery, necessitating emergency procedures like an emergency cesarean section. Umbilical cords may develop true knots that are knots in the cord body. True knots occur more frequently in longer cords and may increase the danger of cord compression. [10, 11] Short umbilical cords are also related to a delay in the second stage of labor and negative obstetrical outcomes such as congenital abnormalities and mortality.

Similarly, extended umbilical cords are linked to higher birth weight, poor newborn outcomes, low Apgar scores, and cord entanglement. [12] Research reported a relationship between the length of the umbilical cord showing that short umbilical cords were related to poor Apgar score in 30.64% of babies and stillbirth in 11.29% of babies, and long umbilical cords have been linked with low Apgar score in 23.89%of babies and stillbirth in 12.57% of babies. [4]

There is a scarcity of evidence available in our population on the association between umbilical cord length and feto-maternal outcomes. This study aims to explore the association between umbilical cord length and unfavorable obstetric outcomes in our population. This may help the obstetricians to anticipate the complications associated with umbilical cord length to prevent newborn problems.

MATERIAL AND METHODS

This cross-sectional study was carried out in the Department of Obstetrics and Gynecology, Khyber Teaching Hospital, Peshawar from March 2023 to September 2023 including 153 pregnant ladies. The sample size was calculated with the help of the Raosoft sample size calculator using the frequency of stillbirth in 11.29% of neonates with short umbilical cords, taking the confidence level 95%, and margin of error 5 %. [12]

Pregnant women in the age range of 18 to 40 years with 37-42 weeks gestation having singleton fetuses in spontaneous labor presented to the labor room were included in the study. Women with ruptured membranes, with congenital fetal defects, with multiple pregnancies, and those having any chronic comorbidities were excluded from the study.

The course of labor has been monitored using a partogram. Frequent auscultation was used for fetal monitoring during labor. All women with abnormal fetal heart rates were monitored on CTG for any abnormal findings. Reduced baseline variations, prolonged tachycardia, fluctuated deceleration, and late decelerations were all considered signs of fetal distress and required immediate delivery. Following the birth of the fetus, the chord was clamped on twice and divided in the center. The length of the cord was measured from the fetal umbilicus to the cut end (1st part) and from the cut end to the placenta (2nd part) using measuring tape. Both the measures were added to each other.

All the cases were categorized as long, normal, and short according to the length of the cord in centimeters as follows; the short chord group contained cases with lengths less than 30 cm, regular lengths from 30 to 70 cm, and long cords with lengths between more than 70 cm. Maternal outcomes like the mode of delivery (normal vaginal, forceps delivery, and C-section delivery) and fetal outcomes like APGAR score at 1 minute and stillbirth were also noted in each case. Fetal ICU admissions were also noted in all patients. SPSS version 23 was used for data analysis. The chi-square test was applied to the data obtained keeping a p-value of ≤ 0.05 as significant.

RESULTS

In this study, the mean maternal age was 29.30±8.48 years, the mean gestational age was 38.098±4.19 years, and the mean cord length was 53.75 ± 21.79 cm. The cord length ranged from 24 to 150 cm. In maximum cases, 111 (72.55 %), having cord length between 30-70 cm were in the normal length category, followed by 27 (17.65 %) cords in length more than 70 cm i.e., long cords category while the remaining 15(9.8%) cords fall in short cord category (Figure 1).

The mean APGAR score observed was 6.15±3.099. Of the total 111 infants with normal umbilical cords, 5 (4.5%) had APGAR scores of less than 6 while 106 (95.5%) had APGAR scores≥6. In the long cord group with a total of 27 infants, 7 (25.9%) had APGAR scores of less than 6 while 20 (74.1%) had APGAR scores≥6. In the short cord group having 15 infants, 6 (40%) had APGAR scores less than 6 while 9 (60%) had APGAR scores≥6.

The p-value was 0.000014, which was significant. Stillbirths were observed in 4 (3.6%), 4 (26.67%), and 5 (18.52%) infants in normal, short, and long umbilical cord groups respectively using a Chi-Square test with a p-value of 0.00131 which was significant (table 1).

Regarding maternal outcomes normal vaginal deliveries were observed in 87 (78.38%), 8 (53.33%), and 17 (62.97%) mothers in infants with normal, short and long

Table No 1: Fetal Outcomes (APGAR scores and Stillbirths) to Cord Length

Cord length	APGAR score < 6		APGAR score ≥ 6		p value	Still birth		Live birth		p value
Normal	5	4.5%	106	95.5%		4	3.6%	107	96.4%	0.00131
Short	6	40%	9	60%		4	26.67%	11	73.33%	
Long	7	25.9%	20	74.1%		5	18.52%	22	81.48%	
Total	18	11.77%	135	88.23%		13	8.5%	140	91.5%	

Table No 2: Maternal outcome

Cord length	Normal vaginal delivery		Forceps delivery		Cesarean section delivery		p value
Normal	87	78.38%	6	5.4%	18	16.22%	0.094011
Short	8	53.33%	3	2%	4	26.67%	
Long	17	62.97%	2	7.4%	8	29.63%	
Total	112	73.20%	11	7.20%	30	19.60%	

Table No 3: NICU admissions

Cord description	NICU admissions		No NICU admissions		p value
Normal length	9	8.1%	102	91.89%	0.079519
Short length	4	26.67%	11	73.33%	
Long length	4	14.81%	23	85.18%	
Total	17	11.11%	136	88.89%	

umbilical cords groups respectively, forceps delivery were performed in 6 (5.4%), 3 (2%), and 2 (7.4%) mothers in infants with normal, short and long umbilical cords groups respectively while cesarean sections were performed in 18 (16.22%), 4 (26.67%) and 8 (29.63%) mothers in infants with normal, short and long umbilical cords groups. The p-value calculated was 0.094011 which was not significant (Table 2).

Nine (8.1%) infants in the normal cord group, 4 (26.67%) infants in the short cord group, and 17 (11.11%) infants in the long cord group were admitted to ICU due to fetal distress. The p-value calculated was 0.079519 which was not significant (Table 3).

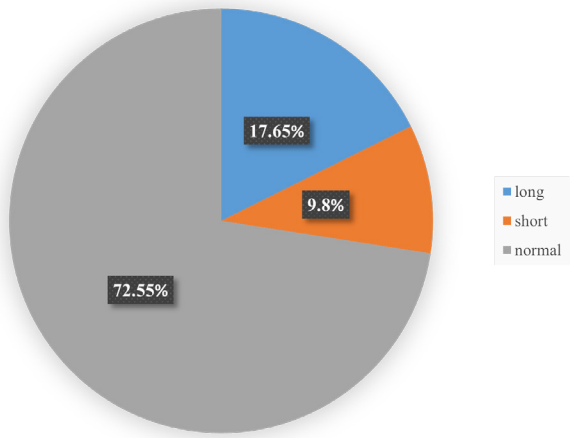

Fig 1: Length-wise distribution of umbilical cords

DISCUSSIONS

The mean gestational age in our study was 38.098±4.19 weeks which is comparable with a study by Njoku CO et al, whose study participants' mean gestational age was 38.94 ±1.326 weeks. [1] This is due to the reason that both of the studies have included term pregnancies. The umbilical cord widely varies in length. At birth, the mature cord is around 50-60 cm long and 12 mm in diameter. A long cord is more than 70 cm long, whereas a short cord is less than 30 cm long. Cord length can range from no cord to 300 cm.[13,14] In our study we observed the mean cord length of 53.75 ± 21.79 cm. In a study by Suzuki Set al. the average cord raged between 60–70 cm and in a study by Shiva Kumar HC et al the average length of the cord was between 61 and 70 cm. [1, 15] The results of this study and our study is comparable. The slight difference in results about cord length is because these studies have larger sample sizes compared to our study.

The incidences of normal, short, and long cords in our study were 72.55 %, 17.65 %, and 9.8% respectively. The incidence of the short cord was 5.9% in a study by Balkawade et al[17] and 7.2% in a study by Adesina et al.[18] In another study normal cords were observed in 80.0% of

cases and long cords were observed in 12.3% of cases. [1] These results of all studies and our results are comparable.

In this study, the total cases having an Apgar score <6 at 1 minute, were 11.77% cases. Out of these, 4.5%, 40%, and 25.9% of cases were found in normal, short, and long cord groups respectively and 30.64 % were in long cord groups. Both short and long cords were significantly associated with lower-than-normal APGAR scores. Similar results were found by Shafqat T et al in their study who observed 15.20% cases in the short cord group and 30.64 % cases in the long cord group. [4]

In our study, cesarean section was performed in 16.22%, 26.67%, and 29.63% of mothers having infants with normal, short, and long umbilical cord groups respectively. Normal vaginal deliveries were observed in 78.38%, 53.33%, and 62.97%) of mothers in infants with normal, short and long umbilical cords groups respectively, forceps delivery was performed in 5.4%, 2%, and 7.4% of mothers in infants with normal, short and long umbilical cords groups.

However, these observations were not statistically significant. Kulshrestha K et al observed that C-section was needed in 59.11%, 18.23%, and 22.64% of mothers having infants with normal, short, and long umbilical cords groups' respectively while no mother delivered through forceps delivery. They also observed that 8.84% of cases in the short cord group, 84.8% in the normal cord group, and 6.35% in the long cord group were delivered through normal vaginal delivery. [3]

In the current study, 8.1% of infants in the normal cord group, 26.67% of infants in the short cord group, and 11.11% of infants in the long cord group were admitted to NICU due to fetal distress but the observations were not statistically significant. These observations were also not statistically significant. Shafqat T et al. in their study observed that 1.23% in the normal cord group, 20.96% in the short cord group, and 15.72% in the long cord group needed NICU admissions. [4]

CONCLUSION

The current study concludes that a positive association between umbilical cord length and fetal outcomes exist. With abnormal umbilical cord length, the possibility of fetal asphyxia i.e., decreased APGAR score and fetal mortality increases. However, the umbilical cord length is not significantly associated with maternal outcomes, such as mode of delivery.

REFERENCES

1. Njoku CO, Odusolu P, Cajetan E, Ekanem E, Njoku A. Umbilical cord length and cord abnormalities in term singleton pregnancy: a review of pregnancy outcome in a tertiary health institution in Nigeria. J Contemp Med Sci. 2019;5(5):242–7.
2. Gahlot A, Vyas J, Himani S, Ekta. A study of fetomaternal outcome in singleton pregnancies with cord around neck. Int J Reprod Contracept Obstet Gynecol 2021;10(7):2725-8.
3. Kulshrestha K, Sukla D, Verma K. Umbilical cord abnormalities and maternal and perinatal outcome: a prospective observational study. J Clin Diag Res. 2021;15(4):QC05-QC09.
4. Shafqat T, Hussain SS, Rahim R. Length of umbilical cord and perinatal outcome. J Postgrad Med Inst. 2020;34(2):115-8.
5. Linde LE, Rasmussen S, Kessler J, Ebbing C. Extreme umbilical cord lengths, cord knot and entanglement: Risk factors and risk of adverse outcomes, a population-based study. PloS One. 2018;13(3):e0194814.
6. Sharma S, Sharma S. Study of length of umbilical cord at term and its correlation with fetal outcome: a study of 500 deliveries. JSAFOG. 2016;8(3):207-11.
7. Sherer DM, Al-Haddad S, Cheng R, Dalloul M. Current perspectives of prenatal sonography of umbilical cord morphology. Int J Women Health. 2021; 29(57):939-71.
8. Wong L, Kwan AH, Lau SL, Sin WT, Leung TY. Umbilical cord prolapse: revisiting its definition and management. Am J Obstet Gynaecol. 2021;225(4):357-66.
9. Pergialiotis V, Fanaki M, Bellos I, Tzortzis A, Loutradis D, Daskalakis G. Evaluation of umbilical cord entanglement as a predictive factor of adverse pregnancy outcomes: a meta-analysis. Eur J Obstet Gynecol. 2019;243(20):150-7.
10. Wong L, Tse WT, Lai CY, Hui AS, Chaemsaithong P, Sahota DS, et al. Bradycardia-to-delivery interval and fetal outcomes in umbilical cord prolapse. Acta Obstet Gynecol Scand. 2021;100(1):170-7.
11. Mehta S, Singla A, Sinha S, Grover A. Long cord: a knotty affair. J Clin Diagnostic Res. 2017;11(5):5-15.
12. Meskele S, Mulu A, GebreMickael A, Ena L. Placental and Umbilical Cord Indices and Their Association with Fetal Distress in Hadiya Zone Public Hospitals, Southern Ethiopia: A Cross-Sectional Study. Int J Gen Med. 2021;14:10045-53.
13. Krakowiak P, Smith EN, de Bruyn G, Lydon-Rochelle MT. Risk factors and outcomes associated with a short umbilical cord. Obstet Gynecol. 2004;103:119-27.
14. Yadav BB, Darade RV, Mahadar NA. Correlation of umbilical cord length with fetal and maternal outcome. JEMDS. 2013;2(4):412-8.
15. Suzuki S, Fuse Y. Length of the umbilical cord and peri-

natal outcome in Japanese singleton pregnancies delivered at greater than or equal to 34 weeks gestation. J Clin Gynecol Obstet. 2012;1(4-5):57-62.

16. Shiva Kumar HC, Tharihalli CT, Chandrashekhar K, Gaddi SF. Study of length of umbilical cord and fetal outcome: a study of 1000 deliveries. Int J Reprod Contracept Obstet Gynecol 2017;6:3770-5.

17. Balkawade NU, Shinde MA. Study of length of umbilical cord and fetal outcome : a study of 1,000 deliveries. J Obstet Gynecol India. 2012;62:520–5.

18. Adesina KT, Ogunlaja OO, Aboyeji AP, Olarinoye OA, Adeniran AS, Fawole AA, et al. Umbilical cord parameters in Ilorin: correlates and foetal outcome. East Afr Med J. 2014;19:274–80.

CONFLICT OF INTEREST: Authors declare no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE: NIL

Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Akhtar N	✓	×	✓	×	✓	×
Ghayur MS	✓	✓	×	✓	✓	×
Bangash AG	×	✓	×	×	✓	×
Akhtar Z	✓	✓	✓	×	✓	✓
Samad A	✓	✓	×	✓	✓	×
Riaz S	×	✓	×	×	✓	×

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 197/DME/KMC.

Dated: 11 03 2024

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

A CASE REPORT: PROBABLE VOGT–KOYANAGI–HARADA SYNDROME: A RARE PRESENTATION IN A PAKISTANI MALE

Asna Tahir, Imran Ahmad, Hina Ikhtiar, Muhammad Usman Khan, Ansa Anam

[1]Department of Ophthalmology, MTI/Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

A 48-year-old male presented to us as an out-patient with a painless blurring of vision for five days. On examination, the visual acuity (VA) of his right eye was 6/36, while that of his left eye was 6/24. The rest of the systemic examination showed no notable findings except for fundus examination, which revealed multiple serous retinal detachments (SRD) confirmed on Optical Coherence Tomography (OCT). Treatment involved intravenous administration of 1 gram methylprednisolone followed by oral steroids. His condition significantly improved after three doses with a corresponding enhancement in visual acuity with a resolution of SRDs. This case report illustrates the efficacy of corticosteroids in the initial and successful treatment of Vogt-Koyanagi-Harada syndrome.

This article may be cited as: Tahir A, Ahmad I, Ikhtiar H, Khan MU, Anam A. A Case Report : Probable Vogt–Koyanagi–Harada Syndrome: A Rare Presentation In A Pakistani Male. J Med Sci July-September;32(3):281-283

INTRODUCTION

VKH is an autoimmune disease involving multiple systems. The occurrence of VKH disease fluctuates depending on geographical location and ethnic background, but generally, it is more prevalent among Asians. These epidemiological findings, along with the discovery of linked major histocompatibility complex (MHC) class II antigens suggest a genetic predisposition underpinning the disorder's pathogenesis. [1] It manifests as a non-necrotizing diffuse granulomatous uveitis, that commonly affects various structures like eyes, inner ear, central nervous system, and skin. [2] It is believed that VKH is due to a T cell (CD4+ Th1 lymphocyte) driven aggressive response to the melanin-producing melanocytes. Melanin has a significant function in maintaining normal vision Within the retina.

Ocular complications from this condition are numerous, and early diagnosis and management can have a great impact on decreasing morbidity. [3] In the early stages of the illness, patients may solely exhibit ocular symptoms, commonly with inflammation primarily affecting the choroid, possibly extending to the iris and ciliary body. [4] Early ocular signs of VKH include multifocal serous retinal detachments (SRDs) and choroidal thickening.

Correspondence
Dr. Imran Ahmad
Assistant Professor
Department of Ophthalmology, MTI/Khyber Teaching Hospital, Peshawar - Pakistan
Cell: +92-300-9333000
Email: doctorimranahmad@gmail.com
Date Received: 22/05/202?
Date Revised: 05/07/202?
Date Accepted: 04/03/2024

The revised diagnostic criteria of VKH syndrome [5] categorizes this syndrome as complete, incomplete, and probable VKH disease. These categories are based on the following;

1. Absence of past penetrating eye trauma,

2. No concurrent ocular conditions,

3. Bilateral uveitis,

4. Presence of neurological and auditory symptoms, and

5. Dermal manifestations such as vitiligo etc.

In complete VKH, criteria 1 to 5 must be fulfilled; for incomplete VKH, criteria 1-3 plus either 4 or 5 are required, and for probable VKH, only criteria 1-3, indicating isolated ocular disease, should be present. Evaluation of VKH includes taking a detailed ophthalmic and systemic history, followed by examination of both eyes along with relevant investigations to rule out any other causes.

CASE REPORT

A 48-year-old Pakistani man visited the outpatient department of Khyber Teaching Hospital, reporting painless blurred vision and floaters in both eyes, which began five days prior and had worsened progressively. He experienced no associated pain, watering, or sensitivity to light. His systemic examination revealed no notable findings, and he had normal blood sugar and blood pressure levels. His past medical and surgical histories were also unremarkable. The patient's previous ocular history indicated a period of diminished vision in both eyes. OCT of the macula was performed, which showed multiple exudative retinal detachments with intervening septae. (Figure:1)

On ocular examination, the visual acuity of the patient's right eye was measured at 6/36, while the left eye's visual acuity was 6/24. Pupils were round, regular, and responsive to light, with absent relative afferent pupillary defect (RAPD) observed. Extraocular movements were within normal limits, and no abnormalities were noted in the adnexa.

Examination of the conjunctiva, cornea, and lens revealed bilateral clarity. In the anterior chamber, +1 cells were seen. A Fundus examination revealed multiple serous retinal detachments (SRDs) bilaterally. All baseline systemic investigations including complete blood count (CBC), C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), and Mantoux test for tuberculosis (T.B) were also well within normal ranges.

Since we planned to start the patient on intravenous steroids, we checked contraindications for IV steroids by monitoring random blood sugar, fasting blood sugar, and glycated hemoglobin (HbA1c). All of which were well within the normal ranges. After doing all the necessary investigations, we started our patient on intravenous (I/V) steroids (methylprednisolone 1 gram) therapy for his uveitis.

On presentation to OPD, his VA in the right eye was 6/36 and 6/24 in the left eye. After the administration of methylprednisolone, his visual acuity of the right eye was found to be 6/36, whereas the VA of the left eye improved to 6/18. On encountering these results, we administered methylprednisolone again with which his VA further improved and was reported to be 6/18 and 6/12 in the right and left eye, respectively. Carrying on with the same pattern, after three doses of I/V steroids his vision improved to 6/9-1 in the right eye, and 6/12 in the left eye. After improvement in the vision, the patient was discharged on oral steroids in a tapering manner along with azathioprine therapy. The patient was advised of total compliance of medications along with regular follow-ups.

DISCUSSION

Probable VKH is a rare autoimmune disease. Arevalo JF, Lasave AS, and Gupta V et.al mentioned in their article that VKH has been reported in a wide variety of populations such as with female predominance and typically in the age range of 20 - 50 years. [6] In our case, the patient was a 48-year-old Asian male. VKH typically affects females more frequently, with a male-to-female ratio of 1:2 as stated by Greco A, Fusconi M, Gallo A, Turchetta R et.al in their publication.[7]

The clinical progression of VKH is categorized into 4 phases. The patient presented to the OPD during the uveitic phase with bilateral redness in the eyes, and painless decreased vision more pronounced in the right eye, and reported seeing floaters in both eyes. Bilateral posterior uveitis was also observed along with multiple serous retinal detachments in both eyes. Until the last follow-up, this patient did not experience a recurrence.

The diagnosis of this condition primarily relies on clinical evaluation. This patient met the criteria of Probable VKH.[5] Treatment options include steroids, immunosuppressants, and immunoglobulins. For a favorable visual prognosis and to prevent inflammation recurrence, it is advised to continue treatment initially for at least six months. [4] Initially, the patient was administered high-dose steroids, with subsequent gradual reduction in dosage.

CONCLUSION

VKH, a multi-system disorder, is primarily a clinical diagnosis. Aggressive corticosteroid therapy is the cornerstone of treatment during the acute phase, often supplemented with immunosuppressive agents because of the

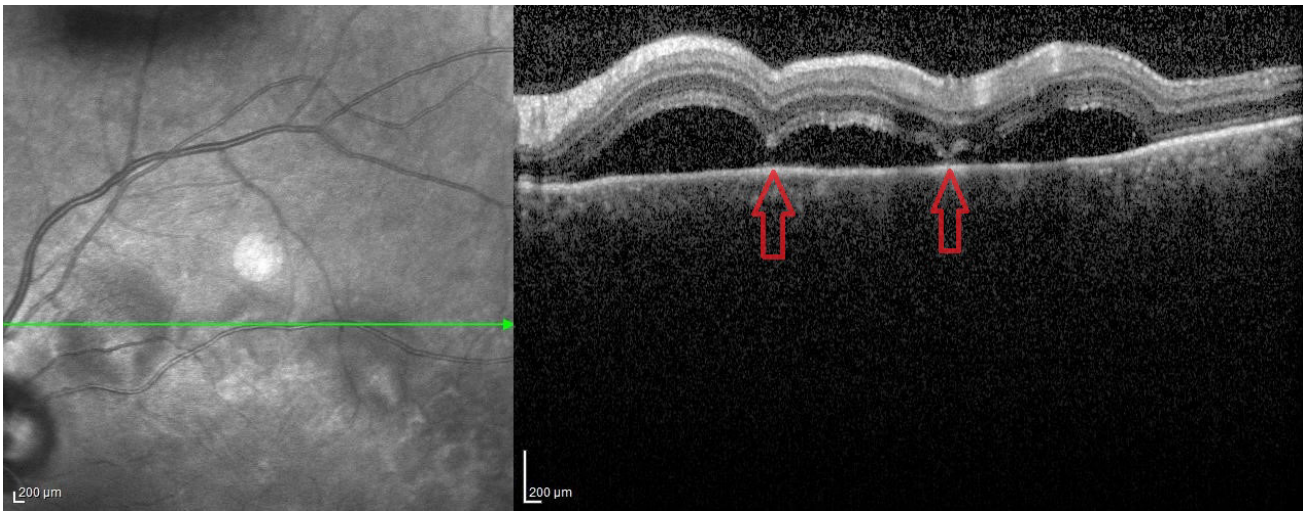

Figure 1: Optical coherence tomography (OCT) depicting multiple serous retinal detachments (SRDs) with septa (red arrows).

recurrences on tapering steroid therapy. Although there is a risk of substantial visual impairment, prompt recognition and treatment can mitigate ocular complications. VKH can lead to vision-threatening ocular complications. Consequently, regular and long-term follow-up with an Ophthalmologist is essential.

REFERENCES

1. Cunningham Jr ET, Rathinam SR, Tugal-Tutkun I, Muccioli C, Zierhut M. Vogt-koyanagi-Harada disease. Ocular Immunology and Inflammation. 2014 Aug 1;22(4):249-52.
2. Tugal-Tutkun I, Smit DP, Abu El-Asrar AM, Herbort Jr CP, Thorne JE. Vogt-Koyanagi-Harada Disease. Ocular Immunology and Inflammation. 2024 Apr 20;32(4):363-6.
3. Golzarri MF, Cheja-Kalb R, Concha-Del-Río LE, Gonzalez-Salinas R, Arellanes-García L. Risk factors for subretinal fibrosis in patients with Vogt Koyanagi Harada syndrome. Ocular Immunology and Inflammation. 2022 Feb 17;30(2):265-9.
4. Attia S, Khochtali S, Kahloun R, Zaouali S, Khairallah M. Vogt–Koyanagi–Harada disease. Expert Review of Ophthalmology. 2012 Dec 1;7(6):565-85.
5. Read RW, Holland GN, Rao NA, Tabbara KF, Ohno S, Arellanes-Garcia L, Pivetti-Pezzi P, Tessler HH, Usui M. Revised diagnostic criteria for Vogt-Koyanagi-Harada 6disease: report of an international committee on nomenclature. American journal of ophthalmology. 2001 May 1;131(5):647-52.
6. Arevalo JF, Lasave AF, Gupta V, Kozak I, Al Harbi MB, Al Rushood AA, Al Dhibi HA. Clinical outcomes of patients with Vogt–Koyanagi–Harada disease over 12 years at a tertiary center. Ocular immunology and inflammation. 2016 Sep 2;24(5):521-9.
7. Greco A, Fusconi M, Gallo A, Turchetta R, Marinelli C, Macri GF, De Virgilio A, de Vincentiis M. Vogt–koyanagi–harada syndrome. Autoimmunity reviews. 2013 Sep 1;12(11):1033-8.

This work is Licensed under a Creative Commons Attribution-(CC BY 4.0)

INSTRUCTIONS FOR AUTHORS

Manuscript Submission

The Journal of Medical Sciences follows the uniform requirements for manuscripts submitted to Biomedical Journals as approved by the International Committee of Medical journal Editors as updated in Oct. 2004 and available at www:icmje.org. Manuscripts are accepted for consideration if neither the article nor any of its contents has been or will be published or submitted elsewhere before appearing in Journal of Medical Sciences.

Manuscript Formatting Guideline

While submitting the document on JMS website, the authors are advised to follow the following guidelines:

1) Always use MS Word format. Don't send any tables in JPG format.

2) Always use Calibri fonts.

3) use 12 size fonts.

4) Double space the manuscript.

5) Justify the margins

6) Keep the main headings bold and in size 14.

7) No extra spaces between paragraphs.

8) Black text on white background only.

Title and Authors Name

The first page of the manuscript must give the title of the article that should be concise and descriptive. Also include on this page the name(s) of the author(s), highest academic degrees, the name of the department and institution in which the work was done, the institutional affiliation of each author, and the name and address of the author to whom reprint requests should be addressed.

Any grant/support that requires acknowledgement should be mentioned on this page. Abstract's word count and article (excluding references) word count should appear at the bottom of this page.

Abstracts

Abstract must not exceed 250 words and the **article must not exceed 3000 words** (excluding references). Articles exceeding the word count or not conforming to "Instructions for authors" will be returned without processing. It is further emphasized that results must not be duplicated in text/tables/figures/graphs.

Key words

Three to 10 key words or short phrases should be added to the bottom of the abstract page. Terms from the Medical subject headings (MeSH) list of Index Medicus should be used.

Introduction, Material and Methods, Results, Discussion, Conclusion, Acknowledgments and references should all start on a separate page from page 03 onwards.

References

The total number of references in an original article must not exceed 40 while in the review articles maximum limit is 100. References must be written double-spaced and numbered as they are cited in the text.

The references must be written in Vancouver style. The style for all the types of references is given in the "Uniform requirements for manuscripts submitted to biomedical journals" at the website of International Committee of medical journal editors. **www.icmje.org**

List all authors when there are six or fewer. If there are more than six, list the first six followed by "et al".

Tables and Illustrations

Each of the tables and illustrations should be on a separate page, must have a title and be on a double space.

Figures should be professionally designed. Symbols, lettering and numbering should be clear and large enough to remain legible after the figure has been reduced to fit the width of a single column. The back of each figure should include the sequence number, the name of the author and the proper orientation (e.g. "top"). If photographs of patients are used, either the subjects should be unidentifiable or their pictures must be accompanied by written permission to use the figure. Duplication of results given in tables and into figures must be avoided.

Ethics

When reporting experiments on human subjects, indicate whether the procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (Institutional or regional) and with the Helsinki Declaration of 1975, as revised in 1983. Do not use patients names, initials, or hospital numbers especially in illustrative material. When reporting experiments on

animals, indicate whether the institution's or a national research council is guide for, or any national law on the case and use of laboratory animals was followed. No article will be entertained without prior ethical approval from ethics committee/ board.

Units of Measurements

Authors should express all measurements in conventional units, with System International (SI) units given in parentheses throughout the text.

Abbreviations

Except for units of measurements abbreviations are discouraged. The first time an abbreviation appears it should be preceded by the words for which it stands. However title and abstract must not contain any abbreviation.

Statistics

Describe statistical methods with enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible quantify findings and present them with appropriate indicators of measurements error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing, such as the use of ρ values, which fails to convey important quantitative information. Discuss the eligibility of experimental subjects. Describe the methods for and success of any binding of observations. Report complications of treatment. Give numbers of observations. Report losses to observation (such as dropouts from a clinical trial). Specify any computer programs used.

Put a general description of methods in the Methods Section. When data is summarised in the Results Section, specify the statistical methods used to analyse it. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support avoid non technical uses of technical terms in statistics, such as "random" (which implies a randomizing device) "normal" significant, "correlation", and sample.

Define statistical terms, abbreviations, and most symbols.

Drug Names

Only generic names should be used.

Permissions

Materials taken from other sources must be accompanied by a written statement from both author an publisher giving permission to the journal for reproduction.

Case Report

Short report of cases, clinical experience, drug trials or adverse effects may be submitted. They must not exceed 500 words, 5 bibliographic references and one table or illustration. The report must contain genuinely new information. The format is title, abstract, introduction, case report, discussion, references.

Review and Action

All articles on receipt for publication are immediately acknowledged but that does not imply acceptance for publication.

Submitted manuscripts are reviewed for originality, relevance, statistical methods, significance, adequacy of documentation, reader interest and composition. Manuscripts not submitted according to the instructions will be returned to the author for correction prior to beginning the peer review process. All manuscripts considered suitable for review are evaluated by a minimum of two members of editorial board. The manuscripts is then sent to two or more than two reviewers who may take a couple of months time to review the manuscript. The ultimate authority to accept or reject the manuscript rests with the Editor.

Revised manuscripts are judged on the adequacy of responses to suggestions and criticisms made during the initial review. All accepted manuscripts are subject to editing for scientific accuracy and clarity by the office of the Editor. When the manuscripts is deemed fit for publication, letter of acceptance is issued to the author. No article is rejected unless similar comments are received from at least two reviewers.

FOR DETAILS, SEE OUR EDITORIAL POLICY IN THE NEXT SECTIONS

AUTHOR'S AGREEMENT

Journal of Medical Sciences (KMC Peshawar pISSN 1997-3438)

Journal_____

ArticleTitle_____

I certify that

A) None of the material in the manuscript has been published previously/currently under consideration for publication elsewhere.

B) The article has not been accepted for publication elsewhere

C) I have not signed any right or interest in the article to any third party

D) I am able/willing to produce the data on which this article is based, should the Editorial Board of the Journal of Medical Sciences request such data.

E) Animal Care Committee/Institutional Review Board approval was granted for this study.

I (including spouse and children), disclose financial interest at the level

a) Nothing to disclose b) Financial interest to the amount of _____

F) I/We confirm to comply fully with the suggestions/critical views of the reviewers/editor, failing which my/our article may be rejected at the sole discretion of the editor. I/we further confirm that if our article is rejected (whihc is the sole discretion of the editor) I/we will have no right to complain against the journal/editor/representative of the journal/printer in any forum including the court of law.

G) I/we suggest the following two overseas reviewers to review our article.

1) _____	_____	_____
2) _____	_____	_____
Name of reviewer	Postal address	Email address & Telephone No.

_____	_____	_____
Author name	Author signature	Author e-mail address

Note: Author agreement form must be signed by each author (one page for each) and submitted with the article.

Author's Checklist:

i) Eliminate nonstandard abbreviation in the titles
ii) Supply full author names (including institutional affiliation and contact informations)
iii) Contribution of individual authors
iv) Nomination of first 3 co-authors by the principal author
v) Abstract: 200 words, Article: 2000 words (excluding references).
vi) Supply references in Vancouver style, accurately cited in the text in numerical order
vii) Cite tables in the text in numerical order
viii) Send 03 Hard copies and on a R/W CD (in MS Word), in a protective envelop, do not use clips
ix) Cite figures in the text in numerical order
x) Author agreement is signed by all authors.
xi) Departmental Permission Letter for the study.
xii) Letter of ethical review of concerned hospital/study place.
xiii) Bank draft for Rs. 5000/- (Rs. Five Thousand) in the name of Journal of Medical Sciences, Peshawar, Pakistan/or deposit in cash with Managing Editor Account No. 4048685170 (3548-9) Can be transferred ONLINE to the Account No. 4048685170 (3548-9) Branch Code 0388 at National Bank of Pakistan, University Campus Branch, Peshawar.

ETHICAL AND EDITORIAL POLICY OF THE JOURNAL OF MEDICAL SCIENCES (JMS) - UPDATED 2024

1. PURPOSE

This document highlights JMS's mission, objectives, and editorial policy regarding the publication process by adhering to the guidelines of COPE (Committee in Publication Ethics) and ICMJE (International Committee of Medical Journals Editors). Each component of the editorial policy is explained in the next sections.

A- MISSION OF JMS

To publish relevant, scientific, and accessible material to help medical students and health professionals in their practice, teaching and learning, and career development

B- OBJECTIVES OF JMS

To publish clinical, epidemiological, public health, educational, translational, and allied sciences research to enable scientists, clinicians, and researchers to learn about developments and innovations in these disciplines

To publish high-quality descriptive and experimental research, review articles, editorials, letters to the Editors, and case reports to enhance the understanding of the scientific community regarding clinical practice and education

To provide a platform for the scientific community to promote their career development through publishing quality research

2- SCOPE

This policy applies to the authors, reviewers, and readers of the JMS inside and outside the institution.

PROCESS / POLICY DESCRIPTION

1. OPEN ACCESS

JMS is an Open-access scholarly literature source that is free of charge and often carries less restrictive copyright and licensing barriers than traditionally published works, for both the users and the authors. However, it complies with well-established peer review processes and tries to maintain high publishing standards.

2. PEER REVIEW PROCESS

The review process of JMS follows a "triage approach". Upon submission of a manuscript, either online or physical, the document undergoes a preliminary open (un-blinded) review by the Editorial team. The document is either accepted for further review, sent for revision back to the authors, or rejected at that time mentioning the reasons for rejection/declining. Further review of JMS follows a blinded approach, where the article is sent to 2 reviewers, local and international who are already registered on the JMS website. During this process, the confidentiality of the authors and reviewers is ensured. The editorial board has the authority to retract an article if a serious violation of credibility or quality of research is found any time before publication, including after acceptance or after the article is published if concerns arise about the integrity of the work. (See also the section on 'Correction and retraction of articles").

3. AUTHORSHIP

According to the ICMJE criteria, authorship is based on 4 criteria; (1) conceptualization and designing, (2) AND, data collection, (3) AND, writing and critical review, (4) AND, taking responsibility for the authenticity and integrity of all the research process. All those designated as authors should meet all these 4 criteria. The co-authors should declare their roles and contributions in the research process explicitly. Those who do not meet all 4 criteria should be ACKNOWLEDGED only. If agreement cannot be reached about who qualifies for authorship, the institution(s) where the work was performed, not the journal editor, should be asked to investigate. The journal editor should seek an explanation and signed statement of the agreement if a corresponding author requests the removal, addition, or changes in the sequence of a co-author after manuscript submission and processing mentioning the approval of all listed authors and the author concerned. The corresponding author is the one individual who takes primary responsibility

for communication with the journal during the manuscript submission, peer review, and publication process. The corresponding author typically ensures that all the journal's administrative requirements, such as providing details of authorship, ethics committee approval, clinical trial registration documentation, and disclosures of relationships and activities, are properly completed and reported. The maximum number of authors for any manuscript must not exceed 6, except in some cases where the rationale must be provided by the corresponding author that will need the approval of a committee comprising the Chief, Executive, and managing editors.

4. SUBMISSION OF MANUSCRIPT

The manuscript should be submitted through the journal`s website, which uses the Online Journal System (OJS) along with the Institution`s Research and Ethics Board (IREB) certificate and other requirements as mentioned during the submission process. The article should have the following format:

4.1: The abstract should be structured with a word count of not more than 250 words. The whole document should be between 2500 and 3500 words (excluding references and appendices) for an original article. The case report and case series should be between 500-1500 words excluding references. A letter to the editor should not be more than 500 words and a review article (including meta-analysis and systematic reviews should be between 3000-5000 words excluding references and other documents. A short communication should be between 1500 to 2500 words excluding references.

4.2: The fonts should be in Calibri, with a size of 12, and spacing of 1.5, with justified margins in the MS Office format.

4.4: No article in any form should contain more than 4 figures and more than 5 tables.

4.6: Copied pictures and tables from other sources will not be entertained unless written approval from the original researcher and publisher is provided and properly captioned with the source.

5. INSTITUTIONAL RESEARCH AND ETHICS BOARD (IREB) CERTIFICATE

Under no circumstances, an article will be processed if approval from the relevant ethical board/committee for Ethical approval is not presented at the time of article submission. The Ethical approval certificate MUST have been availed before the start of the research and must include the participants` consent forms as follows:

a. Baseline data
b. Introduction
c. Purpose of the research
d. Type of research intervention
e. Voluntary participation
f. Information about the trial drug/device/test (if an experimental study)
g. Procedures and protocols
h. Description of the process
i. Side effects and risks
j. Benefits
k. Reimbursements
l. Confidentiality
m. Sharing the results
n. Right to refuse or withdraw from the study
o. Contact person
p. Undertaking of the participant and the researcher

6. CONFLICT OF INTEREST

The authors, peer reviewers, and editors must declare conflicts of interest about the financial aspects, academic competitions, and relationships during the writing, reviewing, and publishing of the manuscripts. This will ensure transparency in the research conduction, writing, and publication. The authors should clearly state the details of sponsors along with their roles and access to data.

7. CONFIDENTIALITY

The editorial board in no way should publicize the work of a researcher in any form unless it is published. They should not publicize the comments and critiques given by reviewers. Similarly, the reviewers are bound to keep the confidentiality of the work of researchers during and after the review. The work of researchers and the critique should never be discussed or exemplified in forums. The confidentiality of the researchers should be maintained in every possible way when the documents are sent for review. However, our review process is open (non-blinded) in the first phase, as per policy of the journal. In this case, the policy is displayed on the journal`s website for the researchers. Reviewers must not retain the manuscript for their per-

sonal use and should destroy paper copies of manuscripts and delete electronic copies after submitting their reviews. If a manuscript is rejected, it should be deleted from the editorial system. If an article is published, the manuscript along with its reviews and other relevant documents should be retained for 3 years and then deleted. The only situation where confidentiality needs to be breached is when a situation of fraud or misconduct is found during the review process or after publication. Still, the authors and sometimes the reviewers, have to be notified.

8. CORRECTION AND RETRACTION OF ARTICLES

The guidelines for correction and retraction of articles are as follows:

8.1: A specific page is allocated in the journal (both electronic and printed) that will be used for news related to corrections in articles published in previous journals.

8.2: The editor should also post a new article version in the journal with details of the changes from the original version and the date(s) on which the changes were made.

8.3: Previous electronic versions will prominently note that there are more recent versions of the article (that will be placed at the end of the abstract). Similarly, the authors or others should cite the more recent version.

8.4: If the error is judged to be unintentional, the underlying science appears valid, and the changed version of the paper survives further review and editorial scrutiny, then retraction with republication of the changed paper, with an explanation, allows full correction of that research paper.

8.5: If a serious violation of credibility or quality of a research paper is found after publication, the article must be retracted after approval of at least 3 editorial board members in consultation with the chief editor. The process will follow the guidelines presented by the Committee on Publication Ethics (COPE).

8.6: The retracted article should be noted on the website and the word “retracted” should be mentioned along with the title of the article.

9. CORRESPONDENCE

Correspondence for submitting an article in JMS will be through a corresponding author. The duties of a corresponding author have already been presented in a previous section. Correspondence regarding debating an article is given high value and a separate page for letters to the editors has been allocated. Derogatory and demeaning letters are screened and letters that promote debates and critique are encouraged to be published. However, correspondence about the articles published in the last 1 year will be included only.

10. THE FEE SUBMISSION PROCESS

A processing and publication fee of Rs. 15,000/-(Pakistani) for local authors and $ 250 (US) for international authors has been approved by the competent authority. The fee should be submitted as bank draft/online payment through the account (IBAN) no: PK56NBPA0388004048685170 (Branch code: 0388 / National Bank of Pakistan, University campus branch, Peshawar, Pakistan) as follows:

1. Article processing fee of 5000/- PKR at the time of submission of the article. This amount will be non-refundable.
2. Article publication fee of 10000/- PKR at the time of acceptance of article after external review. This amount will be refundable if the article is rejected for any reason.
3. For international authors, the amount of 250 US dollars will be accepted after both internal and external review. Researchers belonging to countries other than Pakistan are advised to submit the fee after the whole process of review is completed and the article is accepted for publication.
4. There will be no fee exemption in any circumstances, including members of the editorial board.

11. ROLES OF THE EDITORIAL BOARD, EDITORS, AND MEMBERS

The editorial board of JMS is following the Higher Education Commission (HEC) policy for research journals. The roles of the editorial board for JMS are mentioned below:

11.1: The roles of the Editorial Board are:

11.1.1: To offer expertise in their specialist area

11.1.2: To review submitted manuscripts

11.1.3: To advise on journal policy and scope

11.1.4: To work with the Editor to ensure ongoing development of the journal

11.1.5: To identify topics for special issues of

the journal or recommend a Conference which would promote the journal, which they might also help to organize and/or guest edit

11.1.6: To attract new and established authors and articles

11.1.7: To submit some of their own work for consideration, ensuring that they adhere to Conflict of Interest rules and stating their relationship to the journal. This is very important as the journal cannot be seen to publish only papers from members of the Editorial Board.

11.1.8: It is important that Editorial Boards have a regular communication forum with other boards of similar nature, either face to face in person (depending on their country of origin, funding availability, etc.) or as more journals are doing today, communicating by teleconference, Skype or other web platforms.

11.2: THE PATRON:

The Patron is usually the Dean of the institute, and is overall incharge of the journal, who needs to be kept informed of the decisions taken by the editorial board. The patron is the final authority to approve the decisions and policies of the editorial board.

11.3: THE CHIEF EDITOR:

11.3.1: THE CRITERIA FOR SELECTION OF CHIEF EDITOR ARE:

i. Expertise and experience in the specialist field related to the journal

ii. Publication record of a number of articles and /or books (usually in / related to the specialist field)

iii. Being a reviewer for an international peer reviewed journal

iv. Senior research position with equivalent experience in research and scholarship

v. Enthusiasm to undertake the Editor role

vi. Preferably a diploma, master or doctoral degree in Education and Research

vii. It is not necessary to fulfill all the criteria to become a chief editor.

11.3.2: THE ROLES OF CHIEF EDITOR ARE:

i. The key role of a journal`s chief editor is to promote scholarship in the specialist field associated with the journal, whilst also promoting the journal as the best journal to publish in. For any journal, the editor will need to encourage new and established authors to submit articles and set up a reliable panel of expert reviewers. Editors are also responsible for offering feedback to reviewers when required and ensure that any feedback to authors is constructive.

ii. An editor should also familiarize themselves with the Committee on Publication Ethics (COPE) 'Code of Conduct and Best Practice Guidelines for Journal Editors'.

iii. Depending on how the journal is managed and how it is structured, an Editor may have to make all the decisions regarding which articles to accept or reject for publication.

11.3.3: MANAGING EDITOR:

i. The roles of manging editor are:

ii. To help the chief editor to achieve the above-mentioned goals

iii. To communicate with the authors, reviewers, publishers and other agencies for smooth running of the journal

iv. To regularly evaluate the research work

v. To communicate with funding and regulating agencies (HEC and others) for grants and accreditations.

11.3.4: EXECUTIVE EDITOR:

i. The roles of executive editor are:

ii. To evaluate the research articles presented for publication

iii. To help the editorial board in policy making

iv. The help the editorial board in smooth publishing

v. To communicate with reviewers and collaborate with external agencies for relevant purposes

11.3.5: SECTION EDITORS:

Section editors are allotted different responsibilities. Some of these are mentioned below:

i. Bibliography

ii. Proof-reading

iii. Academic writing reviewing, grammar and spell checking

iv. Dissemination of articles for review

v. Contact with publishers under the supervision of

senior editorial team

vi. Training of future reviewers, young members and other faculty members

vii. others

11.3.6: EDITORIAL ADVISORY BOARD:

Editorial advisory board members consist of national and international senior academicians, researchers, clinicians and others to help the current editorial board in designing, implementing and evaluating policies regarding upgrading the quality of research work. These people also share best practices to help the editorial team to refine their research work.

12. POLICY REGARDING RECRUITMENT AND CONTINUATION OF EDITORIAL BOARD

The policy for recruitment and continuation of the editorial board is based on the guidelines discussed in the previous section. The chief editor, managing editor, and executive editors are recruited by the patron in-Chief. Members are then selected by them from amongst the faculty who have an aptitude for research, and their names are endorsed by the patron. The tenure of the editorial board is decided by the Patron after 3 years whether to continue or recruit a new team or member. The editorial advisory board members are recruited for an indefinite period by the editorial team of JMS.

13. PLAGIARISM POLICY

The journal follows the plagiarism policy of the Higher Education Commission of Pakistan, and for this purpose, a plagiarism standing and review committee has been established under the chairmanship of the Chief Editor of JMS along with 4 members amongst senior faculty. The committee has been given the authority to review research papers and plagiarism complaints related to published work in the journal.

14. CONTACT INFORMATION

The office of managing editor or chief editor should be contacted anytime in working hours or can be contacted through their emails for correspondence.

KHYBER MEDICAL COLLEGE, PESHAWAR - PAKISTAN