HMDJ

HITEC Medical and Dental Journal

ISSN(Print): 2789-4355
ISSN(Online): 2958-0358

ACCREDITED

DECEMBER 2025 / VOLUME 5 / NUMBER 2

HMDJ

HITEC Medical and Dental Journal

December 2025 / Volume 5 / Number 2

ISSN (Print): 2789-4355

ISSN (Online): 2958-0358

Disclaimer

The author(s) of each article published in HMDJ is/are solely responsible for the content thereof; the publication of an article shall not constitute or be deemed to constitute any representation by the editors, HITEC-IMS (Medical college and Dental college) that the data presented therein are correct or sufficient to support the conclusions reached or that the experimental design or methodology is adequate. Authors are responsible for all contents in this article(s)including accuracy of the facts, statements, citing resources, and so on. HITEC Medical and Dental Journal and editors disclaim any liability of violations of other parties' rights, or any damage incurred as a consequence to use or apply any of its contents. Material submitted to HMDJ must be original and not published or submitted for publication elsewhere. Author(s) is/are responsible to get permission from previous publisher or copyright holder if an author is re-using any part of the paper (i.e. figure or figures) published elsewhere, or that is copyrighted.

Open Access

The HITEC Medical and Dental Journal is an open access journal which means that all content is FREELY available without charge to the user or his/her institution. USERS are allowed to read, download, copy, distribute, print, search, or link to the full texts of the articles, or use them for any other lawful purpose, without asking prior permission from the publisher or the auther. The work published is licensed and distributed under the creative commons License.

Publisher

HITEC Institute of Medical Sciences (HITEC-IMS), Taxila Cantt
www.hitec-ims.edu.pk
Contact: 051-4908582

Website

https://hmdj.org/

Printed at

Gulfam Enterprise Anwar Khan Plaza, Kohati Bazar, Rawalpindi, Pakistan

HMDJ

HITEC Medical and Dental Journal

AIMS & SCOPE

HMDJ is the research journal of HITEC Institute of Medical Sciences (HITEC-IMS), Taxila. It is an open access, peer-reviewed, bi-annual journal that aims to keep the medical & dental health professionals updated with the latest information relevant to their fields.

HMDJ welcomes scholarly work from medical, dental and allied subjects (basic & clinical), community health issues and medical education. It publishes original research, review articles, case reports, editorials, letters to editor, short communication, book reviews, recent advances, new techniques, debates, adverse drug reports, current practices, and conference reports. All publications of HMDJ are peer reviewed by subject specialists from Pakistan / abroad.

OBJECTIVES

1. To publish original, peer reviewed clinical and basic sciences research articles.
2. To promote research culture in HITEC-IMS and beyond, by inculcating the habit of medical writing in doctors.
3. To assist physicians to stay informed about the developments in their own & related fields.
4. To support knowledge & experience sharing among the health professionals for the benefit of the patients.
5. To attain ethical medical journalism by delivering credible and reader-friendly publications.

HMDJ
HITEC Medical and Dental Journal
2025 DECEMBER / VOLUME 5 / NUMBER 2

CONTENTS

EDITORIAL

Medical Education in Transition: Preparing Tomorrow's Doctors for a Digital World 45
Maj Gen Prof Hafeez Ud Din HI(M) (Retd), Syed Muhammad Ali Haider

COMMENTARY

Enhancing Emergency Department Care Through Standardized Checklists 48
Sana Abbas

ORIGINAL ARTICLES

Knowledge of PCOS among Medical and Nursing students of Wah Medical College, Wah Cantt 50
Sadia Nadeem, Mahnoor Nadeem, Maria Aslam, Sarah Saleem, Khola Waheed Khan, Shehzadi Sabah Imran

Stigmatization and Discrimination as Predictors of Self-esteem among People Living with HIV /AIDS in Islamabad 54
Arshia Bilal, Asifa Afzal, Alishba Rashid, Aleena Fatima, Maarij Khan, Haris Malik, Shoaib Bukhari, Shazmina Moeed

Assessment of Risk Factors Associated with Hypertension Among Medical Students 59
Salwa Adil, Fareeha Nudrat, Fatima Javed, Eman Noor, Muhammad Abdullah, Muhammad Zaid Aurangzaib, Muhammad Soban, Noor Ul Eman, Saman Fatima, Fatima Asmat, Iffat Noor, Mahjabeen Safdar

Knowledge, Attitude and Perception of Medical Students and Healthcare Professionals towards Artificial Intelligence (AI): A Cross-Sectional Study 65
Muqadus Rizwan, Ahmed Murtaz Khalid

Awareness and Fears regarding Immunization among Guardians of Children Visiting HBS General Hospital Islamabad 74
Ameena Saba, Mahwish Rabia, Tooba Riaz, Samia Mehmood, Rabia Iqbal

CASE REPORT

COVID-19 Associated Spontaneous Subdural Hematoma: A Case Report **79**
Syed Muhammad Ali Haider, Muhammad Sharjeel Sadiq, Muhammad Siddique Abdullah, Muhammad Maaz Qamar, Muhammad Hissan Raza, Muhammad Moeed Azwar Bhatti, Mohammad Hassan Yousaf

EDITOR'S CUTTING EDGE

Case 1 **82**
Case 2 **83**

INSTRUCTIONS TO AUTHORS **84**

ANSWERS TO EDITOR'S CUTTING EDGE **90**

MEDICAL EDUCATION IN TRANSITION: PREPARING TOMORROW'S DOCTORS FOR A DIGITAL WORLD

Maj Gen Prof Hafeez Ud Din HI(M) (Retd)[1], Syed Muhammad Ali Haider[2]

[1]Principal HITEC-IMS, [2]Lecturer, Department of Medical Education, HITEC-IMS

CAPSULE SUMMARY

This editorial explores the evolving landscape of medical education in the era of digital transformation, emphasizing competency-based training, simulation, and ethical integration of AI. There is a need to balance technological innovation with humanistic values to prepare competent and compassionate future physicians.

The healthcare landscape is undergoing a rapid transformation driven by artificial intelligence, digital health technologies, and data-driven innovation. As the boundaries of medicine expand, so must the framework through which we prepare the next generation of physicians. The classical model of didactic teaching, passive learning, and rigid assessment systems, is no longer sufficient for a healthcare environment that demands adaptability, critical thinking, and technological fluency. Medical education is now in transition, evolving from a competency-based to technology-integrated, and research-oriented paradigm that aims to produce doctors equipped for the digital future.

The shift toward Competency Based Medical Education (CBME) represents one of the most significant pedagogical reforms in the modern medicine. Unlike traditional systems that measure time spent in classrooms, CBME focuses on the demonstration of competence. Students advance, not by seniority but by mastery of essential clinical, ethical, and interpersonal skills. This learner centered model acknowledges that each student's pace and pathway to learning may differ. It allows flexibility while ensuring that every graduate meets clearly defined outcomes, aligned with real world medical practice.

Globally, such reforms are increasingly endorsed by the accreditation bodies and organizations such as the World Federation for Medical Education (WFME) and national regulatory authorities. In Southeast Asia, recent work illustrates both enthusiasm for, and challenges in implementing CBME in undergraduate medical curricula[1]. Faculty training, defining competencies, and aligning assessments are among the key tasks.

A defining feature of the new era of medical education is the integration of simulation-based learning. High fidelity manikins, standardized patients, and virtual reality systems provide students with immersive, risk free environments to practice and refine clinical skills. The benefits are well supported by the literature: a systematic review found that simulation based medical education was associated with small to moderate improvements in patient outcomes, particularly in procedural and emergency skills[2].

Further, in preclinical undergraduate medical programs, medical simulation has been shown to significantly improve student performance on standardized exams, especially for first year medical students, demonstrating strong educational values before actual clinical exposure [3].

Studies also show that simulation enhances clinical decision making skills in nursing or analogous health fields, reinforcing its utility for developing thinking skills, not just manual or procedural ones[4].

During the COVID-19 pandemic, virtual Objective Structured Clinical Examinations (OSCEs), remote simulations and digital anatomy modules were widely adopted. These adaptations are now being viewed not just as stopgaps but as sustainable enhancements, especially when blended with in person patient encounters.

Research is no longer an optional pursuit; it is increasingly recognized as a core competency. Embedding structured research modules early helps students develop critical thinking, analytical skills, and evidence-based practice. In particular, being able to evaluate machine learning models, algorithmic outputs, and digital health data will be essential in future practice. Medical school curricula in many parts of the world,

Correspondence to: Maj Gen Prof Hafeez Ud Din HI(M) (Retd)

Email: hafeez_imad@yahoo.co.uk

Received: 22-10-2025
Revision: 30-10-2025
Accepted: 01-12-2025

doi.org/10.69884/hmdj.5.2.9653

including South Asia, are now introducing epidemiology, biostatistics, and scientific writing earlier. This prepares trainees not just to consume knowledge but to question it, validate it, and perhaps even generate it[5,6].

The rise of digital health ecosystems telemedicine, wearable technology, Artificial intelligence (AI) diagnostics, and data analytics, is redefining how clinicians interact with patients, interpret continuous data streams, and make decisions. Digital literacy is becoming as crucial as anatomy or physiology for tomorrow's doctors. Studies exploring digital health competencies have identified key knowledge domains (e.g. data privacy, AI ethics), skills (using digital tools, telehealth), and attitudes (openness to innovation, patient centered digital care)[7]. Integration of such competencies as formal components of curricula is increasingly recommended internationally.

Artificial intelligence is now playing a crucial role in transforming medical education. Surveys among medical students show strongly positive attitudes toward AI as a learning tool. A study in Pakistan found that 80.3% of students believed AI was effective, and 58.4% believed it was a credible resource in medical education [8]. Another study reported that over half of these students saw AI as an assistive tool capable of reducing medical errors and enhancing diagnostic and decision making accuracy [9]. AI is also increasingly being used in assessment, simulation, and performance feedback. A study revealed that graduating students perceived AI tools such as ChatGPT as potentially helpful for exam preparation, research, and exploring medical topics. However, there are concerns about its limited formal integration and ethical implications [10]. A virtual agent hospital, developed by Tsinghua University, is the first fully autonomous hospital run by AI. The virtual facility is not a physical building, but a simulated environment, where AI agents act as doctors and nurses provide dignostic and treatment services to virtual patients. The goal is to use the AI hospital for medical training and to process and learn from a large number of simulated cases more quickly than human doctors could, in reality[11]. Foregoing in view to realize AI's potential, medical schools must include structured AI content in curricula, ensure faculty training and maintain focus on the humanistic and ethical dimensions of medicine so that AI augments, not replaces, the central values of patient care.

Despite the enthusiasm for innovation, measures need to be adopted for effective implementation of CBME, simulation-based, and digital health-oriented curricula, faculty development to acquire requisite skills to handle new realities, procurement of resources and development of essential infrastructure. Besides modification of assessment and evaluation strategies, simultaneously keeping in focus the student well-being in mind with balanced support, mentorship, and human interaction, is obligatory to meet the new challenges.

As we embrace digital transformation, it remains essential to remember that medicine is, at its core, a human science. Compassion, ethical judgment, empathy, and communication are qualities that technology cannot replace. Educational models must ensure that while students become technologically capable, they remain sensitive, ethical, empathetic and patient-centred.

The convergence of CBME, simulation-based learning, research integration, and digital medicine offers a powerful opportunity to produce a generation of physicians who are clinically competent, digitally literate, ethically grounded, and globally connected. The key steps in developing a strategy to achieve these goals would include developing a universal consensus on digital health competencies, evidence-based, cost-effective simulation & assessment modalities and prioritising faculty training and support. Nonetheless, student engagement in research from early years and addressing equity, access, and inclusion, to ensure that technological transformations benefit students and patients from underserved settings, are other essential components.

The goal of medical education remains unchanged to produce compassionate, competent and resilient doctors, capable of leading healthcare into an uncertain future. What is changing is the pathway that blends science with technology, knowledge with skills, and empathy with innovation.

In this era of rapid change, medical education must not merely keep pace with progress; it must lead it. By embracing this transition, we are not only preparing tomorrow's doctors, we are hoping to shape the very future of medicine itself.

FINANCIAL DISCLOSURE/ FUNDING: *None*
ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*
CONFLICT OF INTEREST: *None*
ACKNOWLEDGEMENT: *None*

- ***Maj Gen Prof Hafeez Ud Din HI(M) (Retd):*** *Conception and design, Acquisition of data, Aanalysis and interpretation of data, Critical revision*
- ***Syed Muhammad Ali Haider:*** *Acquisition of data, Aanalysis and interpretation of data, Drafting the article*

REFERENCES

1. Khan A, Kolagi SI, Herur A. IJMS World Conference of Medical Student Research. Int J Med Stud . 2024 | 2024;12. https://doi.org/10.5195/ijms.2024.2860.
2. Zendejas B, Brydges R, Wang AT, Cook DA. Patient Outcomes in Simulation-Based Medical Education: A Systematic Review. J Gen Intern Med 2013;28:1078–89. https://doi.org/10.1007/s11606-012-2264-5.
3. Jabaay MJ, Marotta DA, Aita SL, Walker DB, Grcevich LO, Camba V, Nolin JR, Lyons J, Giannini J. Medical Simulation-Based Learning Outcomes in Pre-Clinical Medical Education. Cureus 2020;12:e11875. https://doi.org/10.7759/cureus.11875.
4. Görücü S, Türk G, Karaçam Z. The effect of simulation-based learning on nursing students' clinical decision-making skills: Systematic review and meta-analysis. Nurse Educ Today 2024;140:106270. https://doi.org/10.1016/j.nedt.2024.106270.
5. Daher AM, Amin F. Assessing the perceptions of a biostatistics and epidemiology module: Views of Year 2 medical students from a Malaysian

university. A cross-sectional survey. BMC Med Educ 2010;10:34. https://doi.org/10.1186/1472-6920-10-34.

6. Segal S, Lloyd T, Houts PS, Stillman PL, Jungas RL, Greer RB. The association between students' research involvement in medical school and their postgraduate medical activities. Academic Medicine 1990;65:530–3. https://doi.org/10.1097/00001888-199008000-00010.
7. Khurana MP, Raaschou-Pedersen DE, Kurtzhals J, Bardram JE, Ostrowski SR, Bundgaard JS. Digital health competencies in medical school education: a scoping review and Delphi method study. BMC Med Educ 2022;22:129. https://doi.org/10.1186/s12909-022-03163-7.
8. Sami A, Tanveer F, Sajwani K, Kiran N, Javed MA, Ozsahin DU, Muhammad K, Waheed Y. Medical students' attitudes toward AI in education: perception, effectiveness, and its credibility. BMC Med Educ 2025;25:82. https://doi.org/10.1186/s12909-025-06704-y.
9. Jackson P, Ponath Sukumaran G, Babu C, Tony MC, Jack DS, Reshma VR, Davis D, Kurian N, John A. Artificial intelligence in medical education - perception among medical students. BMC Med Educ 2024;24:804. https://doi.org/10.1186/s12909-024-05760-0.
10. Alkhaaldi SMI, Kassab CH, Dimassi Z, Oyoun Alsoud L, Al Fahim M, Al Hageh C, Ibrahim H. Medical Student Experiences and Perceptions of ChatGPT and Artificial Intelligence: Cross-Sectional Study. JMIR Med Educ 2023;9:e51302. https://doi.org/10.2196/51302.
11. The Daily CPEC, News Desk. China Launched World's First AI Hospital with 14 AI Doctors 2024.

COMMENTARY

ENHANCING EMERGENCY DEPARTMENT CARE THROUGH STANDARDIZED CHECKLISTS

Sana Abbas[1]
[1]PNS Shifa Hospital Karachi

CAPSULE SUMMARY

High-stress resuscitations, the hectic atmosphere of the Emergency Department (ED) might result in overlooked facts and disjointed care. It is suggested that standardised, evidence-based checklists be used for both adult and pediatric emergencies in order to guarantee a uniform standard of care.

The chaotic nature of the Emergency Department (ED) can lead to missed details and fragmented care, particularly during high-stress resuscitations[1]. To mitigate this and to ensure a consistent standard of care, adoption of standardized, evidence-based checklists for both pediatric and adult emergencies is proposed. These forms serve as critical cognitive aids, guiding healthcare providers through a systematic and comprehensive assessment, thereby improving patient safety and clinical outcomes[1,2]. This approach aligns with the widely accepted principles of Advanced Cardiovascular Life Support (ACLS) and Pediatric Advanced Life Support (PALS), which advocate for a structured approach to patient evaluation and management[3,4].

For pediatric patients, the PALS emergency reception form and checklist incorporates the Pediatric Assessment Triangle (PAT) and a detailed primary and secondary survey. Patient information, initial assessment, primary survey, and secondary survey can be recorded (Table 1).

The adult ACLS emergency reception form and checklist follows a similar structure based on ACLS primary and secondary surveys, emphasizing rapid identification and management of life-threatening conditions, including arrhythmias and cardiac arrest (Table 2).

Implementation of these checklists is expected to enhance patient safety by reducing the likelihood of overlooking critical signs or symptoms, particularly in pediatrics where rapid deterioration is possible. They also improve efficiency by serving as a clear roadmap that guides providers through

Table 1: PALS emergency reception form and checklist.

Section	Items to Record
Patient Information	Name, Date of Birth, Age, Weight (kg), Date/ Time of Arrival, Presenting Complaint, Allergies, Medications
Initial Assessment	Appearance (Lethargic / Alert / Irritable / Tone), Work of Breathing (Normal / Increased Effort / Retractions / Grunting / Nasal Flaring), Circulation to Skin (Pink / Pale / Cyanotic / CRT), Initial Vitals (HR, RR, SpO_2, BP)
Primary Survey	Airway (Patency / Adjunct), DOPE mnemonic for intubated patients (Displacement, Obstruction, Pneumothorax, Equipment Failure), Breathing (Auscultation: Equal / Wheeze / Crackles), Circulation (Pulse Quality, Fluid Bolus), Disability (AVPU, GCS, Pupils, Glucose), Exposure (Temperature, Rashes/ Trauma)
Secondary Survey	History (Signs, Allergies, Medications, Past History, Last Meal, Events), Systemic Exam: HEENT, Respiratory (Inspection, Auscultation), Cardiovascular (Pulses, Heart Sounds), Abdominal (Inspection, Palpation), Musculoskeletal (Deformity, Swelling), Neurological (LOC, Motor, Pupils)

Table 2: ACLS emergency reception room and checklist.

Section	Items to Record
Patient Information	Name, Date of Birth, Age, Weight (kg), Date/Time of Arrival, Presenting Complaint, Allergies, Medications
Primary Survey	Airway (Patency / Adjunct / Obstruction), Breathing (RR, SpO_2, Auscultation), Circulation (HR, BP, Pulse Quality, CRT), Disability (AVPU, GCS, Pupils), Exposure (Temperature, Rashes/Trauma)
Secondary Survey	History (Signs, Allergies, Medications, Past History, Last Meal, Events), Systemic Exam: HEENT, Respiratory (Inspection, Auscultation, Percussion), Cardiovascular (Pulses, Heart Sounds, Murmurs), Abdominal (Inspection, Palpation, Percussion), Genitourinary / Musculoskeletal (GU, MSK), Neurological (LOC, Motor, Sensation)
Emergency Interventions & ACLS Algorithms	ECG (Rhythm), Cardiac Arrest (CPR, Defibrillation, Medications per algorithm)

Correspondence to: Dr. Sana Abbas, PNS Shifa Hospital Karachi.
Email: doctor_amcollian@yahoo.com

Received: 02-10-2025
Revision: 27-10-2025
Accepted: 02-12-2025

necessary steps, reducing backtracking and supporting faster, more confident decision-making[3]. Standardization ensures every patient receives a consistent level of assessment and documentation, which is crucial for quality assurance and accreditation. Furthermore, the forms optimize communication during handovers, provide a structured educational tool for new staff, and improve documentation for legal and quality purposes [4].

A pilot program in the ED is recommended, initially involving a specific team or area. Stakeholder engagement from ER leadership, nursing staff, and physicians is essential, highlighting the benefits for all parties. Mandatory training sessions will ensure staff understand how to use the forms effectively. Forms may be digital, integrated into electronic health records, or paper-based, readily available at triage stations and resuscitation rooms. A feedback loop should be established to gather staff input during the pilot, allowing for iterative improvements to the forms.

REFERENCES

1. Hearns S. Checklists in emergency medicine. Emerg Med J. 2018 Sep;35(9):530-531. Doi: 10.1136/emermed-2018-207782. Epub 2018 Jun 15. PMID: 29907603.
2. Milano, Alyssa et al. "The Impact of a Standardized Checklist on Transition of Care During Emergency Department Resident Physician Change of Shift." The western journal of emergency medicine vol. 20,1 (2019): 29-34. Doi:10.5811/westjem.2018.10.39020
3. American Heart Association. Pediatric Advanced Life Support (PALS) Provider Manual. Dallas: American Heart Association; 2020.
4. American Heart Association. Advanced Cardiovascular Life Support (ACLS) Provider Manual. Dallas: American Heart Association; 2020.

ORIGINAL ARTICLE

KNOWLEDGE OF PCOS AMONG MEDICAL AND NURSING STUDENTS OF WAH MEDICAL COLLEGE, WAH CANTT

Sadia Nadeem[1], Mahnoor Nadeem[2], Maria Aslam[3], Sarah Saleem[4], Khola Waheed Khan[5], Shehzadi Sabah Imran[6]

[1]Assistant Professor Community Medicine, [2]Lecturer Pathology department, [3]House Officer POF Hospital, Wah Medical College, National University of Medical Sciences, Rawalpindi, Pakistan, [4]Community Medicine, MSC Endocrinology, Public Health Specialist. Alkhidmat Razi Hospital Islamabad, [5]Associate Professor Community Medicine, [6]Professor Community Medicine, Wah Medical College, National University of Medical Sciences, Rawalpindi, Pakistan

ABSTRACT

Objective: To evaluate the level of knowledge regarding polycystic ovarian syndrome (PCOS) among undergraduate medical and nursing students of Wah Medical College.

Study Design: Cross-sectional study.

Place and duration of Study: Wah Medical College and the Institute of Nursing, Wah Cantt, Pakistan, 03 months (February to May 2022).

Methodology: Approval was taken from the institutional ethical review committee, convenient sampling was done to select 100 female undergraduates: 50 each first and second year MBBS, and first and second year nursing students respectively. A pretested, self-administered questionnaire, developed for the study, was used to collect data. The instrument comprised two sections: sociodemographic/academic information and structured items assessing knowledge of PCOS. Written informed consent was obtained and confidentiality was maintained. Questionnaires were completed by participants without investigator assistance. Questionnaire data were coded and analyzed using SPSS version 23. Frequencies and percentages were calculated and graphical summaries were produced. Knowledge scores were categorized and the association between programmes (medical versus nursing) was evaluated using the chi square test with a significance threshold of alpha=0.05.

Results: With a 100% response rate, 62% of medical and 68% of nursing students showed good knowledge of PCOS. No meaningful statistical variation was observed across the groups, as the p-value exceeded 0.05.

Conclusion: Both medical and nursing undergraduates exhibited comparable and generally good knowledge of PCOS. Given their roles in the primary care and health education, these students can be leveraged to improve community awareness, correct misconceptions, and support early recognition and management of PCOS.

Keywords: *Androgens, Estrogen, Medical Students, Menstrual Cycles, Nursing Students, Polycystic Ovarian Syndrome, Progesterone.*

How to cite this article: *Nadeem S, Nadeem M, Aslam M, Saleem S, Khan KW, Imran SS. Knowledge of PCOS among Medical and Nursing students of Wah Medical College, Wah Cantt. HMDJ. 2025 December; 05(02): 50-53. 02. https://doi.org/10.69884/hmdj.5.2.3457*

INTRODUCTION

Polycystic Ovarian Syndrome (PCOS) due to modern lifestyle has been declared as a common female endocrine disorder. The World Health Organization (WHO) report 116 million women to be a victim of this disease[1]. In the absence of any other underlying conditions, PCOS is described as a chronic disorder characterized by anovulation or oligo-ovulation with clinical or biochemical hyperandrogenism. The reported prevalence is higher in Pakistani women, ranging up-to 52% as compared to white women which shows a statistic of 10-20% and the same is depicted by women in the United Kingdom[2]. The disorder arises due to an imbalance of estrogen and progesterone, both female sex hormones required for the normal ovulatory cycle to commence and to sustain regularity by their timely release and attainment of peak levels. The etiology is unknown, but certain risk factors are thought to contribute to this disease

Correspondence to: Dr. Khola Waheed Khan, Associate Professor, Wah Medical College, National University of Medical Sciences, Rawalpindi, Pakistan

Email: drkholakhan_12@yahoo.com

Received: 13-10-2025
Revision: 22-12-2025
Accepted: 01-01-2026

doi.org/10.69884/hmdj.5.2.3457

including a genetic predisposition, sedentary routine, social stress and fast food intake[3]. Women with PCOS have a greater likelihood of developing type 2 Diabetes Mellitus due to increased release of adipokines, chemokines, and interleukins, as well as abdominal obesity and insulin resistance (due to the body's inflammatory state). In the past few years, PCOS cases have increased by almost 30% in India. Changes in lifestyle, and ignorance are thought to be the main causes of this phenomenon. Women's awareness must rise in order to prevent important factors that could contribute to infertility issues down the road[4]. There is a high risk of infertility that can lead to negative psychological symptoms like depression and a decreased quality of life, in the long run. For diagnosis, currently, the Rotterdam criteria are preferred, having a complete history and physical examination in adjunct, which states that for the diagnosis of PCOS, any two of the mentioned features must be present i.e. a) anovulation/oligo-ovulation, b) hyperandrogenism and c) visualizing cysts in ovaries on ultrasonography[5]. The objective of this research is to examine medical and nursing students' understanding of PCOS, given their contribution to health care services. As the doctor patient ratio is very low in our country,nurses as well should be educated about this syndrome at undergraduate level so that they can help in removing myths and misconceptions about this syndrome among the general public.

CAPSULE SUMMARY

The level of knowledge regarding polycystic ovarian syndrome (PCOS) among undergraduate medical and nursing students was assessed. Undergraduates of both disciplines had good knowledge of PCOS. They can be effectively used to raise community awareness, dispel myths, and encourage early PCOS detection and management because of their roles in primary care and health education.

Physicians and nurses are pivotal in early detection, patient education, and long-term management of PCOS, especially in settings with low doctor-to-patient ratios. Yet, while prior studies have largely examined general populations or medical students, nursing undergraduates remain underexplored. This gap is critical: inadequate preparation at the undergraduate level may hinder recognition of symptoms, counseling on risk factors, and myth-dispelling, thereby delaying diagnosis and worsening outcomes. Accordingly, this study seeks to assess and compare PCOS knowledge among medical and nursing students, highlight misconceptions and educational deficits, and provide evidence to guide curricular improvements and public health strategies for earlier recognition and better management of PCOS.

METHODOLOGY

At Wah Medical College (WMC) and the Institute of Nursing, Wah Cantt, Pakistan, this cross-sectional study was conducted between February 2022 and May 2022 following approval from the Institutional Ethical Review Committee of WMC. The study population comprised female undergraduates enrolled in the first and second years of the MBBS and first-year and second-year students of the Institute of Nursing. Using a convenience sampling approach, a total of 100 participants were recruited: 50 female MBBS students and 50 female nursing students. Knowledge levels were categorized a priori as follows: good knowledge = ≥75% of the maximum score, fair knowledge = 50–74%, and poor knowledge = <50%. These cut-offs are commonly used in health-knowledge surveys to distinguish high, moderate and low levels of understanding, and to facilitate comparison across groups.

Data was collected using a validated questionnaire developed for the study and reviewed for content validity, completed independently by participants. The instrument consisted of two sections: the first recorded sociodemographic and academic information (including year of study and programme), and the second assessed knowledge of PCOS through structured items. Prior to data collection, written, informed consent was obtained from each participant and confidentiality of responses was assured; questionnaires were completed by the students themselves in a private setting.

Data from all questionnaires were coded and processed in SPSS version 23. Frequencies and percentages were calculated to describe student demographics and individual item responses. Differences in knowledge items were examined using the Chi-square test, with statistical significance defined at $p < 0.05$

RESULTS

The response rate was 100%, in which 50 were female students of WMC and 50 female nursing students. Both group had approximately same good knowledge about PCOS i.e. 62% and 68% respectively. No statistically significant variation in knowledge was observed between medical and nursing students, as presented in Table 1. Medical students had relatively better knowledge about the complications of PCOS as shown in figure 1. Nursing students showed a better knowledge of the hormones responsible for PCOS (Table 2).

Table 1. Comparative Analysis of PCOS Knowledge between Medical and Nursing Students.

Students	Knowledge about PCOS in Students			p-value
	Good knowledge n(%)	Average knowledge n(%)	Poor knowledge n(%)	
Medical students	31 (62)	18(36)	1(2)	0.503
Nursing students	34(68)	14(28)	2(4)	

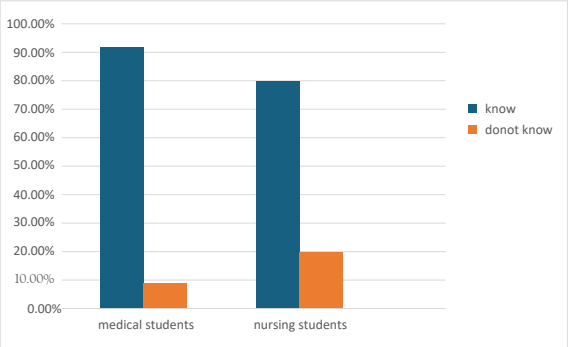


Figure 1. Distribution of Knowledge Regarding the Complications of PCOS among Medical and Nursing Students.

Table 2. Distribution of Knowledge Regarding Hormonal Elevations in PCOS among Medical and Nursing Undergraduates.

	Raised Androgen levels	
	Known (%)	Don't known (%)
Medical students	23 (46)	27 (54)
Nursing students	36 (72)	14 (28)

DISCUSSION

For community healthcare, health professionals are required to have a good grasp on the newly emerging as well as the prevailing diseases in the community for which not only the level of knowledge must be assessed but also implementation on improving the pre-existing knowledge must be made for better deliverance of healthcare to the community. In Malaysia, research on PCOS awareness revealed that almost half of the participants (47.3%) demonstrated limited knowledge[6]. A related study from Karachi reported significantly higher knowledge scores among students enrolled in medical colleges compared to those from non-medical institutions ($p < 0.05$) [7].

In our study level of knowledge is categorized into good, average and poor, out of 100 only 31 (62%) medical students and 34(68%) of nursing students had good knowledge. However, these results were contrary to the study conducted in India in which about 60.5% of women had inadequate awareness of PCOS, followed by 14.7% of respondents with basic awareness and 24.9% with comprehensive awareness[8]. A survey conducted in Malaysia found that nearly half of respondents (47.3%) had poor knowledge of PCOS[9]. Similarly, a study among Pakistani women at universities in Karachi reported that only 20 out of 177 participants (11.3%) had any knowledge. Of the 20 participants, 11 (10%) possessed medical science qualifications[10]. Furthermore, inadequate knowledge regarding PCOS was found in another study carried out at Islam Medical and Dental College, Sialkot, Pakistan, and Dow University of Health Sciences, Karachi, Pakistan. The mean score for PCOS knowledge across all students was 11.58 ± 4.99, for medical students it was 12.02 ± 4.73, and for non-medical students it was 9.36 ± 5.65, with $\alpha = 0.861$[11]. In India, one study found a mean knowledge score of 22, which improved to 31 after health education ($p = 0.0012$)[12]. Another study with 200 female medical students revealed that 6% had PCOS; of these, 72% were aware of the condition, mainly through teachers, while 28% had low or no awareness[13]. Despite their educational background, many university students show inadequate knowledge of this prevalent disorder. Research indicates that female medical students were knowledgeable about PCOS causes and risk factors but had limited understanding of its complications[14]. In another study conducted in King Abdulaziz Specialists Hospital, Taif, Saudi Arabia, the majority (89%) had heard of ovarian cysts previously; 39% knew about them from friends, 34% learned about them through health education, and 27%, from the media[15] . PCOS causes a significant socioeconomic burden to the health care system all over the world so in order to address this problem, few of nationally representative surveys were carried out in India between 2010 and 2014, revealing a range in prevalence rates from 6% to 46.8%[16], which is similar to the study conducted on Emirati students that revealed a prevalence rate of 13%[17].

PCOS cause many complications, and in our study, the majority (91.7%) knew the common complications of PCOS while 8.3% did not know. Of the nursing students, (80.0%) knew what the complication of PCOS were, and (20.0%) of them did not know. Since mothers' awareness of PCOS has a substantial impact on their daughters' awareness, which promotes quicker diagnosis and prevention of complications. A study conducted in 2017–2018 surveyed 1,580 school girls from 19 randomly selected districts in Tehran and 480 of their mothers. The study showed that just 3.2% (n=48) of the girls and 27% (n=148) of the mothers were aware of PCOS. Of these, 10.41% (n=5) of the mothers and 22.91% (n=11) of the girls were diagnosed with this condition. According to the findings of this study, Female school students together with mothers demonstrated awareness of PCOS in 3.2% (n = 48) and 27% (n = 148), respectively. Of these, 10.41% (n=5) of the mothers and 22.91% (n=11) of girls had PCOS diagnoses[18]. A cross-sectional study was carried out with female undergraduates from two northern Jordan universities, in which 1133 (95.9%) of the total participants identified the word PCOS, and their scores were substantially higher than those of the non-recognition group ($p < 0.001$, $M = 11.85$, $SD = 4.79$ versus $M = 5.61$, $SD = 4.91$)[19].

In our study, out of the total medical students, only 23 (46%) knew that androgens are raised in PCOS while 27 (54%) did not know, and among the nursing students, 36(72%) knew and the remaining 14 (28%) did not know. In general, women with favorable attitudes towards managing PCOS through lifestyle adjustments had high levels of knowledge about the condition. A study was conducted in Saudi Arabia in 2023 that included the majority (n=314, 82.8%) had heard of PCOS, understood the role of androgens (n=290, 76.5%), and thought that androgens were elevated in PCOS (n=284, 74.9%)[20].

CONCLUSION

The nursing and medical students had good knowledge about PCOS. They can play a vital role in transmitting information to the community. They can be utilized not only for knowledge transfer but also for removing the myths and misconceptions related to the disease in the general public.

ETHICAL APPROVAL: *letter no. WMC/ERC/IRB/022 dated 19 January 2022.*

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*

AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*

FINANCIAL DISCLOSURE/ FUNDING: *None*

ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*

CONFLICT OF INTEREST: *None*

ACKNOWLEDGEMENT: *None*

AUTHORS' CONTRIBUTION

- ***Sadia Nadeem:*** *Conception and design, Drafting the article*
- ***Mahnoor Nadeem:*** *Collection of data, Drafting the article*
- ***Maria Aslam:*** *Collection of data, Analysis and interpretation of data*
- ***Sarah Saleem:*** *Analysis and interpretation of data*
- ***Khola Waheed Khan:*** *Analysis and interpretation of data*
- ***Shehzadi Sabah Imran:*** *Critical revision*

REFERENCES

1. Kiran S, Sarwar H, Masih S. The knowledge and awareness on polycystic ovarian syndrome among lady health visitors in public health nursing school lahore: Knowledge and awareness on PCOSs. Pakistan Journal of Health Sciences. 2023;4(05):140-4.
2. Manzoor J, Khalid F, Nadeem F, Shakir A, Nisa WT, Zahid J. Perception of female nurses and nursing students regarding polycystic ovarian syndrome working in a tertiary hospital. Journal of Health, Wellness, and Community Research. 2025:e242-e.
3. Sunanda B, Nayak S. A study to assess the knowledge regarding PCOS (polycystic ovarian syndrome) among nursing students at NUINS. Journal of Health and Allied Sciences NU. 2016;6(03):24-6.
4. Sharma S, Mishra AJ. Tabooed disease in alienated bodies: A study of women suffering from polycystic ovary syndrome (PCOS). Clinical Epidemiology and Global Health. 2018;6(3):130-6
5. Behboodi Moghadam Z, Fereidooni B, Saffari M, Montazeri A. Polycystic ovary syndrome and its impact on Iranian women's quality of life: A population-based study. BMC women's health. 2018;18(1):164.
6. Goh JE, Farrukh MJ, Keshavarzi F, Yap CS, Saleem Z, Salman M, et al. Assessment of prevalence, knowledge of polycystic ovary syndrome and health-related practices among women in klang valley: A cross-sectional survey. Frontiers in Endocrinology. 2022;13:985588.
7. Khalfe SA, Rafi U, Fatima B. Prevalence and awareness of polycystic ovarian syndrome among medical students of Karachi, Pakistan. Journal of Shifa Tameer-e-Millat University. 2023;6(2):78-82.
8. Kaundal A, Renjhen P, Kumari R, Kumari Sr R. Awareness of lifestyle modifications in the management of polycystic ovarian syndrome: A hospital-based descriptive cross-sectional study. Cureus. 2023;15(3).
9. Gul S, Zahid SA, Ansari A. PCOS: Symptoms and awareness in urban Pakistani women. Int J Pharma Res Health Sci. 2014;2(5):356-60.
10. Rizvi M, Islam MA, Aftab MT, Naqvi AA, Jahangir A, Ishaqui AA, et al. Knowledge, attitude, and perceptions about polycystic ovarian syndrome, and its determinants among Pakistani undergraduate students. Plos one. 2023;18(5):e0285284.
11. Qasim M, Hina L, Fatima Y, Sibgha A, Asima Y, Hadiqa S. A Cross-sectional Survey of Reproductive Health Knowledge, Lifestyle Choices, and Polycystic Ovary Syndrome Awareness Among Female Medical Students of Punjab, Pakistan. medtigo J Med. 2024;2(4):e30622415. doi:10.63096/medtigo30622415.
12. Duhan L, Choudhary R, Dahiya P. To evaluate the effect of a structured training program about polycystic ovarian syndrome on the knowledge and perception of nursing students of a government nursing teaching institute in Northern India. Journal of Family Medicine and Primary Care. 2024;13(11):5134-8.
13. Upadhye JJ, Shembekar CA. Awareness of PCOS (polycystic ovarian syndrome) in adolescent and young girls. Int J Reprod Contracept Obstet Gynecol. 2017;6(6):2297-301.
14. Malin MV, Surekha T. A study to assess the knowledge of female medical students on polycystic ovary syndrome in NRI Institute of medical sciences. Int J Res Med Sci. 2022;11:243.
15. Albezrah NKA, Arein FR. Knowledge, attitude, and practice toward weight reduction among polycystic ovary syndrome women at Taif city. Saudi Journal for Health Sciences. 2019;8(2):112-7.
16. Deswal R, Narwal V, Dang A, Pundir CS. The prevalence of polycystic ovary syndrome: A brief systematic review. Journal of Human Reproductive Sciences. 2020;13(4):261-71.
17. Pramodh S. Exploration of lifestyle choices, reproductive health knowledge, and polycystic ovary syndrome (PCOS) awareness among female emirati university students. International Journal of Women's Health. 2020:927-38.
18. Malekzadeh F, Mohammadi M, Navid B, Moini A, Omani-Samani R. Awareness of polycystic ovary syndrome among schoolgirls and their mothers: a cross-sectional study. International Journal of Fertility & Sterility. 2023;17(4):299.
19. Alshdaifat E, Sindiani A, Amarin Z, Absy N, AlOsta N, Abuhayyeh HA, et al. Awareness of polycystic ovary syndrome: a university students' perspective. Annals of Medicine and Surgery. 2021;72:103123.
20. Aljuaid A, Sindi HA, Alhadi W, Zayied IAA, Althobaiti L, Imran I, et al. Knowledge, attitude, and practice of lifestyle modifications among Saudi women diagnosed with polycystic ovary syndrome (PCOS). Cureus. 2023;15(11).

ORIGINAL ARTICLE

STIGMATIZATION AND DISCRIMINATION AS PREDICTORS OF SELF-ESTEEM AMONG PEOPLE LIVING WITH HIV /AIDS IN ISLAMABAD

Arshia Bilal[1], Asifa Afzal[2], Alishba Rashid[3], Aleena Fatima[4], Maarij Khan[5], Haris Malik[6], Shoaib Bukhari[7], Shazmina Moeed[8]

[1]Associate Professor Community Medicine, Fazaia Medical College, Air University, [2]Assistant Professor, Community Medicine, HITEC-IMS, [3]Community Medicine, Fazaia Medical College, [4]Community Medicine, Fazaia Medical College, [5]Community Medicine, Fazaia Medical College, [6] Community Medicine, Fazaia Medical College, [7]Community Medicine, Fazaia Medical College, [8]PAF Hospital, Islamabad

ABSTRACT

Background: Society's negative attitudes and beliefs towards people living with Human immunodeficiency virus / Acquired immunodeficiency syndrome (HIV/AIDS) can lead to stigmatization, which results in exclusion, shame, and discrimination, and can harm the self-esteem and well-being of people living with HIV (PLHIV). This study seeks

Objective: This study seeks to find out the correlation of various types of discrimination and stigma with self-esteem among PLHIV.

Study Design: Analytical, cross-sectional study.

Place and duration of study: Islamabad, 01 year (September 2022 to October 2023).

Methodology: Semi-structured questionnaires translated in Urdu were used to collect the data through interview by the researchers themselves. The analysis was done using SPSS version 23.0, keeping the alpha at 5%.

Results: Stigma (r=-.268*, p=0.025), self-discrimination (r=-.252*, p=0.035) and discrimination from friends and family (r=-.335**, p=0.005) experienced by PLHIV showed a significantly inverse correlation with their self-esteem.

Conclusion: The study highlights a significant inverse relationship between stigma and discrimination (self-discrimination and family/friends' discrimination) with self-esteem of PLHIV. To address this, public health authorities should device community education initiative to reduce stigma and discrimination towards PLHIV. Promoting awareness among the general community and PLHIV can enhance the self-esteem in affected individuals and thereby contributing towards the achievement of National AIDS Control Programme (NACP) objectives.

Key Words: *Discrimination, PLHIV, HIV, Self-esteem, Stigma.*

How to cite this article: *Bilal A, Afzal A, Rashid A, Fatima A, Khan M, Malik H, Bukhari S, Moeed S. Stigmatization and Discrimination as Predictors of Self-esteem among People Living with HIV /AIDS in Islamabad . HMDJ. 2025 December; 05(02): 54-58. https://doi.org/10.69884/hmdj.5.2.2759*

INTRODUCTION

Human immunodeficiency virus (HIV) attacks and weaken the body's immune system, while acquired immunodeficiency syndrome (AIDS) represents most advanced stage of the disease. HIV spreads through body fluids such as blood, breast milk, semen and vaginal fluids[1]. Antiretroviral therapy (ART) is used for prevention and management of HIV, and if left untreated, it can progress to AIDS over several years[2].

HIV and AIDS are major public health concerns, affecting nearly 36.7 million people worldwide[1].

HIV/AIDS cases have risen significantly in Pakistan, especially among the sex workers, people who inject drugs (PWID), and transgender individuals, categorizing the country as having a "concentrated epidemic"[3]. In the last 10 months of 2022, a total of 9,773 new HIV cases were reported, raising concerns about the effectiveness of preventive efforts and the virus's spread beyond key populations. By 2023, nearly 200,000 people were predicted to be living with HIV in the country[4]. Factors such as cultural barriers, socioeconomic challenges, limited awareness, healthcare access, and stigma contributed to the increase[5].

HIV/AIDS-related stigma remain widespread, as individuals are labeled as socially unacceptable due to certain traits or

Correspondence to: Dr. Arshia Bilal, Fazaia Medical College, Air University.

Email: drarshiabilal@yahoo.com

Received: 21-10-2025
Revision: 18-12-2025
Accepted: 22-12-2025

doi.org/10.69884/hmdj.5.2.2759

behaviors, triggering guilt, shame, and low self-esteem among people living with HIV/AIDS (PLHIV). Research indicates that PLHIV face moderate to high levels of stigma, often perceived as immoral, leading to depression, discrimination, violence, suicidal tendencies, and psychological distress[1,3,6,7,8]. Self-esteem plays a crucial role in maintaining hope, health and overall quality of life, especially during adolescence when environmental stressors can undermine it[9]. Stigma is a major barrier to preventive, care, and treatment, causing many PLHIV to seek healthcare only when severely ill[10,11].

CAPSULE SUMMARY

Discrimination and stigma with self-esteem among people living with HIV (PLHIV) inversely correlated significantly reducing the self-esteem of PLHIV. Social isolation and adverse effect on the quality of life of this marginalized population can be avoided through community education in order to render National AIDS Control Programme objectives achievable.

A study in Pakistan found that stigma and discrimination against PLHIV occur in various forms like verbal, physical, and institutional. Many face denial of jobs, housing, education, and healthcare upon disclosing their HIV status. They experience verbal abuse, physical violence, and social exclusion, significantly affecting their quality of life and that of their families and communities. In healthcare settings, stigma discourages access to essential medical care[12]. While discrimination impacts self-esteem, studies show a complex relationship, as it also contributes to stress among individuals living with HIV/AIDS[13].

Stigma, discrimination, and prevailing cultural norms within the Pakistani community not only make it difficult for PLHIV to disclose their HIV status but also pose significant constraints on conducting research among the affected populations. Therefore, to the date, this analytical cross-sectional study is the first to analyze the correlation of the stigmatization and discrimination on self-esteem of PLHIV in the region of Islamabad. In light of result of this research, we aim to provide evidence to the healthcare providers and put their attention to device effective health education strategies for general public to change their perspective towards PLHIV. Supporting attitude from general population will boost their self-esteem and will keep their morale high in fighting against HIV.

METHODOLOGY

This analytical cross-sectional study employed purposive sampling and was conducted at the Antiretroviral Therapy (ART) Special HIV Clinic, Pakistan Institute of Medical Sciences (PIMS), Islamabad, and Dareecha (social welfare organization supporting the transgender community). The study was approved by the National AIDS Control Programme (NACP), National Institute of Health (NIH), Islamabad, the head physician of PIMS, and Institutional Review Board (IRB) of Fazaia Medical College. Informed written consent was obtained from all participants. The study was carried out from September 2022 to October 2023 over a span of one year. Those PLHIV, who provided consent were included, while those under 18 or deemed incapable of comprehension due to intoxication, sickness, or cognitive impairment were excluded. Using equation of absolute precision of WHO sample size software, the study determined a sample size of 82 with a 90% confidence interval, and 0.09 absolute precision at a stigma prevalence among PLHIV of 41.93%[10]. Data was collected using semi-structured questionnaire translated into Urdu covering demographics, self-esteem, stigma and discrimination by the pre-trained researchers themselves through interviews.

Rosenberg Self-Esteem Scale was used to assess the self-esteem. It is a 10-item validated measure, responses of which were collected on a Likert scale (Strongly Agree = 3, Agree = 2, Disagree = 1, and Strongly Disagree = 0). There were five negatively phrased questions, which were reversely coded. The total score ranged from 0-30 points, with high score showing higher degree of self-esteem[14]. Stigma was measured using the short HIV stigma scale (12 questions), responses were collected on a 4-point Likert scale, ranging from strongly disagree (1) to strongly agree (4)[15]. The options were re-categorized into "Yes" or "No" with "Yes" expressing stigma. Discrimination was assessed by self-developed questionnaire and was classified into self-discrimination and discrimination from family/friends and other PLHIV, with higher scores reflecting greater discrimination faced. Internal validity of the questionnaire was assessed by the experts from NACP and ART clinic PIMS, and the changes were made based on their suggestions. For analysis of data, SPSS version 23.0 was used, proportion for categorical data, while mean and standard deviation for quantitative data were calculated. The correlation of self-esteem with discrimination and stigma was assessed by using Pearson's coefficient of correlation, while keeping the variables quantitative, and alpha was preset at 5%.

RESULTS

The total 82 PLHIV were approached as per sample size, out of which 12 refused to give data making non-respondent rate of 14.6%. Out of 70 people who gave consent, 71.5% were under 40 years of age, 52% were males, 21% were transgender and rest were female. Half of them (51.4%) were married and had children. Most of them, 40% were unemployed, 11.4% were either dancers or beggars and 5.7% were doing some business while 4.3 % were sex workers. Total 47.1% had HIV positive persons in their family and friends.

Frequencies and percentages of each question showing perceived stigma on HIV stigma index scale is shown in Table 1. Around 40% of respondents, were careful to tell someone about their HIV status as they found it as a risk and wanted to keep it secret (Table 1). Rosenberg Self-esteem scale was used to assess the self-esteem of PLHIV (Table 2).

Table 1: Proportion of PLHIV who perceived stigma on HIV Stigma Scale.

Variables	Category	Frequency	(%)
People I care about stopped calling after learning I have HIV	Yes	28	17.5
I have lost friends after telling them I have HIV	Yes	35	21.9
Some people avoid touching me if they know I have HIV	Yes	33	20.6
Telling someone I have HIV is risky	Yes	61	38.1
I work hard to keep HIV a secret	Yes	61	38.1
I am very careful who I tell about HIV	Yes	64	40
Most people believe that person who has HIV is dirty	Yes	48	30
Most people are uncomfortable around someone with HIV	Yes	52	32.5
It is said that people with HIV are treated like outcast. Did you feel that?	Yes	44	27.5
I feel guilty because I have HIV	Yes	30	18.8
I feel guilty as I am not good as a person as others because of HIV	Yes	21	13.1
People attitude towards HIV makes me feel worse	Yes	50	31.3
Total Score (mean ± SD)	7.53±3.04		

Table 2: Self-esteem as measured by Rosenberg Self-esteem scale.

Variables	Categories	Frequency	(%)
On the whole, I am satisfied with myself	Strongly agree	38	54.3
	Agree	20	28.6
	Disagree	6	8.6
	Strongly Disagree	6	8.6
At times I think I am no good at all	Strongly agree	16	22.9
	Agree	18	25.7
	Disagree	22	31.4
	Strongly Disagree	14	20
I feel that I have a number of good qualities	Strongly agree	48	68.6
	Agree	15	21.4
	Disagree	7	10
	Strongly Disagree	0	0
I am able to do things as well as most other people.	Strongly agree	40	57.1
	Agree	18	25.7
	Disagree	10	14.3
	Strongly Disagree	2	2.9
I feel I do not have much to be proud of	Strongly agree	13	18.6
	Agree	13	18.6
	Disagree	19	27.1
	Strongly Disagree	25	35.7
I certainly feel useless at times	Strongly agree	6	8.6
	Agree	12	17.1
	Disagree	27	38.6
	Strongly Disagree	25	35.7
I feel that I am a person of worth, at least on an equal plane with others	Strongly agree	41	58.6
	Agree	22	31.4
	Disagree	4	5.7
	Strongly Disagree	3	4.3
I wish I could have more respect for myself	Strongly agree	25	35.7
	Agree	16	22.9
	Disagree	16	22.9
	Strongly Disagree	13	18.6
All in all, I am inclined to feel that I am a failure	Strongly agree	10	14.3
	Agree	10	14.3
	Disagree	28	40
	Strongly Disagree	22	31.4
I take a positive attitude towards myself	Strongly agree	36	51.4
	Agree	24	34.3
	Disagree	10	14.3
	Strongly Disagree	0	0
Total Score (mean ± SD)	15.57 ± 2.6		

Table 3 presents the mean stigma scores, the various categories of discrimination (from family & friends, from other PLHIV, and from oneself), and their correlation with self-esteem. Overall, various categories of discrimination show inverse relationship with self-esteem and this association is statistically significant in terms of stigma and discrimination from family, friends and oneself.

Table 3: Correlation between Self-Esteem and Mean Scores of stigma and discrimination Subtypes.

Variables		Rosenberg Self-esteem	Mean ± SD
Discrimination from Family/ friends	Pearson Correlation	-.335	8.31± 4.08
	Sig. (2-tailed)	0.005	
Self-Discrimination	Pearson Correlation	-0.252	6.61±3.40
	Sig. (2-tailed)	0.035	
Discrimination from PLHIV	Pearson Correlation	-.131	1.36±1.17
	Sig. (2-tailed)	0.281	
Stigma	Pearson Correlation	-.268	7.53±3.04
	Sig. (2-tailed)	0.025	

DISCUSSION

HIV is a global health challenge that has been accompanied by a persistent and deeply entrenched stigma. The stigma and discrimination surrounding the HIV, affect the well-being of the individual and also hamper their access to healthcare. By identifying the role of stigma and discrimination in undermining the self-esteem of PLHIV, this study signifies the need to create awareness among masses, regarding the behavior towards PLHIV, thus enhancing their self-esteem and quality of life.

PLHIV frequently encounter stigma and discrimination, particularly in developing nations, like Pakistan. Consistent with prior research conducted in India, Nepal and US, our findings indicate that majority of PLHIV face stigma and discrimination on a regular basis[11,12,16,17].

Current research reveals a strong relationship between self-esteem and stigma (p = 0.021). Similar studies, done worldwide, which showed significant effect of stigma on self-esteem. People who experienced stigma had lower self-esteem, they were disowned by family, faced physical and verbal threat, denied healthcare and ill treatment. Additionally, HIV/AIDS are often linked with stigmatized behaviors, such as bisexuality, substance abuse and sex work, contributing to misconceptions and social discrimination[12]. This stigmatized behavior developed the feeling of guilt, moral impurity, God's punishment and shame among the PLHIV[1,16,18]. HIV/AIDS-related stigma can affect psychological well-being, leading to a decline in overall quality of life[17,19,20]. This negative attitude of community towards PLHIV is due to limited literacy about this disease, they believe that HIV is highly contagious and can spread through emotional and physical interactions with an infected person.

Additionally, a significant relationship was also observed between self-esteem and discrimination, including self-discrimination (p = 0.035) and discrimination from family/ friends (p = 0.005). The negative Pearson correlation coefficients indicate an inverse relationship between self-esteem and both self-discrimination (-.252) and family/friends discrimination (-.335). Though moderate level correlation but reducing this discrimination can enhance their social acceptance and thus boost their self-assurance. Other studies from Pakistan strengthen our findings that HIV-related stigma and discrimination originate from families, communities, healthcare providers and institutions, negatively impacting the lives of PLHIV [3,18,21].

These persistent barriers threaten their rights, dignity, and well-being, while also limiting their access to healthcare. As a result, individuals may hesitate to disclose their HIV status, struggle with inadequate social support, and fail to adhere to antiretroviral therapy (ART), all of which diminish their quality of life. Furthermore, stigma and misinformation contribute to the continued spread of new HIV infections due to the above-mentioned barriers. These negative effects underscore the urgent need for psychosocial interventions to mitigate HIV-related stigma and discrimination and improve the quality of life for PLHIV.

CONCLUSION

The stigma and discrimination inversely correlated and could significantly reduce the self-esteem of PLHIV. Thus contributing to social isolation and adversely affecting the overall quality of life of this marginalized population. Concerned authorities should educate the community to reduce stigma and discrimination towards PLHIV. Raising awareness among PLHIV and the general community can improve the self-esteem of PLHIV and thus can render NACP objectives achievable.

LIMITATIONS

The causal associations over time were restricted due to cross-sectional design. The population was selected from specialized HIV clinics and centers, which introduced selection bias and may not have reflected the broader reality. They may differ significantly from high-risk individuals who actually face stigma and had low self-esteem due to which they do not access formal healthcare services, potentially underestimating the unmet needs in the wider community.

RECOMMENDATIONS

Integrated behavioral interventions are required to reduce stigma in both community and healthcare settings, as stigma remains a major barrier preventing PLHIV from seeking testing

and adhering to treatment. Reducing stigma may improve HIV screening uptake and may help in achieving UNAIDS 95-95-95 targets.

Actively engaging the affected populations such as sex workers and transgender to promote HIV screening and facilitate the uptake of tailored interventions is requires.

ACKNOWLEDGEMENTS: Dr. Saima Paracha, Advisor National AIDS Control Program (NACP) CMU/HIV and Dareecha and its dedicated team

ETHICAL APPROVAL: *Reference number: 1BD/FMC/1341/1/ IRB, 01-06-2023*

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*

AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*

FINANCIAL DISCLOSURE/ FUNDING: *None*

ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*

CONFLICT OF INTEREST: *None*

AUTHORS' CONTRIBUTION

- ***Arshia Bilal:*** *Conception and design, Analysis and interpretation of data, Critical revision*
- ***Asifa Afzal:*** *Conception and design, Analysis and interpretation of data, Drafting the article, Critical revision*
- ***Alishba Rashid:*** *Acquisition of data, Analysis and interpretation of data, Drafting the article*
- ***Aleena Fatima:*** *Acquisition of data, Analysis and interpretation of data, Drafting the article*
- ***Maarij Khan:*** *Acquisition of data, Analysis and interpretation of data, Drafting the article*
- ***Haris Malik:*** *Acquisition of data, Drafting the article*
- ***Shoaib Bukhari:*** *Acquisition of data, Drafting the article*
- ***Shazmina Moeed:*** *Acquisition of data, Analysis and interpretation of data*

REFERENCES

1. Kohli N, Kumar V, Yadav S, Tripathi P. People with HIV/AIDS: Stigma, Self-Esteem and Psychological Health. Psychol Stud. 2024 Dec;69(4):432-40.
2. WHO, HIV and AIDS. https://www.who.int/news-room/fact-sheets/detail/hiv-aids, 2023.
3. Ullah S, Ulhaq F, Basit A, Imtiaz F, Noreen A, Elahi A. HIV/AIDS Stigma and Discrimination in Pakistan: A Qualitative Study. IJBR. 2024 Nov 23;2(02):531-40.
4. Aizaz M, Abbas FA, Abbas A, Tabassum S, Obeagu EI. Alarming rise in HIV cases in Pakistan: Challenges and future recommendations at hand. Health Sci Rep. 2023 Aug;6(8):e1450.
5. Ali U, Riaz U, Doyle H, Satti A, Mahmood N, Rasheed S, Zahra K. Prevalence and predictors of depressive symptoms among people living with HIV in Pakistan; country-wide secondary data analysis from National Stigma Index Study. PLOS Glob Public Health. 2024 Nov 4;4(11):e0003882.)
6. Friedland BA, Gottert A, Hows J, Baral SD, Sprague L, Nyblade L, McClair TL, Anam F, Geibel S, Kentutsi S, Tamoufe U. The People Living with HIV Stigma Index 2.0: generating critical evidence for change worldwide. Aids. 2020 Sep 1;34:S5-18.
7. Yang H, Xie X, Nie A, Yin Y, Wang H, Chen H. HIV-related stigma among people living with HIV in Liangshan Yi Autonomous Prefecture, China. J Assoc Nurses AIDS Care. 2020 Mar 1;31(2):199-207.
8. Wei L, Yan H, Guo M, Tian J, Jiang Q, Zhai M, Zhu B, Yin X, Liao Y, Yu B. Perceived HIV stigma, depressive symptoms, self-esteem, and suicidal ideation among people living with HIV/AIDS in China: A moderated mediation modeling analysis. J Racial Ethn Health Disparities. 2023 Apr;10(2):671-9.
9. Small LA, Huynh AK, Parchment TM. The association between self-Esteem, stigma, and mental health among South African youth living with HIV: the need for integrated HIV care services. AIDS care. 2022 Jan 2;34(1):86-94.
10. Adane B, Yalew M, Damtie Y, Kefale B. Perceived stigma and associated factors among people living with HIV attending ART clinics in public health facilities of Dessie City, Ethiopia. HIV AIDS (Auckl). 2020 Oct 7:551-7.
11. Subedi B, Timilsina BD, Tamrakar N. Perceived stigma among people living with HIV/AIDS in Pokhara, Nepal. HIV AIDS (Auckl). 2019 May 7:93-103.
12. Chaudhary S, Kakchapati S. Social stigma, discrimination, and their determinants among people living with HIV and AIDS in Sudurpashchim Province, Nepal. HIV & AIDS Review. International Journal of HIV-Related Problems. 2022 Jul 5;21(3):230-8.
13. Maqsood F, Baneen B, Maqsood S. Stress-related growth of HIV/AIDS patients: Role of religion and self-esteem in mitigating perceived discrimination. J Pak Med Assoc. 2021 Jun 1;71(6).
14. Cheng WL, Chang CC, Griffiths MD, Yen CF, Liu JH, Su JA, Lin CY, Pakpour AH. Quality of life and care burden among family caregivers of people with severe mental illness: mediating effects of self-esteem and psychological distress. BMC psychiatry. 2022 Oct 31;22(1):672.
15. Reinius M, Wettergren L, Wiklander M, Svedhem V, Ekström AM, Eriksson LE. Development of a 12-item short version of the HIV stigma scale. Health Qual Life Outcomes. 2017 Dec 31;15(1).
16. Sebastian S, Subathra V, Sadath A. Does stigma predict variability in self-esteem? Role of stigma on self-esteem of persons living with HIV/AIDS in India. Indian J Soc Psychiatry. 2018 Jul 1;34(3):225-30.
17. Earnshaw VA, Eaton LA, Collier ZK, Watson RJ, Maksut JL, Rucinski KB, Kelly JF, Kalichman SC. HIV stigma, depressive symptoms, and substance use. AIDS patient care and STDs. 2020 Jun;34(6):275-80.
18. Ullah S, Naz A. Diseases related stigmatization and discrimination: investıgating the perspectives and experıences of HIV/AIDS patients in Khyber Pakhtunkhwa, Pakistan. Multidisciplinary Approaches to Research. 2022 Sep;2:27.
19. Basha EA, Derseh BT, Haile YG, Tafere G. Factors affecting psychological distress among people living with HIV/AIDS at selected hospitals of North Shewa Zone, Amhara Region, Ethiopia. AIDS Res Treat. 2019;2019(1):8329483.
20. Armoon B, Fleury MJ, Bayat AH, Fakhri Y, Higgs P, Moghaddam LF, Gonabadi-Nezhad L. HIV related stigma associated with social support, alcohol use disorders, depression, anxiety, and suicidal ideation among people living with HIV: a systematic review and meta-analysis. Int J Ment Health Syst. 2022 Mar 4;16(1):17.
21. Sameen S, Lakhdir MP, Azam SI, Asad N. Evaluating knowledge about HIV and discriminatory attitudes among Pakistani women of reproductive age using 2017–18 Demographic Health Survey data. Sci Rep. 2023 Oct 19;13(1):17849.

ORIGINAL ARTICLE

ASSESSMENT OF RISK FACTORS ASSOCIATED WITH HYPERTENSION AMONG MEDICAL STUDENTS

Salwa Adil[1], Fareeha Nudrat[2], Fatima Javed[3], Eman Noor[4], Muhammad Abdullah[5], Muhammad Zaid Aurangzaib[6], Muhammad Soban[7], Noor Ul Eman[8], Saman Fatima[9], Fatima Asmat[10], Iffat Noor[11], Mahjabeen Safdar[12]

[1,2,3,4,5,6,7,8,9,10]Fifth year MBBS students, [11]Assistant Professor Community Medicine, [12]Statistician CMH Kharian Medical College

ABSTRACT

Objective: To assess the prevalence of hypertension among medical students and to explore its relationship with lifestyle and risk factors.

Study Design: Cross-sectional study.

Place and Duration of Study: CMH Kharian Medical College, 03 months (March to June 2024).

Methodology: The sample consisted of 150 medical students from CMH Kharian Medical College. Participants were selected using stratified random sampling. Data collection involved a comprehensive, self-structured questionnaire, comprising demographic information, lifestyle factors and medical history, alongside standardized measurements for Body Mass Index (BMI) and blood pressure. Stress was assessed through a questionnaire, formulated using the perceived stress scale as a reference. Statistical analysis was performed using chi-square test and one-way ANOVA via IBM SPSS 28.

Results: The study had 59 male and 91 female students having a mean age of 21.07 years. Overall, 10 out of 150 (6.67%) students were found hypertensive. The compared variables were gender, family history, smoking, BMI, year of study, stress, diet and physical activity. There was a significant association between hypertension and gender, year of study and BMI, all other variables did not have a significant association.

Conclusion: Hypertension was prevalent among medical students. The findings highlight the need for targeted interventions to manage hypertension risk factors, particularly for male students and those with greater than normal BMI. It underscores the importance of lifestyle factors to mitigate hypertension risk in the population.

Key words: *BMI, Hypertension, Lifestyle Factors, Medical Students, Smoking, Stress.*

How to cite this article: *Adil S, Nudrat F, Javed F, Noor E, Abdullah M, Aurangzaib MZ, Soban M, Eman NUL, Fatima S, Asmat F, Noor I, Safdar M. Assessment of Risk Factors Associated with Hypertension Among Medical Students. HMDJ. 2025 December; 05(02): 59-64. https://doi.org/10.69884/hmdj.5.2.7658*

INTRODUCTION

Hypertension is a medical condition, characterised by arterial blood pressure(BP) greater than or equal to 140/90 mmHg in adults[1]. According to the National Health Survey of Pakistan, 18% of adults suffer from hypertension[2]. This disease, often dubbed "the silent killer" due to its initial asymptomatic presentation, has significantly contributed to the global disease burden, with recent data showing an increasing prevalence in younger, high-stress populations such as medical students.

Correspondence to: Dr. Salwa Adil, CMH Kharian Medical College

Email: salwakhan6224@gmail.com

Received: 03-10-2025
Revision: 08-12-2025
Accepted: 06-01-2026

The ideal arterial BP is a systolic pressure less than 120mmHg and a diastolic pressure less than 80mmHg. Hypertension can be classified into various stages as it progresses towards severe or life-threatening disease: a prehypertensive state (120-139 mmHg systolic or 80-89 mmHg diastolic), stage 1 hypertension (140-159 mmHg systolic or 90-99 mmHg diastolic), stage 2 hypertension (160-180 mmHg systolic or 100-120 mmHg diastolic), and hypertensive crisis or malignant hypertension, a medical emergency marked by BP exceeding 180/120 mmHg[1].

While gender differences and genetic factors have been linked to the development of hypertension, various environmental factors have also been identified as predisposing factors. Emphasizing these factors holds a greater public health value as they are modifiable and can be effectively targeted through preventative and therapeutic interventions[3,4,5]. Lifestyle factors include high sodium intake, poor dietary habits, physical inactivity, inadequate hydration, a high body mass index (BMI),

doi.org/10.69884/hmdj.5.2.7658

and excessive screen time. Psychosocial factors include psychological stress (academic, career, and relationship stress), depression and abnormal sleep-wake cycles[6,7,8]. Smoking, alcohol and other substance abuse are also important triggers[9]. Other minor causes include the use of several therapeutic agents, including sympathomimetic drugs, corticosteroids, CNS stimulants, NSAIDs, and even some dietary supplements[10].

Interestingly, many of these environmental factors are commonly encountered by medical students because of their academic and social circumstances. Owing to their busy schedules, most medical students have poor dietary habits, resorting to salt-dense foods and empty calories. High sodium intake promotes water retention and increased systemic vascular resistance, subsequently leading to abnormal changes in the endothelial structure and function, as well as in the sympathetic autonomic control of the cardiovascular system[11]. Consumption of red meat, excessive dietary fats and junk food increases the risk of dyslipidaemias, hyperlipidaemias and atherosclerosis, while Dietary Approaches to Stop Hypertension (DASH) and Mediterranean diets appear to have a protective role[12].

Medical students spend a significant portion of their day on smartphones and similar gadgets for their academics[13]. This contributes to reduced physical activity and an overall sedentary lifestyle. According to recent data, prolonged periods of sitting or lying down, along with failure to meet the recommended levels of movement and exercise are associated with an increased risk of diabetes mellitus and hypertension[8]. Obesity, whether resulting from a sedentary lifestyle or other etiologies, has shown a significant association with elevated blood pressure. Individuals with a BMI greater than 30.0 fall in the obesity range and contribute to 60-70% cases of hypertension. It is found that the higher the BMI, the greater the prevalence of obesity-related complications, including a 3 to 4 times greater risk of hypertension, diabetes, cancers and chronic kidney diseases, compared to those in the normal BMI range. Conversely, physical activity, exercise training and promotion of cardiorespiratory fitness have proven to be highly effective in preventing hypertension[14].

Medical students, particularly males, commonly resort to smoking after entering medical school. This tendency is often triggered by peer influence and social conformity, or as a getaway from depression, troublesome relationships and fear of failure in their examinations. Habitual tobacco smoking and other substance abuse exert a detrimental effect on vascular structure and blood pressure, ultimately leading to organ damage. When dyslipidemia and sedentary lifestyle coexist with smoking and substance abuse, a synergistic effect takes place, further compounding the risk of coronary heart disease[15].

CAPSULE SUMMARY

Hypertension was prevalent among medical students, significantly associated with gender, year of study and BMI. Focused treatments were required to control the risk factors, particularly for male students and those with higher than normal BMI. The importance of lifestyle adjustments in reducing hypertension risk was also highlighted.

Stress also has a profound impact on hypertension, with hormones like catecholamines causing tachycardia and vasoconstriction. Medical studies often take an extensive toll on the mental health of students, pushing them to develop depression and anxiety. Studies have correlated higher depression scores with higher diastolic blood pressures. Stress reactions vary from person to person, and many of life's demands, such as career, relationships and health, can cause considerable upset and anxiety. Psychological stress can manifest as sleep disturbances, eating disorders, and restlessness, all of which increase vulnerability to hypertension. On the other hand, relaxation and meditation techniques have been shown to lower blood pressure effectively[16].

METHODOLOGY

A cross-sectional study was conducted at CMH Kharian medical college with medical students over a span of 3 months, March to June 2024. The research work started after the approval by the ethical review committee of CMH Kharian Medical College. Informed written consent was taken from the participants.

A total of 150 students were selected using an online number generator from a population of 650 students. Stratified random sampling was done, which ensured representation across different strata within the student population of all five batches. Thirty-four students were selected randomly from the first three batches, with a total strength of 150 each and 24 from 4th and final year, with a strength of 100 each. The minimum and maximum ages were 18 and 25 years, respectively.

The inclusion criteria only included medical students currently enrolled at CMH Kharian medical college. Conversely, the study excluded individuals who were either medical students from other institutions or non-medical students. This approach was designed to focus on the specific population of medical students within the college, thereby providing targeted insights into the prevalence and risk factors of hypertension among this group.

In our study, BP measurements were conducted using standardized sphygmomanometer to ensure consistency and accuracy across all participants. This approach provided reliable data for the prevalence of hypertension to analyse the relationship between various risk factors and hypertension among the medical students. For the measurement of BMI, height and weight were recorded, using standardized equipment to guarantee precision. BMI was calculated using the formula: BMI = weight (kg) / height (m^2). Participants were then categorized into different BMI ranges based on the World Health Organization (WHO) classification: underweight (BMI

< 18.5), normal weight (BMI 18.5–24.9), overweight (BMI 25.0–29.9), and obese (BMI ≥ 30.0).

A structured questionnaire was developed to collect detailed information on various potential risk factors for hypertension. The questionnaire was structured into several sections, including demographic information, dietary habits, physical activity, stress levels, and personal and family medical history.

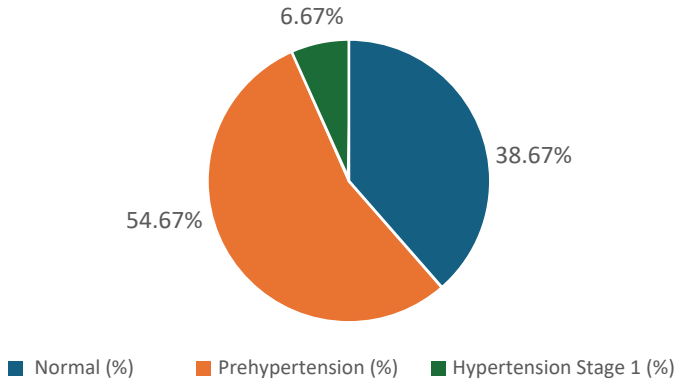


Figure 1: Prevalence of hypertension among medical students.

RESULTS

The pie chart (Figure 1) shows the overall prevalence of prehypertension and hypertension in medical students. Most of the students (54.67%) were prehypertensive, while the next big chunk was followed by normal BP (38.67%). Only 6.67% of the student population of 150 were hypertensive (stage 1).

Distinct gender differences were found in the BP profiles (Table 1). Specifically, male medical students exhibited higher proportions of prehypertension (69.49%) and hypertension stage 1 (8.47%) compared to their female counterparts. In contrast, females showed a higher prevalence of normal BP (49.45%) compared to males (22.03%). Moreover, the occurrence of hypertension stage 1 was more in males at 8.47%, while 5.49% in females. Overall, results for the effect of gender on hypertension were significant (p- value 0.003).

Chi square was used to find the association between BMI and BP, p-value was found to be 0.044 meaning a statistically significant association. Participants in the underweight and normal BMI category showed higher percentages (60.9% and 38.5% respectively) of normal BP while the percentage of participants with normal BP decreases from normal to overweight category (Figure 2). Similarly, the prevalence of prehypertension increases across the BMI categories reaching 100% in the obese group. Although the number of participants was small for the obese category, and the generalizability was limited but results supported the existing evidence of association between blood pressure and BMI (Figure 2).

The chi-square assessing the association of year of study with BP gave a p-value of 0.002. This proves a highly significant

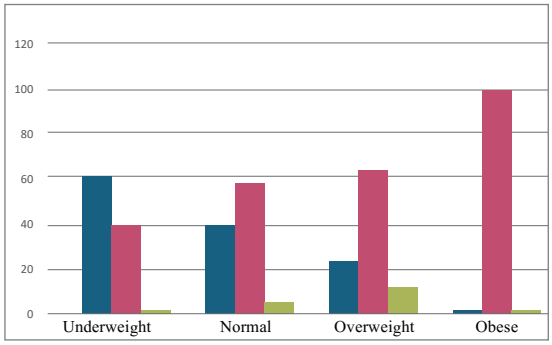


Figure 2: Distribution of BP categories across different BMI groups.

association between increasing year of study (consequently increasing age) and BP (Table 2).

A multinomial logistic regression was conducted to assess the association of age, gender, BMI category, and family history of hypertension with BP category (Normal, Prehypertension, Hypertension Stage 1). The "Normal" BP group was used as the reference category (Table 3).

Gender was the only statistically significant predictor ($\chi^2(2) = 9.429$, $p = 0.009$), indicating it contributed meaningfully to the model.

Age ($\chi^2(14) = 16.464$, $p = 0.286$), BMI categories ($\chi^2(6) = 6.970$, $p = 0.324$), and Family history of hypertension ($\chi^2(2) = 0.067$, $p = 0.967$) were not significant predictors.

While family history, ethnicity and residence (boarder or day scholar) showed no significant association with blood pressure.

DISCUSSION

Our study found a significant association between gender and BP categories among medical students. Specifically, male medical students exhibited higher proportions of prehypertension (69.49%) and hypertension stage 1 (8.47%) compared to their female counterparts, who showed a higher prevalence of normal BP (49.45%). These results align with a study at a medical college in Karachi where there was a 4.88% prevalence of hypertension among students[17]. In another study at Qassim University in Saudi Arabia, 14.6% of medical students were hypertensive, with 6.9% having isolated diastolic hypertension, 4.6% isolated systolic hypertension, and the remaining had both[4].

These findings highlight the importance of incorporating gender considerations into preventive strategies for hypertension among medical students. Age was another significant factor in our study, with older participants exhibiting higher rates of prehypertension and hypertension compared to younger individuals. This is consistent with findings from other studies, including those conducted in Makerere University and rural medical colleges, where older age groups showed increased

Table 1: Association of gender with hypertension.

Gender	Normal (%)	Prehypertension (%)	Hypertension (%)	Total (%)	p-value
Male	22.03	69.49	8.47	100%	0.003
Female	49.45	45.05	5.49	100%	
Total	38.67	54.67	6.67	100%	

Table 2: Association of year of study with hypertension.

Year of study	Normal BP (%)	Prehypertension (%)	Hypertension Stage 1 (%)	p-value
1st Year	55.9	35.3	8.8	0.002
2nd Year	38.2	61.8	0	
3rd Year	47.1	44.1	8.8	
4th Year	20.8	79.2	0	
Final Year	20.8	62.5	16.7	

Table 3: Association of gender and BP categories.

Predictor Variable	Chi-Square	df	p-value	Interpretation
Gender	9.429	2	0.009	Statistically significant → Gender affects hypertension status.

prevalence of hypertension reinforcing the importance of early interventions in younger populations to prevent the progression of hypertension [18].

Our study assessed BMI and found it to be a significant factor associated with BP. While previous studies, such as those conducted in rural medical colleges, demonstrated a high prevalence of obesity and significant correlations between anthropometric indices like BMI, waist circumference and waist-to-hip ratio with BP, our findings add to the growing body of evidence highlighting the critical role of BMI in hypertension risk among young adults[19]. Specifically, our analysis showed that higher BMI was associated with increased BP, suggesting that weight management should be a key component of hypertension prevention strategies.

The significant association between the year of study and hypertension in our research, particularly the higher prevalence of prehypertension and hypertension stage 1 in final-year students aligns with findings from other studies emphasizing the impact of academic stress and increased clinical workload (coupled with the pressure of transitioning into responsible medical professionals) on blood pressure. These results underscore the need for effective stress management programs within medical schools to mitigate the cardiovascular impact of academic pressures.

Only 3.3% of the total participants were smokers. Due to small sample size no significant association was found between smoking status and hypertension, but the prevalence of hypertension was higher among smokers as compared to non-smokers.

Stress levels surprisingly did not show a significant association with hypertension in our study, despite varying distributions of BP categories across different stress levels. This contrasts with findings from other studies, where academic stress and workload were significant contributors to elevated BP among medical students. The lack of statistical significance in our sample suggests that perceived stress levels may not be a robust predictor of hypertension, though further research with larger sample sizes and more precise stress measurement tools could provide clearer insights.

Residence status (day scholar or boarder) also did not show a statistically significant association with hypertension risk in our study. However, notable differences were observed, with boarders having a higher percentage of normal BP and day scholars showing a higher prevalence of hypertension stage 1. These findings suggest lifestyle differences between these groups, such as dietary habits and physical activity levels, which could influence BP.

Dietary habits showed a trend toward association with blood pressure although the results were not statistically significant. Participants consuming sugary, high-sodium foods ≥5 times/ week had the highest rates of prehypertension (75%) and none with normal BP. In contrast, those who rarely consumed such

foods had better BP profiles. A daily intake of 1–2 servings of fruits and vegetables was linked to the highest percentage of normal BP (39.8%). Fast food consumption showed no clear association. Overall, poor dietary habits appeared to be associated with elevated BP.

Family history and genetic predisposition did not show significant relationships with hypertension in our study, a finding consistent with some previous studies but differing from others that identified family history as a significant risk factor[2]. This discrepancy highlights the complex interplay of genetic and environmental factors in hypertension development and suggests that further research is needed to clarify these relationships.

While the statistical analysis showed no significant association between physical activity and prevalence of hypertension, data showed that participants with no after meals or weekly exercise have increased percentages of prehypertension and hypertension compared to the ones who do regular physical activity.

In conclusion, our study highlights the significant prevalence of hypertension and prehypertension among medical students, with important associations observed with gender, age and year of study. These findings are largely consistent with previous research reinforcing the need for comprehensive public health interventions, psychological counselling for stress management and lifestyle modification programs to address hypertension in this vulnerable population. Future research should explore the long-term effects of these risk factors and the effectiveness of targeted interventions in reducing hypertension prevalence among medical students.

LIMITATIONS

- Limited sample size, may not be compared with the general population.
- Some data was based on self-reports, complicating the accuracy of the study's measurements.

RECOMMENDATION

Overall, the research underscores the critical need for targeted interventions to address hypertension risk factors among medical students. Emphasis should be placed on managing lifestyle factors and healthy weight management to reduce hypertension risk. Additionally, the findings suggest that educational institutions should incorporate regular health screenings and wellness programs to monitor and support students' cardiovascular health throughout their medical education.

CONCLUSION

Hypertension is prevalent among medical students, with significant associations observed with gender, Year of study and BMI. The findings highlight the need for targeted interventions to manage hypertension risk factors, particularly for male students and those with greater than normal BMI and underscore the importance of lifestyle factors to mitigate hypertension risk in the population.

ETHICAL APPROVAL: *Reference number: CKMC/IERB/AC-0245, Date: 06-02-2024.*

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*

AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*

FINANCIAL DISCLOSURE/ FUNDING: *None*

ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*

CONFLICT OF INTEREST: *None*

ACKNOWLEDGEMENT: *None*

AUTHORS' CONTRIBUTION

- ***Salwa Adil:*** *Conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Critical revision*
- ***Fareeha Nudrat:*** *Conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Critical revision*
- ***Fatima Javed:****Acquisition of data, Drafting the article*
- ***Eman Noor:*** *Acquisition of data, Drafting the article*
- ***Muhammad Abdullah:*** *Acquisition of data, Drafting the article*
- ***Muhammad Zaid Aurangzaib:*** *Acquisition of data, Drafting the article*
- ***Muhammad Soban:*** *Acquisition of data, Drafting the article*
- ***Noor Ul Eman:****Acquisition of data, Drafting the article*
- ***Saman Fatima:*** *Acquisition of data, Drafting the article*
- ***Fatima Asmat:*** *Acquisition of data, Drafting the article*
- ***Iffat Noor:*** *Drafting the article, Critical revision*
- ***Mahjabeen Safdar:*** *Analysis and interpretation of data*

REFERENCES

1. Bell K, Twiggs J, Olin BR. Hypertension: the silent killer: updated JNC-8 guideline recommendations. Alabama Pharmacy Association; 2015. OR World Health Organization. Hypertension [Internet]. 2025 Sep 25 [cited 2025 Dec 26]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension)
2. Saleem F, Hassali AA, Shafie AA. Hypertension in Pakistan: time to take some serious action. Br J Gen Pract. 2010 Jun 1;60(575):449.
3. Di Giosia P, Giorgini P, Stamerra CA, Petrarca M, Ferri C, Sahebkar A. Gender differences in epidemiology, pathophysiology, and treatment of hypertension. Curr Atheroscler Rep 2018 Mar;20(3):13.
4. AlWabel AH, Almufadhi MA, Alayed FM, Aloraini AY, Alobaysi HM, Alalwi RM. Assessment of hypertension and its associated risk factors among medical students in Qassim University. Saudi J Kidney Dis Transpl. 2018 Sep 1;29(5):1100-8.
5. Patel RS, Masi S, Taddei S. Understanding the role of genetics in hypertension. Eur Heart J. 2017 Aug 1;38(29):2309-12.
6. Yang MH, Kang SY, Lee JA, Kim YS, Sung EJ, Lee KY, Kim JS, Oh HJ, Kang HC, Lee SY. The effect of lifestyle changes on blood pressure control among hypertensive patients. Korean J Fam Med. 2017 Jul 20;38(4):173.

7. Mohammedin AS, AlSaid AH, Almalki AM, Alsaiari AR, Alghamdi FN, Jalalah AA, Alghamdi AF, Jatoi NA, Said A, Al-Ghamdi FN, Jalalah A. Assessment of hydration status and blood pressure in a tertiary care hospital at Al-Khobar. Cureus. 2022 Aug 5;14(8).
8. Lavie CJ, Ozemek C, Carbone S, Katzmarzyk PT, Blair SN. Sedentary behavior, exercise, and cardiovascular health. Circulation research. 2019 Mar 1;124(5):799-815.
9. Husain K, Ansari RA, Ferder L. Alcohol-induced hypertension: Mechanism and prevention. World J Cardiol. 2014 May 26;6(5):245.
10. Hulisz D, Lagzdins M. Drug-induced hypertension. US Pharm. 2008;33(9).
11. Grillo A, Salvi L, Coruzzi P, Salvi P, Parati G. Sodium intake and hypertension. Nutrients. 2019 Aug 21;11(9):1970.
12. Batubo NP, Moore JB, Zulyniak MA. Dietary factors and hypertension risk in West Africa: a systematic review and meta-analysis of observational studies. J. Hypertens. 2023 Sep 1;41(9):1376-88.
13. Roomi MH, Srivastava A, Girdhar N, Jha C, Thakur S. A study of the correlation between screen time and hypertension among young adults in North India: a cross-sectional analysis. Cureus. 2024 Jan 4;16(1).
14. Petersen L, Schnohr P, Sørensen TI. Longitudinal study of the long-term relation between physical activity and obesity in adults. Int J Obes. 2004 Jan;28(1):105-12.
15. Pazdro-Zastawny K, Dorobisz K, Bobak-Sarnowska E, Zatoński T. Prevalence and associated factors of cigarette smoking among medical students in Wroclaw, Poland. Risk Manag. Healthc. Policy. 2022 Mar 18:509-19.
16. Liu MY, Li N, Li WA, Khan H. Association between psychosocial stress and hypertension: a systematic review and meta-analysis. Neurol Res. 2017 Jun 3;39(6):573-80.
17. Shams N, Niaz F, Motwani R, Shaikh Z, Saleem F. Obesity and hypertension in female medical students; frequency and risk factors. J Liaquat Uni Med Health Sci. 2015 Jan 1;14(01):26-32.
18. Nyombi KV, Kizito S, Mukunya D, Nabukalu A, Bukama M, Lunyera J, Asiimwe M, Kimuli I, Kalyesubula R. High prevalence of hypertension and cardiovascular disease risk factors among medical students at Makerere University College of Health Sciences, Kampala, Uganda. BMC Res Notes. 2016 Feb 17;9(1):110.
19. Lahole S, Rawekar R, Kumar S, Acharya S, Wanjari A, Gaidhane S, Agrawal S. Anthropometric indices and its association with hypertension among young medical students: A 2 year cross-sectional study. J Family Med Prim Care. 2022 Jan 1;11(1):281-6.

ORIGINAL ARTICLE

KNOWLEDGE, ATTITUDE AND PERCEPTION OF MEDICAL STUDENTS AND HEALTHCARE PROFESSIONALS TOWARDS ARTIFICIAL INTELLIGENCE (AI): A CROSS-SECTIONAL STUDY

Muqadus Rizwan[1], Ahmed Murtaz Khalid[2]

[1]Final year MBBS student, CMH Kharian Medical College, [2]Professor, Department of Physiology, CMH Kharian Medical College, Pakistan/Tutor PGDip Diabetes, University of South Wales,UK

ABSTRACT

Objective: To determine the knowledge, attitude, and perception of medical students and healthcare professionals about Artificial Intelligence (AI), and identify likely barriers in its acceptance for successful use in healthcare.

Study Design: Cross-sectional study.

Place and Duration of Study: CMH Kharian Medical College and Combined Military Hospital (CMH), Kharian, 03 months (March to June 2025).

Methodology: This study was carried out among medical students and healthcare workers, using a structured interview form. This instrument evaluated the participants' understanding of AI, attitudes toward integration of the same into clinical practice, and perceived benefits and limitations as well as its ethical implications. Statistical analysis was performed using SPSS-27.

Results: A total of 384 participants, of whom 382 answered (99.48%) the questionnaire. Overall, 17.3% of healthcare professionals and 8.8% medical students had formal training on AI (p=0.020). The awareness regarding AI was higher in healthcare professionals as compared to students (p <0.05) . Overall, 60% of respondents were hopeful about the future role of AI in healthcare. Concerns about accuracy and reliability of AI in diagnosis was the most common worry among professionals (34.69%) closely followed by students (32.7%).

Conclusion: Although healthcare professionals and medical students had positive attitudes toward AI, their relatively low level of knowledge underlines the importance of education in this area. Inclusion of AI-related content into medical curriculum can improve future healthcare enterprises with AI as a dominant feature.

Key words: *AI, Artificial Intelligence, Attitude and Perception, Healthcare Professionals, Knowledge, Medical Education, Medical Students.*

How to cite this article: *Rizwan M, Khalid AM. Knowledge, Attitude and Perception of Medical Students and Healthcare Professionals Towards Artificial Intelligence (Ai): A Cross-Sectional Study. HMDJ. 2025 December; 05(02): 65-73. https://doi.org/10.69884/hmdj.5.2.3457*

INTRODUCTION

The medical care landscape is being transformed by digital revolution. There is a vast potential in digital healthcare; it may also enhance the quality of medical care. Machine learning, mobile apps, wearables, sensors, and telemedicine have the potential to improve the conventional medical model of clinical history, examination, differential diagnosis, and treatment[1]. Medical Artificial Intelligence (AI) comprises using the ability of computers and other technology to aggregate data, input into machines and systems, as well as process that data and analyse it for particular characteristics in the way a human being might draw out conclusions from various stimuli. AI will revolutionize medical practice. There are a few radiologists who feel that increasing use of AI in radiology could negatively impact their jobs in the near future[2]. AI is being applied in different healthcare systems for rapid progress. Healthcare is also where AI has the greatest power to transform how diagnosis, treatment and prognosis are handled for patients. Adequate knowledge of the significance and use of AI in healthcare can be quite beneficial. ChatGPT and other AI applications enable medical students to advance their knowledge and clinical skills.

Correspondence to: Dr. Muqadus Rizwan, CMH Kharian Medical College.

Email: nuqadasrizwan41@gmail.com

Received: 09-10-2025
Revision: 22-12-2025
Accepted: 22-12-2025

doi.org/10.69884/hmdj.5.2.3457

Beyond that, it is fast access and a time saver. AI-empowered tools in clinical practice can have a positive impact on healthcare professionals. AI can manage different activities in healthcare; however, it will pose multiple challenges for practitioners and have a significant effect on the profession (healthcare) at large[3].

The knowledge, attitude, and perception of healthcare providers on AI represent a principal factor in its acceptance and efficient use. There could be some hiccups with these AI-based systems because of privacy and data security. It follows, hence, that the confidentiality of medical records should be preserved as AI is introduced because health data and records are sensitive[4]. In addition, patient consent has been another daunting challenge regarding private data since the integration of AI into healthcare may contribute to broad access to patients' information without their agreement. One of the many fears is that humankind can be substituted by AI in looking after people. It can lead to dehumanization in medicine. The use of AI can present serious privacy problems. It can affect a patient's autonomy. Although AI is crucial and advantageous in the healthcare field, it also has its limitations. AI-generated data can be biased. Dependence on data quality exists. Biased and nonsensical queries can result from poor data quality. It can increase healthcare costs. Beyond that, there is no established regulatory framework that guides the creation and implementation of AI for healthcare. There are several challenges that make it difficult for AI to be adopted into the healthcare industry. There are a number of obstacles to this, such as unawareness, lack of expert knowledge or training, financial issues, and interest[5].

Healthcare workers' knowledge, attitudes, and perceptions of AI have been the subject of numerous studies; as a result, education and training about AI are required to fill the knowledge gap. Nonetheless, these surveys found other differences in the knowledge about, attitude towards, and perception of AI among healthcare professionals according to specific characteristics like type of profession and experience or exposure to AI[6,7]. The purpose of this study was to assess medical students' and healthcare professionals' knowledge, attitude, and perception of AI. Moreover, it determined the factors affecting the adoption and effective utilization of AI tools and the barriers in their integration in medical care. The results of this study may guide new educational and training programs for increasing its acceptance and efficient use in health communities.

CAPSULE SUMMARY

Most of the participants had heard about AI but lacked the formal AI education and were interested in receiving AI training. A strong relationship was seen between the level of qualification and AI training, and awareness. The biggest concerns were job loss, moral issues, and invasion of privacy, sacrificing human touch to patient-care. Unawareness inadequately trained personnel, and financial constraints were a few barriers towards the application of AI in healthcare.

METHODOLOGY

This cross-sectional study was undertaken among the medical students and healthcare personnel of CMH Kharian Medical College and CMH Kharian, from March – June, 2025. For sampling, a non-probability convenience technique was employed. The sample size was 384, calculated by the open epi calculator with a 95% confidence level, 50% expected frequency of knowledge, and 5% marginal error. All healthcare providers like house officers, medical officer, post graduate residents, consultants and students who agreed to be part of the study and gave consent were incorporated in the study.

We excluded healthcare professionals who were not practicing at present, and those from another profession that are not health-related. A close-ended survey instrument was developed through extensive literature review to evaluate participants' knowledge of AI; attitude toward the integration into clinical practice and perceived benefits and limitations. The face validity of questionnaire was established through expert reviews. Prior to data collection, participants gave their informed consent.

The participants were interviewed with an online questionnaire form after obtaining IERB approval. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 27 and were summarized using descriptive statistics (frequencies and percentages). For inferential statistics, the association between qualification level and categorical variables was tested by the chi-square test. The ordinal variables such as knowledge levels and the scores of attitude on AI, improving the healthcare efficiency, and the levels of perception on the future role of AI, were compared using Mann Whitney U test between healthcare profession and medical students. Significance was recorded at $p < 0.05$.

RESULTS

Out of 384 participants, 382(99.5%) completed the survey questionnaire. Among them, there were 153 (40%) males and 229 (60%) females. A total of 98 (26%) were graduated healthcare professionals and 284 (74%), undergraduate medical students. A large number of the subjects, 300 (78.5%) fell in the 21-30 years' age group. A total of 284 medical students were included in the study with 28(10%) in first year, 61(21%) in second year, 61(21%) in third year, and 54(19%) in fourth years, whereas those who participated from the fifth year were relatively higher than others and it was 80 (28%). Out of 98 healthcare professionals, 45 (46%) were house officers; 23 (23%) were medical officers/ demonstrators, 6(6%) were postgraduate residents, and 24 (24%) were consultants.

There was a significant relationship between the participants' qualification and their formal training on AI (p=0.020), indicating that healthcare professionals (17.3%) were more likely to undergo some form of formal training with respect to

Table 1: Comparison of AI formal training, awareness and usage between medical students and health care professionals.

Variables	Medical students		Healthcare professionals		p-value
	Yes n(%)	No n(%)	Yes n(%)	No n(%)	
Formal Training	25(8.8)	259(91.2)	17(17.3)	81(82.7)	0.020
Awareness	201(70.8)	83(29.2)	89(87.8)	12(12.2)	<0.001
Use of AI applications	250(91.5)	24(8.5)	84(85.7)	14(14.3)	0.096

Table 2: Comparison of attitude and perception towards AI in health care between medical students and health care professionals.

Variables	Medical students			Healthcare professionals			p-value
	Yes n(%)	No n(%)	Unsure n(%)	Yes n(%)	No n(%)	Unsure n(%)	
Comfortable while using AI	199(70.1)	23(8.1)	62(21.8)	68(69.4)	15(15.3)	15(15.3)	0.069
Integration of AI	226(79.6)	17(6.0)	41(14.4)	83(84.7)	5(5.1)	10(10.2)	0.519
Additional AI training	260(91.5)	24(8.5)	-	91(92.9)	7(7.1)	-	0.680
Replacement of human healthcare professionals	56(19.7)	169(59.5)	59(20.8)	12(12.2)	63(64.3)	23(23.5)	0.240
Independent medical decisions	47(16.5)	185(65.1)	52(18.3)	13(13.3)	75(76.5)	10(10.25)	0.089

medical students (Table 1). There was a statistically significant difference between participants' qualification and awareness of AI (p<0.001), showing that healthcare professionals are more aware of AI (87.8%) compared to medical students (70.8%) (Table 1). Regarding the use of AI applications, medical students reported using AI applications (91.5%) more than healthcare professionals (85.7%), but the difference did not reach statistical significance (p = 0.096) (Table 1).

Statistical analysis did not indicate any significant relationship between the respondents' qualification and comfort in use of AI (p=0.069), attitude towards integration of AI in medical education and training (p=0.519), willingness for additional AI training, perception that AI can replace human healthcare professional (p = 0.240) and perception that AI can decide without any human intervention (p = 0.089) (Table 2).

The median (IQR) of knowledge score was 3.00(2) for both healthcare professionals and medical students. There was a non-significant difference between medical students' and healthcare professionals knowledge levels, U=13031.0, z= -0.97 and p = 0.331. The frequency comparison of the AI knowledge of two groups is displayed in Table 3. There was no significant difference in the attitude towards AI as a tool

Table 3: Comparison of frequency of Knowledge of AI medical students and among health care professionals.

Knowledge of AI	Medical students n(%)	Healthcare professionals n(%)	p-value
Very knowledgeable	35(12.3)	11(11.2)	0.30
Somewhat knowledgeable	76(26.8)	36(36.7)	
Neutral	55(19.4)	13(13.3)	
Slightly knowledgeable	92(32.4)	32(32.7)	
Not knowledgeable at all	26(9.2)	6(6.1)	

Table 4: Comparison of the frequency of Attitude towards AI improving healthcare efficiency between medical students and healthcare professionals.

Improvement in healthcare	Medical students n(%)	Healthcare professionals n(%)	p-value
Strongly agree	66(23.2)	27(27.6)	0.65
Agree	156(54.9)	50(51.0)	
Neutral	54(19.0)	20(20.4)	
Disagree	8(2.8)	1(1)	
Strongly disagree	0(0)	0(0)	

Table 5: Comparison of frequency of Perception towards future role of AI in healthcare between medical students and healthcare professionals.

Future Role of AI	Medical students n(%)	Healthcare professionals n(%)	p-value
Very optimistic	39(13.7)	15(15.3)	0.83
Somewhat optimistic	128(45.1)	44(44.9)	
Neutral	100(35.2)	33(33.7)	
Somewhat pessimistic	11(3.9)	6(6.1)	
Very pessimistic	6(2.1)	0(0)	

to enhance healthcare efficiency between medical students and health professionals (U= 13351.0, z=-0.661, p=0.50). Healthcare professionals had a median(IQR) attitude score of 2.00(1), and the median(IQR) attitude score of medical students was 2.00(0). The frequency comparison of attitude comparison of the two groups is displayed in Table 4. There was no significant difference in perception level towards the future role of AI between medical students and healthcare professionals, U=13620.5, z=-0.337, p=0.73. The perception among medical students had a median(IQR) score of 2.00(1) when compared with healthcare professionals, they also received a median(IQR) of 2.00(1). The comparison of frequency of perception towards AI between the two groups is listed in Table 5.

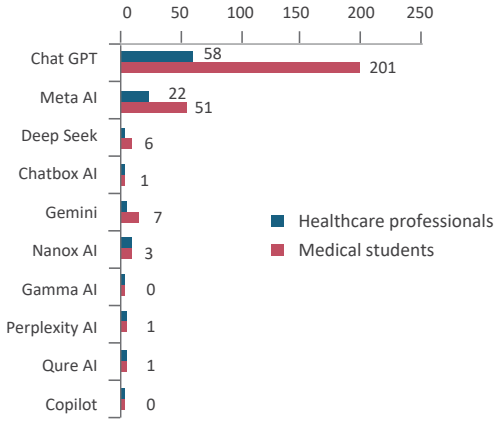


Figure 1: Different AI applications used by medical students and healthcare professionals.

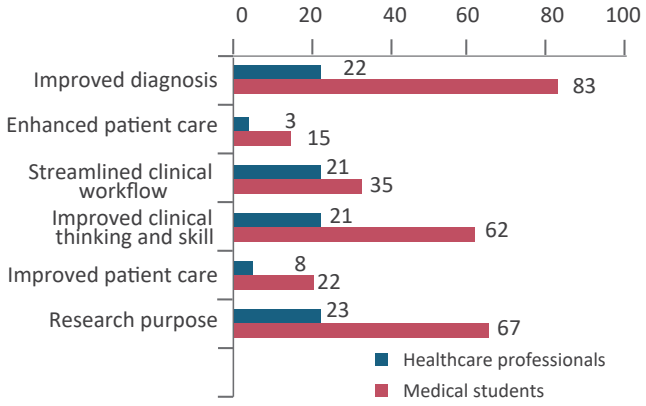


Figure 2: Perception of participants towards the benefits of AI in healthcare.

The two AI apps used most frequently by the participants were ChatGPT and Meta AI. Out of 98 healthcare professionals and 284 medical students, 70.7% of medical students and 59.1% of healthcare professionals were using Chat GPT, and 17.9% of medical students and 22.4% of healthcare professionals were using Meta AI. (Figure 1)

Total 29.22 % medical students and 22.4 % healthcare professionals perceived that AI could improve diagnosis, 12.32 % medical students and 21.4% healthcare professionals believed that AI could streamline clinical workflow, 21.8% medical students and 21.1% healthcare professionals perceived the utility of AI in improved clinical thinking and skill while 23.59% medical students and 23.4 % healthcare professional believed AI to be beneficial for research purposes. (Figure 2)

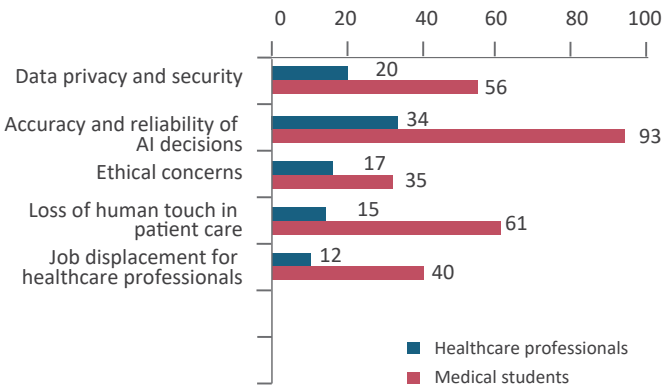


Figure 3: Concerns of participants about AI use in healthcare.

Among 284 medical students and 98 healthcare professionals, 19.7% medical students and 20.4% healthcare professionals believed data privacy and security to be the concerns, 32.7% medical students and 34.69% healthcare professionals pointed towards accuracy and reliability of AI diagnosis as the concerns, 12.32% medical students and 17.3% healthcare professionals mentioned the ethical concerns, 21.4% medical students and 15.3% healthcare professionals believed the loss of human touch in patient care, and 14.08% medical students and 12.2% healthcare professionals believed the job displacement for human healthcare professionals were the concerns (Figure 3).

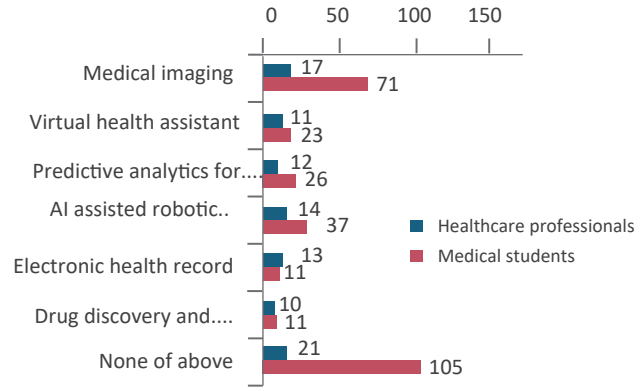


Figure 4: Knowledge of participants regarding AI applications in healthcare.

Among 284 medical students and 98 healthcare professionals, 25% medical students 17.3% and healthcare professionals knew about medical imaging analytics (AI assisted x-rays and MRI), 8.09% medical students and 11.2% healthcare professionals were familiar with virtual health assistant, 9.15% medical students and 12.2% healthcare professionals were familiar with predictive analytics for diseases diagnosis, 13.02% medical students and 14.2% healthcare professionals were familiar with AI assisted robotic surgeries, 3.8% medical students and 13.2% healthcare professionals were familiar with electronic health record (EHR) automation 3.8% medical students and 10.2% healthcare professionals were familiar with drug discovery and development (Figure 4).

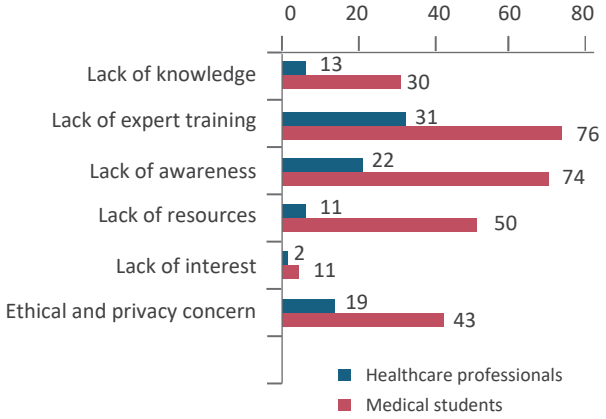


Figure 5: Perception of participants about barriers towards successful implementation of AI in healthcare.

Regarding the potential barriers towards successful AI integration in healthcare, 26.05% medical students and 22.02% healthcare professionals believed it was the lack of awareness, 26.7% medical students and 31.6% healthcare professionals mentioned the lack of expert training, 10.56% medical students and13.3% healthcare professionals said the lack of knowledge, 15.14% medical students and19.3% healthcare professionals pointed to the ethical and privacy concerns, and 17.6% medical students and11.22% healthcare professionals believed that lack of resources were the barriers.

DISSCUSION

We set out to understand how people perceive and form attitudes towards AI in healthcare. The study revealed that most of interviewees had heard about AI but personally lacked the formal AI education and were interested in receiving further training about AI. The discrepancies between IT and traditional education levels reflect the growing recognition of the importance of AI in healthcare. A discrepancy persists between the state-of-the-art and strong models of learning. A cross-sectional study was done with the medical students from Kerala during 2024, to determine their knowledge & perceptions regarding AI. Of total 325 responders, 57.2% and 54.2% believed AI technology would be supportive to avoid errors in medication and improve decision accuracy in healthcare. Around 49% believed that AI would make medical services more accessible. Total 37.6% of respondents were concerned that AI would take away medical jobs. Around 69.2% were concerned about reduced human touch of medicine[8]. A research carried out in Jordan found out that only about 69% people were knowledgeable about AI, 46.2% individuals were interested in learning about AI. Around 54.1% reported that AIs in automatic diagnoses of disease was useable. Ethical issues from AI development were raised by 42.4% participants[9]. A cross-sectional survey in Riyadh found that 73.39% participants were aware of AI. Around 69.4% reported that AI was a medium to be employed by healthcare professionals. Total 75.1% thought AI might reduce medical errors[10]. In another study, majority (64%) stated that they had never been exposed to application of AI at work place while as high as 80% believed

use of AI might jeopardize their privacy. A large number (40%) considered AI being harmful and 10% showed their fear that they might be replaced by AI. Conversely, 79% said AI would probably be useful in their area of work[11]. One cross-sectional study was conducted in Vietnamese medical students. Among them 92% had no prior exposure to AI in health care. Around 77.9% believed that AI might be useful for their job. Around 83.54% students said that decreased funding was a challenge to implement AI in healthcare. Total 81% said a lack of training was the main factor in hampering health care from using AI[12]. In another study, 83.3% students favoured the use of AI in administration. Total 91.7 percent participants said AI was an acceptable tool to use with health data in research. Around 33.3% expressed concern that their data was not sufficiently guaranteed and 58.3% were concerned about being observed at work in the future[13].

The IT skills related to AI in medical curriculum are considered important by medical students. Regarding applications in teaching and learning, there are potential applications of ChatGPT in education. There was a modest student rated gain in treatment expectations through AI compared with human delivered information[14]. Artificial Intelligence scenario teaching mode allows to be more student engaging and central for teaching, which aids in student performance significantly. It enhances clinical thinking and skills[15]. A study conducted throughout Germany, Austria and Switzerland revealed that individuals were relatively inexperienced with AI, around 487 participants had little formal education in the area. Total 189 had bad experiences with AI based chat apps such as ChatGPT. Around 349 individuals believed that AI would have a positive effect on medicine[16]. A cross-sectional survey conducted in 2023 among American students studying a healthcare profession revealed that 42.99% of the individuals didn't know about ChatGPT. Most students agreed that ChatGPT was a helpful tool in healthcare setting and it provided trustworthy data. Participants recognized ChatGPT as useful for clinical education, medical info and ease of work[17]. A study conducted in Jordan in 2023 showed that 66.4% individuals had no or limited AI knowledge and as high as 54.4% gained awareness about the subject matter not from their school, but from social media. On the other hand 51.2% had positive attitude of AI and 77.6% would approve of AI involvement in the health profession. Participants recognized that obstacles between medical professionals were lack of expert training (53 %), lack of awareness (50%), and lack of interest (41%)[18].

A study among 486 Canadian undergraduate medical students in 2023 revealed that 94% felt that AI use in medicine would be routine eventually. Artificial Intelligence would benefit medicine according to 84% of the respondents, 67% wanted AI to be part of medical curricula. Around 85% participants were uneducated in relation to AI[19]. In a cross-sectional study from northern India in 2022, out of (367 patients), 74.4% thought that AI would have a significant part in future healthcare delivery. The majority (79.6%) of the participants had no knowledge regarding the application of AI. Doctors' interest to know more about AI was 51.6%. The 69.3% of students were eager to gain specific information and to know more about AI. Around 62.5% of doctors and 84.4% of medical students considered AI, beneficial to the healthcare career[20].

In an Egyptian cross sectional study on perception, attitude along with possible barriers toward AI among medical students and house officers (1346 participants), 76.4% had insufficient knowledge about significance and usefulness of AI in health sphere. The proportion of negative attitude to AI constitutesd 87.4%[21]. In another study on 2522 medical students, moderate computer literacy was demonstrated by 75.7%, technology for learning was a constant use among 57.5%, and the scenario on AI significantly affecting healthcare had a concordant opinion by 48.8%. The majority of participants, around 66%, accepted to conduct the AI education for the entire students studying medical under graduate level in order to enrich their educational quality[22]. The explosive progress of AI and machine-learning are offering novel tools to the clinicians. Legitimate concerns exist, that make it unlikely to supplant human evaluation. But these tools have real promise to help in screening the patients, exposing physician bias and nudging the next step, following capacity building [23].

Another study at Rangaraya Medical College was conducted among medical students in the year 2023. The study found out that 85.5% students were familiar with AI and only 45% responded that AI would make errors while diagnosing the diseases. Most of the students believed AI to be important in both pathological as well as radiological diagnostic processes. Fear of replacement of doctors with AI was reported by 58% students, followed by fear of loss of privacy (75.2%) and less human interaction with patients (93.1%)[24]. Artificial Intelligence has been previously evaluated in the Syrian doctors and students regarding their knowledge, attitude and practice towards it. Total 1494 participants were included in this study, 1055 had prior knowledge about AI and 357 knew its application in medicine. Positive attitudes towards the application of AI in medicine were captured during study[25]. Another study in Sultan Qaboos University, aiming to evaluate knowledge, attitude and perception of AI in healthcare among medical students, revealed that 75.4% students did not have experience with AI in healthcare. Further, 78.7% participants believed that every medical student should be formally trained on AI competences. The study demonstrated that medical students had a favourable perception and attitude of AI[26].

In the year 2021, a research was carried out to determine perceptions of Western Australian Medical Students about AI in healthcare. Total 134 students were enrolled in the study, and 84.8% had basic knowledge about AI; with 58.6% students believing that AI should be a part of their medical training, while concerning was that 56.6% did not believe AI would affect their job security as a doctor [27].

Based on a survey from Pakistan to evaluate the knowledge, attitude & perception of healthcare students and professionals towards use of AI in healthcare (616 participants), 78.7% hadn't received any training about AI, 70.3% believed

more ethical dilemmas would result by the use of AI and 66.4% supported AI's incorporation in undergraduate education[6]. A study was conducted in Mardan , KPK, Pakistan in 2023 on 150 doctors from various departments of a medical complex. Around 66% of the respondents had heard of AI but they were not sure about its application in healthcare. Most doctors in this study had little knowledge and low practice level of AI[28].

Our results indicated that most participants did not have AI training, which was also found in similar study conducted across Germany, Austria and Switzerland and a study done in Pakistan[16,6]. This projects a common trend of defied structured AI education and learning in healthcare. Alluding to the small proportion of study participants who were trained in AI, level of awareness was high in our study participants, similar findings have been reported in a study conducted in Jordan in 2024[9].

AI is rapidly becoming an evolving field in health delivery. The majority of participants in our study agreed on integration of AI into medical curriculum, incorporating in education and training part. These findings were reinforced in other studies conducted in Pakistan in 2024, Western Australia in 2021[27]and Jordan in 2023 that illustrated the potential importance of preparing future healthcare professionals with AI-related skills[6,27,9]. In our study most of the participants expressed willingness to have further AI training , in line with the research done by Sultan Qaboos University in year 2023, showing agreement and adaptability to technical evolution from healthcare providers, and medical students[26].

In this study, majority of the subjects were not agreed with the possibility of AI substituting human healthcare providers, which is in conjunction with a study conducted in Kerala and Rangaraya Medical College[8,24]. Further, opinion of human intervention in the medical decision rather than AI independence is also consistent with a previous study conducted in 2023[23].

In our study, participants reported the application of chat GPT and Meta AI as relevant to their practice consistent with findings of another study done in 2024[14]. A majority agreed that AI could result in improved diagnosis and clinical knowledge and skills which was also observed in other studies[10,15,23].

Use of the AI in research was recognized by most participants in our study. These results are in accordance with a study conducted in 2023. Potential barriers to a successful integration with healthcare are lesser awareness and novice's training as reported in Jordan[18]. In our study some participants believed it to be a result of limited finances. These findings are similar with results reported among Vietnamese Medical Students in 2023[12]. Ethical concern and privacy related concerns due to AI were raised by many of the participants in our study. These results are consistent with a Pakistani study[6]. Our participants believed on asserted view that AI could lead clinical practice towards no human touch which was aligned with finding from study conducted in Kerala and in Rangaraya Medical College[8,24].

Many of the participants indicated that they were afraid of losing their jobs, this is in line with the results of the study performed in Western Australia in 2021[27]. Ultimately majority of participants in this study reported to have little knowledge about AI, like the findings of a survey conducted at Jordan in 2024[8]. Most participants were somehow optimistic about AI's future role aligning with the studies conducted in Northern India in 2022[20].

A major limitation of this work is that it was cross-sectional, and thus we were unable to make causal inferences. These responses could be susceptible to recall or social desirability bias in the sense that participants may have exaggerated or underestimated what they know about or how they perceived AI related change. The findings of the sample are likely not representative of all medical students and healthcare professionals among institutions or regions. Qualitative interviews or focus groups were not conducted as part of the study, which would have offered further explanation for attitudes and perceptions. The study did not specify responses by medical specialty, which can shape opinions on AI.

To avoid such bitter experiences in future, with optimal integration of AI into healthcare, medical/healthcare education curriculum should include both fundamental and applied concepts of AI, so the students will have better preparation when they enter in real-life healthcare environment. Hospitals and health organizations should arrange workshops, webinars and certification courses in AI for the existing workforce foster collaborations between medical and computer science faculties to develop AI modules that are used in practice, frame ethical guidelines for the use of AI in healthcare. This will dispel fears and encourage safe use of AI. Health authorities should generate greater awareness about the importance of using AI in this sector, which is expected to have implications for all stakeholders.

CONCLUSION

Despite limited AI knowledge , participants' attitude and perception were positive regarding the implementation of AI in healthcare. There was a strong relationship between level of qualification and AI training, and awareness. Job loss, moral issues, invasion of privacy, and sacrificing human touch to patient-care were among the biggest concerns raised by majority of the responders. Unawareness, inadequately trained personnel and financial constraints were a few barriers towards effective application of AI in healthcare.

The study limitation is that only face validation of questionnaire was performed without undergoing comprehensive validation and reliability testing.

ETHICAL APPROVAL: *Reference number: CKMC/IERB/AC-00220, Date: 07-02-2025*
CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*
AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*
FINANCIAL DISCLOSURE/ FUNDING: *None*
ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*
CONFLICT OF INTEREST: *None*
ACKNOWLEDGEMENT: *None*
AUTHORS' CONTRIBUTION

- ***Muqadus Rizwan:*** *Conception and design, Acquisition of data, Aanalysis and interpretation of data, Drafting the article*
- ***Ahmad Murtaz Khalid:*** *Critical revision, Drafting the article*

REFERENCES

1. Butcher CJT, Hussain W. Digital healthcare: the future. Future Healthc J. 2022;9(2):113–7. doi:10.7861/fhj.2022-0046.
2. Ahuja AS. The impact of artificial intelligence in medicine on the future role of the physician. PeerJ. 2019 Oct 4;7:e7702. doi: 10.7717/peerj.7702. PMID: 31592346; PMCID: PMC6779111.
3. Mehta N, Harish V, Bilimoria K, Morgado F. Ginsburg S, Law M, et al. Knowledge and Attitudes on Artificial Intelligence in Healthcare: A Survey Study of Medical Students [version 1]. MedEdPublish 2021, 10:75 (https://doi.org/10.15694/mep.2021.000075.1)
4. Khan B, Fatima H, Qureshi A, Kumar S, Hanan A, Hussain J, etal. Drawbacks of Artificial Intelligence and Their Potential Solutions in the Healthcare Sector. Biomed Mater Devices. 2023 Feb 8:1-8. doi: 10.1007/s44174-023-00063-2. Epub ahead of print. PMID: 36785697; PMCID: PMC9908503.
5. Baowaly MK, Lin CC, Liu CL, Chen KT. Synthesizing electronic health records using improved generative adversarial networks. J Am Med Inform Assoc. 2019 Mar 1;26(3):228-241. doi: 10.1093/jamia/ocy142. PMID: 30535151; PMCID: PMC7647178.
6. Habib MM, Hoodbhoy Z, Siddiqui MAR. Knowledge, attitudes, and perceptions of healthcare students and professionals on the use of artificial intelligence in healthcare in Pakistan. PLOS Digit 4Health. 2024 May 10;3(5):e0000443. doi: 10.1371/journal.pdig.0000443. PMID: 38728363; PMCID: PMC11086889.
7. Ahmed Z, Bhinder KK, Tariq A, Tahir MJ, Mehmood Q, Tabassum MS, Malik M, Aslam S, Asghar MS, Yousaf Z. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Pakistan: A cross-sectional online survey. Ann Med Surg. 2022 Apr 1;76:103493. https://doi.org/10.1016/j.amsu.2022.103493
8. Jackson P, Ponath Sukumaran G, Babu C, Tony MC, Jack DS, Reshma VR, et al. Artificial intelligence in medical education - perception among medical students. BMC Med Educ 24, 804 (2024). https://doi.org/10.1186/s12909-024-05760-0
9. Rjoop A, Al-Qudah M, Alkhasawneh R, Bataineh N, Abdaljaleel M, Rjoub MA, Alkhateeb M, etal. Awareness and Attitude Toward Artificial Intelligence Among Medical Students and Pathology Trainees: Survey Study JMIR Med Educ 2025;11:e62669 doi: 10.2196/62669PMID: 39803949PMCID: 11741511
10. Syed W, Basil A. Al-Rawi M. Assessment of Awareness, Perceptions, and Opinions towards Artificial Intelligence among Healthcare Students in Riyadh, Saudi Arabia. Medicina. 2023; 59(5):828. https://doi.org/10.3390/medicina59050828
11. Castagno S, Khalifa M. Perceptions of Artificial Intelligence Among Healthcare Staff: A Qualitative Survey Study. Front Artif Intell. 2020 Oct 21;3:578983. doi: 10.3389/frai.2020.578983. PMID: 33733219; PMCID: PMC7861214
12. Truong NM, Vo TQ, Tran HTB, Nguyen HT, Pham VNH. Healthcare students' knowledge, attitudes, and perspectives toward artificial intelligence in the southern Vietnam. Heliyon. 2023 Nov 22;9(12):e22653. doi: 10.1016/j.heliyon.2023.e22653. PMID: 38107295; PMCID: PMC10724669.
13. Moldt JA, Festl-Wietek T, Madany Mamlouk A, Nieselt K, Fuhl W, Herrmann-Werner A. Chatbots for future docs: exploring medical students' attitudes and knowledge towards artificial intelligence and medical chatbots. Med Educ Online. 2023 Dec;28(1):2182659. doi: 10.1080/10872981.2023.2182659. PMID: 36855245; PMCID: PMC9979998.
14. Thomae AV, Witt CM, Barth J. Integration of ChatGPT Into a Course for Medical Students: Explorative Study on Teaching Scenarios, Students' Perception, and Applications. JMIR Med Educ. 2024 Aug 22;10:e50545. doi: 10.2196/50545. PMID: 39177012; PMCID: PMC11360267.
15. Zheng K, Shen Z, Chen Z, Che C, Zhu H. Application of AI-empowered scenario-based simulation teaching mode in cardiovascular disease education. BMC Med Educ. 2024 Sep 13;24(1):1003. doi: 10.1186/s12909-024-05977-z. PMID: 39272041; PMCID: PMC11401274.
16. Weidener L, Fischer M. Artificial Intelligence in Medicine: Cross-Sectional Study Among Medical Students on Application, Education, and Ethical Aspects. JMIR Med Educ. 2024 Jan 5;10:e51247. doi: 10.2196/51247. PMID: 38180787; PMCID: PMC10799276.
17. Cherrez-Ojeda I, Gallardo-Bastidas JC, Robles-Velasco K, Osorio MF, Velez Leon EM, Leon Velastegui M, etal. Understanding Health Care Students' Perceptions, Beliefs, and Attitudes Toward AI-Powered Language Models: Cross-Sectional Study. JMIR Med Educ. 2024 Aug 13;10:e51757. doi: 10.2196/51757. PMID: 39137029; PMCID: PMC11350293.
18. Issa WB, Shorbagi A, Al-Sharman A, Rababa M, Al-Majeed K, Radwan H, et al. Shaping the future: perspectives on the Integration of Artificial Intelligence in health profession education: a multi-country survey. BMC Med Educ. 2024 Oct 18;24(1):1166. doi: 10.1186/s12909-024-06076-9. PMID: 39425151; PMCID: PMC11488068.
19. Pucchio A, Rathagirishnan R, Caton N, Gariscsak PJ, Del Papa J, Nabhen JJ, et al. Exploration of exposure to artificial intelligence in undergraduate medical education: a Canadian cross-sectional mixed-methods study. BMC Med Educ. 2022 Nov 28;22(1):815. doi: 10.1186/s12909-022-03896-5. PMID: 36443720; PMCID: PMC9703803.
20. Kansal R, Bawa A, Bansal A, Trehan S, Goyal K, Goyal N, et al. Differences in Knowledge and Perspectives on the Usage of Artificial Intelligence Among Doctors and Medical Students of a Developing Country: A Cross-Sectional Study. Cureus. 2022 Jan 19;14(1):e21434. doi: 10.7759/cureus.21434. PMID: 35223222; PMCID: PMC8860704.
21. Allam RM, Abdelfatah D, Khalil MIM, Elsaieed MM, El Desouky ED. Medical students and house officers' perception, attitude and potential barriers towards artificial intelligence in Egypt, cross sectional survey. BMC Med Educ. 2024 Oct 31;24(1):1244. doi: 10.1186/s12909-024-06201-8. PMID: 39482613; PMCID: PMC11529482.
22. Rizwan S, Rizwan S, Rizwan M, Hashim A, Nawal ., Batool S. Perceptions of Medical Students towards Artificial Intelligence: Medical Students

Towards Artificial Intelligence. PJHS-Lahore [Internet]. 2025 Jan. 31 [cited 2025 Feb. 1];6(1):36-41. Available from: https://thejas.com.pk/index.php/pjhs/article/view/2364

23. MacIntyre MR, Cockerill RG, Mirza OF, Appel JM. Ethical considerations for the use of artificial intelligence in medical decision-making capacity assessments. Psychiatry Res. 2023 Oct;328:115466. doi: 10.1016/j.psychres.2023.115466. Epub 2023 Sep 7. PMID: 37717548.(for introduction)
24. Swarnalata, Garapati S, Peetala S, Rampatruni R. (2024). Artificial intelligence, its knowledge, attitude, and perceptions among future health care workforce - undergraduates in a government medical college. J Popul Ther Clin Pharmacol. 2024; 31(11): 1452-1462. https://doi.org/10.53555/dp2d4308
25. Swed S, Alibrahim H, Elkalagi NKH, Nasif MN, Rais MA, Nashwan AJ, et al. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Syria: A cross-sectional online survey. Front Artif Intell. 2022 Sep 29;5:1011524. doi: 10.3389/frai.2022.1011524. PMID: 36248622; PMCID: PMC9558737.
26. Al Hadithy ZA, Al Lawati A, Al-Zadjali R, Al Sinawi H. Knowledge, Attitudes, and Perceptions of Artificial Intelligence in Healthcare Among Medical Students at Sultan Qaboos University. Cureus. 2023 Sep 8;15(9):e44887. doi: 10.7759/cureus.44887. PMID: 37814766; PMCID: PMC10560391.
27. Stewart J, Lu J, Gahungu N, Goudie A, Fegan PG, Bennamoun M, Sprivulis P, Dwivedi G. Western Australian medical students' attitudes towards artificial intelligence in healthcare. PLoS One. 2023 Aug 31;18(8):e0290642. doi: 10.1371/journal.pone.0290642. PMID: 37651380; PMCID: PMC10470885.
28. Sadiq F, Sadiq F, Gul R, Zuhra F, Khan MK, Shah SMA, Uzma F, Khattak NUH, Alam W, Khan MU. Knowledge, Attitude, and Practice (KAP) Regarding the Use of Artificial Intelligence in Hospital Settings in Mardan, Khyber Pakhtunkhwa, Pakistan. Cureus. 2024 Dec 9;16(12):e75355. doi: 10.7759/cureus.75355. PMID: 397---81175; PMCID: PMC11707555.

ORIGINAL ARTICLE

AWARENESS AND FEARS REGARDING IMMUNIZATION AMONG GUARDIANS OF CHILDREN VISITING HBS GENERAL HOSPITAL ISLAMABAD

Ameena Saba[1], Mahwish Rabia[2], Tooba Riaz[3], Samia Mehmood[4], Rabia Iqbal[5]

[1] Associate Professor, [2]Professor and HOD, [3] Assistant Professor ,[4] Assistant Professor, [5] Senior Registrar,
Department of Pediatrics, HBS Medical and Dental College, Islamabad

ABSTRACT

Objective: To assess awareness and fears among the guardians regarding immunization and to determine the causes responsible for none/partial immunization of children.

Study Design: Descriptive Cross-sectional.

Place and Duration of Study: HBS General Hospital Islamabad, 06 months (July to December 2024).

Methodology: Total 200 guardians of none or partially immunized children according to expanded Programme of immunization (EPI) were interviewed from indoor and outpatient department. They were asked about demographic details, reasons for none or partial immunization, and their attitude and misconceptions regarding immunization were assessed. Data was analyzed using SPSS version 19 to calculate descriptive statistics.

Results: Maximum children (87%) were partially immunized and only 13% were unimmunized. Polio coverage was maximum among all the vaccines. However, the reported coverage of pentavalent vaccine was 2% and it was minimum among all the vaccines. Difficult access, careless attitude, unawareness, refusal by males, adverse effects; child sickness and misconceptions regarding vaccine source and fear of infertility were identified as accountable reasons for poor vaccine coverage. Almost half of the guardians (54.5%) had no idea about vaccine preventable diseases. Nearby EPI center was available to only 49.5% of study population.

Conclusion: This study revealed that difficult access, carelessness and unawareness are leading causes of lack of immunization. People have misconceptions regarding source, adverse effects and indication. Awareness raising strategies are needed in community.

Keywords: *Awareness, Fears, Guardians, Immunization, Misconceptions, Practices, Vaccination.*

How to cite this article: *Saba A, Rabia M, Riaz T, Mehmood S, Iqbal R. Awareness and Fears regarding Immunization among Guardians of Children Visiting HBS General Hospital Islamabad. HMDJ. 2025 December; 05(02): 74-78. https://doi.org/10.69884/hmdj.5.2.1501*

INTRODUCTION

Immunization is a fundamental part of the global health promotion because communicable diseases share the major burden of mortality and morbidity throughout the world. It is estimated that 117 million of the children born from 1994-2023 were provided with routine childhood immunization. This routine immunization resulted in prevention of almost 508 million lifetime cases of diseases amenable to be prevented by vaccination. This had also prevented 32 million hospitalized cases and almost 1,129,000 premature deaths[1]. In Pakistan, under <5-year mortality is very high. Statistics show that 86/100000 live born children die before reaching the age of 5 years. Vaccine preventable diseases account for half of this mortality[2,3].The estimated coverage rate of complete immunization among Pakistani children fluctuates between 43-84%. Approximately 01 out of 05 children in urban areas and 02 out of 03 children in rural areas are unimmunized[4]. Fund allocation for vaccination program of Pakistan was increased in 2011 from 154 to 230 billion dollars. Although more than half of this fund is fixed for polio eradication campaign, yet Pakistan is amongst the two polio endemic countries[4].

Expanded Program of Immunization (EPI) was launched in

Correspondence to: Dr. Ameena Saba, HBS medical and dental college and Hospital.

Email: sadiaahmed383@gmail.com

Received: 23-10-2025
Revision: 16-01-2026
Accepted: 19-01-2026

06.doi.org/10.69884/hmdj.5.2.1501

Pakistan 1976, and currently vaccination against 12 communicable diseases had been included in this program. It is providing vaccinations to all children free of cost all over Pakistan. Vaccines included in EPI program are providing immunity against tuberculosis, polio, diphtheria, pertussis, tetanus, hepatitis B, haemophilus influenza B, measles, pneumococcal, typhoid, rubella, rota viral diarrhea. Moreover, on national immunization days, EPI workers provide door to door service of oral polio vaccine administration[5]. It is estimated that discontinuing EPI program in Pakistan can lead to 1000 deaths daily[6].

CAPSULE SUMMARY

Awareness and fears among guardians regarding immunization and the causes responsible for none/ partial immunization of children were assessed. Knowledge of the people was insufficient with multiple confusions and misconceptions Easy access of the vaccination center in addition to carelessness were the major concerns of the participants.

Responsible factors for reduced coverage of vaccination identified in studies conducted nationally and internationally are unawareness, negligence, societal troubles, inaccessibility of vaccination centers, misinterpretations and lack of trust on vaccination [7,8]. Situation is the same in both urban and rural areas although children residing in urban areas have better immunization comparatively. Various researches have identified the problems faced by EPI workforce related to vaccine availability, cold chain maintenance, safety matters, transportation services and lack of awareness, responsible for the under coverage of immunization[9]. According to Ministry of health Government of Pakistan in Punjab vaccination coverage is a bit improved as compared to past. It is now almost 89% in Punjab, in Azad Jammu and Kashmir it is 88%, Khyber Pakhtunkhwa 68% and in Baluchistan it is 37%[10].In urban slums of Rawalpindi and Islamabad it is 72%, which is poor considering the educational level of the local population. The aim of this study was to evaluate the awareness of guardians about immunization and identify the probable reasons of poor immunization. It was conducted in HBS General Hospital, which is providing advanced health services for the children of highly populated areas of Tarlai, Taramari and some areas of Azad Kashmir. People from poor socioeconomic and educational background visit this hospital, which make it favorable place for identifying common myths and misconceptions related to immunization in this community. Identifying underlying reasons of poor vaccination coverage will help in targeted public awareness, which will contribute to improved vaccination of children.

METHODOLOGY

This was a descriptive cross-sectional study, which was completed in six months from 1st July to 31st December 2024 after taking written approval from Institutional ethical review committee. Sample size was calculated by using Open-epi calculator, keeping 95% confidence interval and 5% margin of error, taking 73% prevalence of completed immunization as per EPI protocol in Rawalpindi/Islamabad[11]. The sample size came out to be 189. Data was collected from 200 guardians of children visiting OPD or medical wards of HBS General Hospital in Islamabad using consecutive nonprobability sampling. Consent of the guardians was taken before data collection. Guardians of the unimmunized children or children with partial (incomplete) immunization status were included in the study. Children with no history of any vaccine, including polio drops, were considered unimmunized, while those with history of incomplete EPI schedule were characterized as partially immunized. A self-structured questionnaire, comprising variables indicating demographic data, vaccination status, accessibility to EPI center, guardian's views and practices about immunization, was designed following a thorough review of literature and discussion with fellow consultant pediatricians. It was further evaluated through a pilot study and few revisions were made based on its results. The questionnaire was presented to caregivers and their uninterrupted responses of the guardians were recorded. At the end of interview correct knowledge of immunization was shared with the guardians. SPSS version 19 was used for data analysis. Frequencies and percentages for the categorical variables were calculated.

RESULTS

Data was collected from the 200 guardians. A great majority 179 (89.5%) were able to understand Urdu. Out of 200 guardians, 182 (91%) were the parents, 14 (7%) were the grandparents and 4 (2%) were among the other group. Regarding age distribution 87 (43.5%) were unaware of their age, 57 (28.5%) were in the age range of 20-30 years, 34 (17%) of the guardians were from 31-40 years age group and 22 (11%) belonged to <20 years of age. When guardians were enquired about the number of children, 96 (48%) had 3-5 children in the family, 71(35.5%) guardians had <3 children and 33(16.5%) had > 5 children in family. Vaccination status of the children according to the EPI schedule was evaluated and the causes for the incomplete or no immunization were enquired from the guardians. Distribution

Table 1: Frequency distribution of children Immunized according to the EPI Schedule.

Immunization status	Frequency	Percentage (%)
Partially Immunized	174 (n=200)	87
Polio Vaccination coverage	120 (n=174)	69
BCG + Polio	15(n=174)	9
Measles +Polio	15(n=174)	9
BCG	11(n=174)	6.5
Pentavalent -1	3(n=174)	2
Measles	8(n=174)	4.5
Un immunized	26 (n=200)	13

of the Immunization status of the children as per EPI schedule is given below in Table 1.

Table 2: Reasons for no/incomplete immunization identified by the guardians (n=200).

Reason	Frequency(n=200)	Percentage (%)
Absence of awareness	29	14.5
Not important/ useful	47	23.5
Poor availability	58	29
Experienced adverse events	17	8.5
Resistance by male members of family	18	9
Misconceptions about vaccines	13	6.5
Not halal	5	2.5
Affects health	11	5.5
Infertility issues	2	1

Reasons for non/partial vaccinations were identified and the commonest reason identified by 29% guardians was difficult access. Detailed results are given below in Table 2.

To assess the awareness of guardians about the diseases, which can be prevented by immunization, 54.5% had no idea about it. Three or greater than three diseases were identified by 19.5% while 24% mentioned polio, 1.5% identified only measles and 0.5% only mentioned pertussis. It was observed that taking decision for the child immunization was not the authority of the mothers, only 118 (59%) had the authority to decide for their child's health while rest of the mothers 82 (41%) said that autonomy for decision-making was in the hands of the husband or his mother. Out of 82, 23 mothers could not vaccinate their children because family did not allow them.

During the immunization days, almost 174 (87%) guardians gave the response that their children were taking polio drops. Reasons for avoiding the polio drops identified by the remaining 26 guardians are given in Table3.

Table 3: Reasons for avoiding polio drops (n=26).

Reasons	Frequency (n=26)	Percentage (%)
Useless	8	30.76
Haram product	3	11.53
Causes Infertility	3	11.53
Social customs	12	46.15

Majority of the respondents (62%) agreed to the necessity of immunization, 25% did not agree with it while 13% responded with "do not know". When the guardians were enquired about further need of information regarding immunization, 154 (77%) guardians were interested to have more knowledge about immunization, while rest (23%) were least interested. During the data collection guardians were counseled about the importance of immunization. Because of counselling 66.5% agreed to immunize their children in future while the rest 16.5% did not agree and remaining 17% were indecisive. Difficult access was identified as the main reason for incomplete immunization. Door-to-door immunization service was suggested by 88% guardians to address the low coverage rate.

DISCUSSION

Results obtained are comparable with studies conducted previously in other areas of Pakistan. Analysis of individual vaccine coverage revealed that it is relatively low for the vaccines requiring hospital visit for administration (pentavalent and measles) compared to the vaccines provided by door-to-door visits, like polio. This is in contrast to a study conducted before, which showed better coverage of BCG (65-75%) and pentavalent (45-65%) [12]. This supports that people are becoming careless to bother a hospital visit for vaccination, relying on door-to-door service. Meanwhile poor access to the health services may also be contributing to the low coverage in our setting as well.

Causes identified by the guardians for none or incomplete immunization in other reference studies are same as in our study. Among the reasons identified, poor access to the vaccination center (29%), carelessness (23.5%) and unawareness (14.5%) were the commonest causes[13,14]. Our study also identified misconceptions about vaccination a predominant problem which is inline with the other researches[9,15,16]. Few other important aspects highlighted by our research were apprehension about haram source of vaccine, male dominance, and concerns about infertility, which has also been recognized previously[17]. Our guardians also reported fear of side effects among the causes of incomplete immunization. Safety and efficacy of vaccine is continuously monitored. Safety testing is considered from the earliest stage of its development, until approved by FDA and is monitored on an ongoing basis for licensure. Literature supports that vaccines can cause side effects but mostly reported side effects are minor and subside within a few days. Severe allergic reactions and some specific adverse events associated with certain vaccines, like fits associated with pertussis vaccine, are rarely reported[18]. Therefore, the myths about the side effects in the community should be addressed. Routine immunization should be followed as per the recommended schedule, even if the child is suffering from chronic diseases and regardless of repeated hospitalization[19]. Child illness as a hindrance for immunization was is identified in our study. Community awareness sessions can address this problem. In addition, all vaccines are halal according to fatawa given by muslim ulama and scholars. Any constituent used in vaccines does not cause infertility and all the substances used are permissible in Islam[16].

Although polio is, presently, an alarming issue due to emergence of new cases, especially in KPK but our study showed better polio vaccine coverage than other vaccines. Refusal by people

considering it useless, haram source of vaccine and risk of infertility were the major reasons identified in our study for not getting polio drops, which are different from the study conducted previously in Peshawar[20]. Our study identified ignorance about vaccine-preventable diseases and difficulty in understanding Urdu among the majority of the study population. Although our media spreads public awareness about vaccination in Urdu, but we had included some areas of Kashmir in our study and the people in Kashmir better understood their local language. Translation of the awareness message in local language for better understanding should be considered. In a population where most of females are even ignorant of their age, immunization awareness cannot be expected much.

CONCLUSION

In spite of continuous efforts by the government, knowledge of the people about immunization is insufficient with multiple confusions and misconceptions related to requirement, vaccine source, benefits and hazards. Easy access of nearby vaccination center is still the major concern. People are also becoming more careless about children vaccination.

RECOMMENDATIONS

- Electronic and print media especially local channels and newspapers should spread awareness in local languages for addressing the language barrier.
- Ulamas of the area should be involved to educate and convince people and clear their misconceptions regarding religious point of view about vaccination .
- Training of EPI workers, focused on the flexibility of vaccination, allowing any unvaccinated child of <3 years of age to be vaccinated according to the amended age-related schedule.
- Mobile EPI services can address the poor access by providing door-to-door immunization; however, effective implementation requires addressing challenges related to labor, finances, transport services, and safety of the workers.

LIMITATIONS

It was a hospital-based, crossectional study so the findings were insufficient in scope and may not be fully representative of the general population. Study design selection also restricts its ability to establish the causal relationship between causes identified with the poor or incomplete immunization coverage. Consecutive sampling also limits the generalizability of the results and the study sample may not adequately represent all caregivers or children, eligible for immunization. Community-based studies, with appropriate sample size and probability sampling, are recommended to obtain more comprehensive and accurate information on immunization coverage.

ETHICAL APPROVAL: *Reference number: Appl #HBS/IRB/35/24, Date: 25-06-2024*

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*

AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*

FINANCIAL DISCLOSURE/ FUNDING: *None*

ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*

CONFLICT OF INTEREST: *None*

ACKNOWLEDGEMENT: *None*

AUTHORS' CONTRIBUTION

- ***Ameena Saba:*** *Conception and design, Acquisition of data*
- ***Mahwish Rabia:*** *Critical revision*
- ***Tooba Riaz:*** *Aanalysis and interpretation of data*
- ***Samia Mehmood:*** *Drafting the article*
- ***Rabia Iqbal:*** *Drafting the article*

REFERENCE

1. Zhou F, Jatlaoui TC, Leidner AJ, et al. Health and Economic Benefits of Routine Childhood Immunizations in the Era of the Vaccines for Children Program — United States, 1994–2023. MMWR Morb Mortal Wkly Rep 2024;73:682–685. Doi: http://doi.org/10.15585/mmwr.mm7331a2.
2. Memon Z, Fridman D, Soofi S, Ahmed W, Muhammad S, Rizvi A, Ahmed I, Wright J, Cousens S, Bhutta ZA. Predictors and disparities in neonatal and under-5 mortality in rural Pakistan: cross-sectional analysis. Lancet Reg Health Southeast Asia 2023;15:100231. Doi: https://doi.org/10.1016/j.lansea.2023.100231 PMID:37614356 PMCID:PMC10442969.
3. Umer MF, Zofeen S, Hu W, Qi X, Zhuang G. Spatiotemporal clustering analysis of Expanded Program on Immunization (EPI) vaccination coverage in Pakistan. Sci Rep 2020;10:10980. Doi: https://doi.org/10.1038/s41598-020-67839-0.
4. Global Polio Eradication Initiative. Endemic countries [Internet]. Geneva: World Health Organization; 2020 [cited 2025 Mar 29]. Available from: https://polioeradication.org/where-we-work/pakistan/.
5. Health Department Punjab. Expanded Programme on Immunization (EPI) [Internet]. Lahore: Government of Punjab; 2015 Jan 7 [cited 2025 Mar 29]. Available from: http://health.punjab.gov.pk.
6. Vellingra A, Depoorter A, Van Damme P. Vaccination coverage estimates by EPI cluster sampling survey of children (18–20 months) in Flanders, Belgium. Acta Paediatr 2002;91:599–603. Doi: https://doi.org/10.1111/j.1651-2227.2002.tb03283.x.
7. Ullah K, Saleem J, Zakar R, et al. Exploring the reasons for defaulting from childhood immunization: a qualitative study in Pakistan. BMC Public Health 2024;24:408. Doi: https://doi.org/10.1186/s12889-024-17926-y.
8. Kuuyi A, Kogi R. Factors contributing to immunization coverage among children less than 5 years in Nadowli-Kaleo District of Upper West Region, Ghana. PLOS Glob Public Health 2024;4(8):e0002881. Doi: https://doi.org/10.1371/journal.pgph.0002881.
9. Nelson KN, Wallace AS, Sodha SV, Daniels D, Dietz V. Assessing strategies for increasing urban routine immunization coverage of childhood vaccines in low- and middle-income countries: a systematic review of peer-reviewed literature. Vaccine 2016 Nov 4;34(46):5495–5503. Doi: https://doi.org/10.1016/j.vaccine.2016.09.038.

10. Expanded Programme of Immunization, Ministry of Health, Government of Pakistan. Fact file of EPI Pakistan [Internet]. Islamabad: Government of Pakistan; [cited 2025 Jun]. Available from: http://www.epi.gov.pk.
11. Khan A, Azam N, Javaid R, Riaz M, Mughal FAR, Iqbal S. Immunization status of children in urban slums of Rawalpindi and barriers to immunization. Pak Armed Forces Med J 2024;74(4):1152–6. Doi: https://doi.org/10.51253/pafmj.v74i4.7959.
12. Butt M, Mohammed R, Butt E, Butt S, Xiang J. Why have immunization efforts in Pakistan failed to achieve global standards of vaccination uptake and infectious disease control? Risk Manag Healthc Policy 2020 Feb 12;13:111–24. Doi: https://doi.org/10.2147/RMHP.S211170 PMID:32104117 PMCID:PMC7024803.
13. Ullah K, Saleem J, Zakar R, et al. Exploring the reasons for defaulting from childhood immunization: a qualitative study in Pakistan. BMC Public Health 2024;24:408. Doi: https://doi.org/10.1186/s12889-024-17926-y.
14. Riaz A, Husain S, Yousafzai MT, Nisar MI, Shaheen F, Mahesar W, Dal SM, Omer SB, Zaidi S, Ali S. Reasons for non-vaccination and incomplete vaccinations among children in Pakistan. Vaccine 2018;36(35):5288–93. Doi: https://doi.org/10.1016/j.vaccine.2018.07.024.
15. Imtiaz M, Alam A, Mulk FU. Community perception and constraints to the Expanded Program on Immunization (EPI) in Peshawar, Pakistan: a public health perspective. THE PROGRESS: A J Multidiscip Stud 2025;6(2):56–65. Doi: https://doi.org/10.71016/tp/nch35s79.
16. Alsuwaidi AR, Hammad HAA, Elbarazi I, Sheek-Hussein M. Vaccine hesitancy within the Muslim community: Islamic faith and public health perspectives. Hum Vaccin Immunother. 2023;19(1):2190716. Doi https://doi.org/10.1080/21645515.2023.2190716 PMID:36914409; PMCID:PMC10038058.
17. Soofi SB, Vadsaria K, Mannan S, Habib MA, Tabassum F, Hussain I, et al. Factors associated with vaccine refusal (polio and routine immunization) in high-risk areas of Pakistan: a matched case-control study. Vaccines 2023;11(5):947. https://doi.org/10.3390/vaccines11050947.
18. Centers for Disease Control and Prevention. Possible side effects from vaccine [Internet]. Atlanta: CDC; 2024 Jul 31 [cited 2025 Jun 30]. Available from: https://www.cdc.gov/vaccines/basics/possible-side-effects.html.
19. Beni A, Mazzilli S, Bellino E, Costagliola G, Ferretti E, Lopalco PL, et al. Uptake of vaccinations among children with chronic diseases is affected by knowledge gaps and implementation challenges in Italy. Vaccines 2021;9(11):1217. Doi: https://doi.org/10.3390/vaccines9111217.
20. Khan SA, Ashfaq M, Ayub A, Jamil A, Badshah J, Ullah I, Shahabuddin A, Khalid F. Developing a three-dimensional narrative to counter polio vaccine refusal in Charsadda. J Glob Health. 2020 Dec;10(2):021301. Doi: https://doi.org/10.7189/jogh.10.021301. PMID: 33312515; PMCID: PMC7719351.

CASE REPORT

COVID-19 ASSOCIATED SPONTANEOUS SUBDURAL HEMATOMA: A CASE REPORT

Syed Muhammad Ali Haider[1], Muhammad Sharjeel Sadiq[2], Muhammad Siddique Abdullah[3], Muhammad Maaz Qamar[4], Muhammad Hissan Raza[5], Muhammad Moeed Azwar Bhatti[6], Mohammad Hassan Yousaf[7], Syed Waseem Akhtar[8]

[1] Lecturer, [2]Medical Officer, HITEC Institute of Medical Sciences, [3]House Officer, Margalla Hospital, [4]Medical Officer, [5]4th year student of HITEC IMS, [6] House Officer, HITEC Institute of Medical Sciences, [7]Lecturer, International Islamic Medical College, [8]Professor, Department of Neurology, HITEC Institute of Medical Sciences

ABSTRACT

Since March 2020, the health community, all over the world, has faced risks posed by the Coronavirus disease 2019 (COVID-19) pandemic. Worldwide, many reports show that coronavirus-related diseases bring together symptoms affecting both the brain and the vascular system. We describe a case where a young male with COVID-19 developed a spontaneous subdural hematoma 02 weeks after the infection started without having any history of cerebral or vascular injuries. The patient was admitted after testing positive for COVID-19. On the third day of isolation, the patient complained of a severe headache. On CT brain, a subdural hematoma was seen. The patient underwent an emergency craniotomy with satisfactory results. After surgery, he made smooth progress and was discharged a week later. Subdural hematoma is one of the hemorrhagic events that can occur after COVID-19 infection. Any COVID-19 patient who exhibits symptoms of altered consciousness needs to have a brain CT or MRI, and further neurological examination must be done.

Keywords: *Coronavirus, Coronavirus disease 2019, COVID-19, Spontaneous Subdural Hematoma, Subdural Hematoma.*

How to cite: *Haider SMA, Sadiq MS, Abdullah MS, Qamar MM, Raza MH, Bhatti MMA, Yousaf MH, Akhtar SW. COVID-19 Associated Spontaneous Subdural Hematoma: A Case Report. HMDJ. 2025 December; 05(02): 79-81. https://doi.org/10.69884/hmdj.5.2.9137*

INTRODUCTION

The cause of the coronavirus disease 2019 (COVID-19) is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). It started in Wuhan, China, and has now affected countries around the world. The World Health Organization (WHO) classified COVID-19 as a communicable disease[1]. A patient with COVID-19 infection may present with mild breathing difficulties to severe CNS issues. Patients with COVID-19 affected brain may lead to acute ischemic stroke, intracerebral bleeding, and hemorrhagic necrotizing encephalopathy[2,3]. The primary reason for subdural hematomas is traumatic brain injury, resulting in the rupture of bridging veins, followed by bleeding in the subdural space. In this study, we report a case of spontaneous subacute subdural hematoma (SDH) in a COVID-19 patient with no cardiovascular risk factors.

CAPSULE SUMMARY

A case of spontaneous subacute subdural hematoma in a COVID-19 patient with no cardiovascular risk factors is reported. Healthcare workers should be aware of the possibility of cerebral bleeding from COVID-19 infection.

Case Report:

A 23-year-old male arrived at the emergency room in July 2024, complaining of fever, cough and breathlessness for ten days. The patient had no other disease. His vital signs were as follows: temperature 38.7°C, respiratory rate 24 breaths/min, O2 saturation of 89% (room air), heart rate 87 beats/min regular, and BP110/70 mmHg. He had no prior history of any injury, fall, or unconsciousness. He was oriented in time, place, and person. Carotid bruit was absent. The examination of cranial nerves, motor system, sensory system, heart and abdomen was unremarkable. Auscultation of the lungs revealed

Correspondence to: Dr. Syed Muhammad Ali Haider, MBBS, Lecturer, Department of Medical Education, HITEC Institute of Medical Sciences.

Email: alihaider1999.ah@gmail.com

Received: 02-10-2025
Revision: 29-10-2025
Accepted: 01-12-2025

doi.org/10.69884/hmdj.5.2.9137

bilateral coarse crackles. The chest CT scan revealed ground-glass opacities, suggesting SARS-CoV-2 infection. Since his COVID-19 tests were positive, he was moved to the intensive care unit to be isolated, and was put on Lopinavir/Ritonavir, Hydroxychloroquine, and Dexamethasone. On the third day of admission, the patient started complaining of a severe, continuous, non-throbbing headache followed by a drop in consciousness. His Glasgow Coma Scale (GCS) was 5; the

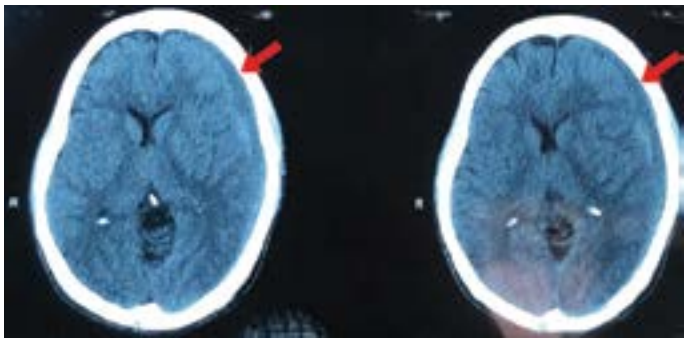


Figure 1: Plain CT scan of the brain showing Spontaneous Subacute Fronto-Temporal Subdural Hematoma marked with a red arrow.

patient gradually stopped reacting to painful stimuli. Brain CT revealed a SDH in the left frontotemporal area with edema brain on the ipsilateral side (Figure 1). A left frontotemporal craniotomy was performed to evacuate 130 mL of hematoma followed by duraplasty. The day after surgery, the patient was extubated without any post-surgical complications.

DISCUSSION

As a neurotropic and neuroinvasive virus, SARS-CoV-2 is linked to neurological symptoms of COVID-19, including encephalitis, myelitis, seizures, ischemic stroke, and viral presence in the cerebrospinal fluid [4]. The first investigation by Rothstein et al. demonstrated that SARS-CoV-2-associated intracerebral hemorrhage, subarachnoid hemorrhage, and ischemic stroke manifested in COVID-19 patients, a phenomenon deemed very unusual[5]. Our patient was not taking any antiplatelet or anticoagulant medication. Gogia et al. reported the first case where a patient receiving both Aspirin and Clopidogrel suffered from a hyperacute subdural hematoma and intracerebral hemorrhage[6]. In November 2020, Altschul et al. identified various forms of cerebral bleeding and its risk factors among individuals with COVID-19 . Of the 5227 COVID-19 patients, 35 experienced some form of bleeding, and 17 of these had acute SDH. Five were on anticoagulant medication, and 70.6% (n = 12) had experienced a head injury before the bleeding[7]. These risk variables were not present in our case . In a review, Cheruiyot et al. evaluated intracranial bleeding in people with COVID-19 from the data extracted from 23 studies. Only 19 of the 148 people had been diagnosed with SDH, and according to that study, none of them had the subacute SDH[8].

There are some explanations why these patients tend to develop SDH. Since the brain parenchyma has the ACE-2 receptors, it becomes the most likely site for SARS-CoV-2 to enter the brain. Furthermore, ACE-2 receptors are crucial for cerebral blood flow and vascular autoregulation. According to Sharifi-Razavi et al.,

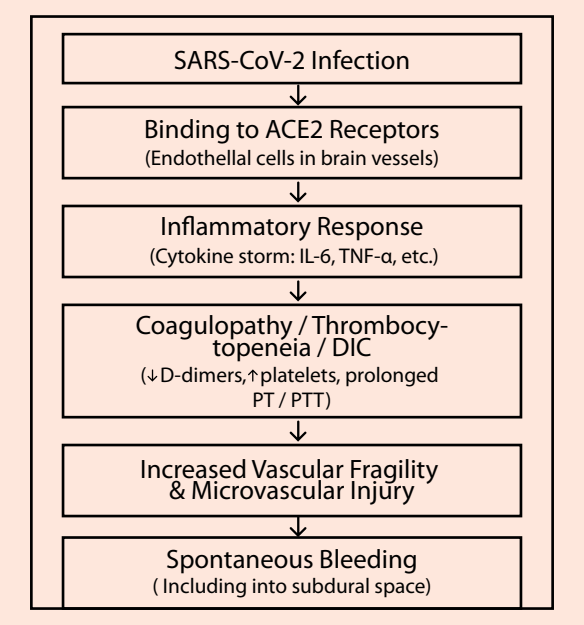


Figure 2: Pathogenesis of COVID-19-Induced Subdural Bleed.

direct invasion by SARS-CoV-2 may produce ACE-2 receptor malfunction, which might impair autoregulation and increase the risk of arterial wall rupture when hypertensive[9]. Due to viremia and weakening of the vessels of the subdural space, a minor jerk of the head from coughing, sneezing, or a Valsalva maneuver may make the bridging veins more vulnerable to bleeding. Figure 2 explains the possible pathogenesis of the COVID-19-induced SDH.

While many COVID-19 patients develop blood clotting, it is also important to know that they can experience bleeding. Thrombocytopenia, hyperfibrinolytic condition, excessive anti-coagulation factors intake, and the use of preventive anticoagulant medications are among the variables that increase a patient's risk of bleeding [10]. Prolonged hypoxia of the endothelial cells as well as immune inflammation, triggered by too many cytokines, could trigger more internal bleeding [3,11]. With increased levels of matrix metalloproteinases and tissue plasminogen activator, the risk of bleeding within the subdural space is higher with a minor blow to the head.

CONCLUSION

Besides the blood clots commonly seen, we should further look out for cerebral bleeding, as it may happen in COVID-19 patients. Healthcare workers should be aware of the possibility of cerebral bleeding from COVID-19 infection.

CONSENT FOR PUBLICATION: *Written, informed consent was obtained from the study participants.*
AVAILABILITY OF DATA: *Data is available from the corresponding author on a justified request.*
FINANCIAL DISCLOSURE/ FUNDING: *None*
ARTIFICIAL INTELLIGENCE TOOLS DISCLOSURE: *None*
CONFLICT OF INTEREST: *None*
ACKNOWLEDGEMENT: *None*
AUTHORS' CONTRIBUTION

- ***Syed Muhammad Ali Haider:*** *Conception and design, Acquisition of data, Drafting the article, Critical revision*
- ***Muhammad Sharjeel Sadiq:*** *Acquisition of data*
- ***Muhammad Siddique Abdullah:*** *Aanalysis and interpretation of data, Drafting the article*
- ***Muhammad Maaz Qamar:*** *analysis and interpretation of data, Drafting the article*
- ***Muhammad Hissan Raza:*** *Drafting the article*
- ***Muhammad Moeed Azwar Bhatti:*** *Drafting the article*
- ***Mohammad Hassan Yousaf:*** *Drafting the article, Critical revision*
- ***Syed Waseem Akhtar:*** *Critical revision*

REFERENCE

1. Stawicki SP, Jeanmonod R, Miller AC, Paladino L, Gaieski DF, Yaffee AQ, et al. The 2019-2020 Novel Coronavirus (Severe Acute Respiratory Syndrome Coronavirus 2) Pandemic: A Joint American College of Academic International Medicine-World Academic Council of Emergency Medicine Multidisciplinary COVID-19 Working Group Consensus Paper. J Glob Infect Dis. 2020;12(2):47–93.
2. Li Y, Li M, Wang M, Zhou Y, Chang J, Xian Y, et al. Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study. Stroke Vasc Neurol. 2020 Sep;5(3):279–84.
3. Poyiadji N, Shahin G, Noujaim D, Stone M, Patel S, Griffith B. COVID-19–associated Acute Hemorrhagic Necrotizing Encephalopathy: Imaging Features. Radiology. 2020 Aug;296(2):E119–20.
4. Fotuhi M, Mian A, Meysami S, Raji CA. Neurobiology of COVID-19. Journal of Alzheimer's Disease. 2020 Jun 30;76(1):3–19.
5. Rothstein A, Oldridge O, Schwennesen H, Do D, Cucchiara BL. Acute Cerebrovascular Events in Hospitalized COVID-19 Patients. Stroke. 2020 Sep;51(9).
6. Gogia B, Fang X, Rai P. Intracranial Hemorrhage in a Patient With COVID-19: Possible Explanations and Considerations. Cureus. 2020 Aug 31;
7. Altschul DJ, Unda SR, de La Garza Ramos R, Zampolin R, Benton J, Holland R, et al. Hemorrhagic presentations of COVID-19: Risk factors for mortality. Clin Neurol Neurosurg. 2020 Nov;198:106112.
8. Cheruiyot I, Sehmi P, Ominde B, Bundi P, Mislani M, Ngure B, et al. Intracranial hemorrhage in coronavirus disease 2019 (COVID-19) patients. Neurological Sciences. 2021 Jan 3;42(1):25–33.
9. Sharifi-Razavi A, Karimi N, Rouhani N. COVID-19 and intracerebral haemorrhage: causative or coincidental? New Microbes New Infect. 2020 May;35:100669.
10. Dorgalaleh A. Bleeding and Bleeding Risk in COVID-19. Semin Thromb Hemost. 2020 Oct 8;46(07):815–8.
11. Tang N, Li D, Wang X, Sun Z. Abnormal coagulation parameters are associated with poor prognosis in patients with novel coronavirus pneumonia. Journal of Thrombosis and Haemostasis. 2020 Apr;18(4):844–7.

DIAGNOSTIC CHALLENGE

Check the correct answer on page 90

Case 1

Figure 1

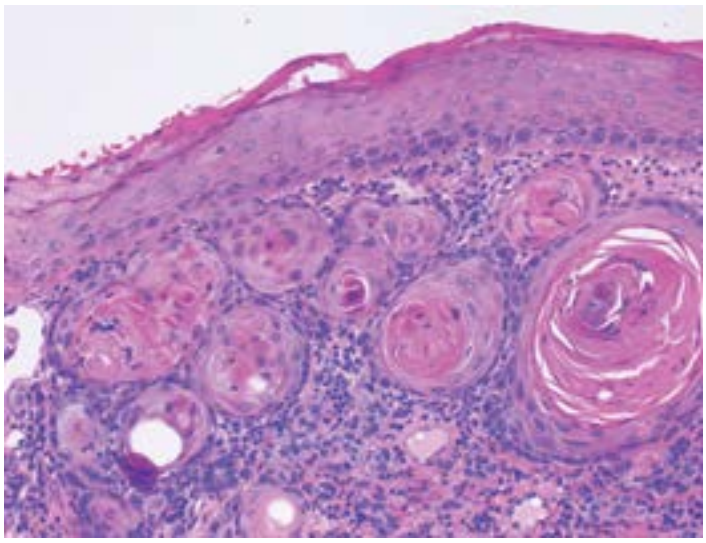
A 27-year-old female patient presented to the Oromaxillofacial (OMFS) department at HITEC-IMS with a bluish lesion on the left buccal mucosa, present for the past two and a half years. The lesion was initially small but has gradually enlarged over time.
On clinical examination, the lesion appeared soft, compressible and bluish, with an increase in size upon lying down, crying, or performing the Valsalva maneuver. Aspiration yielded blood, which ceased after application of a pressure pack for 15 minutes.

Q1. What is your diagnosis?
Q2. What clinical features distinguish similar lesions from this one?

DIAGNOSTIC CHALLENGE

Check the correct answer on page 91

Case 2



A 65-year-old female , reported to OMFS department at HITEC-IMS with a complaint of a non-healing ulcer on the left mandibular alveolar ridge for the past 03 months. The lesion had gradually increased in size and occasionally bled on touch. The patient also reported pain and tenderness in the affected area. She gave a significant history of snuff dipping (naswar) in the left buccal vestibule for about 30 years.

On intraoral examination, an exophytic ulcerative erythematous lesion was seen on the left mandibular alveolus, extending from the canine to the last molar region, measuring approximately 3.5–4 cm anteroposteriorly and 2–2.5 cm mediolaterally. The lesion was indurated, tender, and bled on probing. The buccal vestibule and lingual cortex were involved, but the tongue appeared spared.

Q1. What is the probable diagnosis of this case?
Q2. How will you investigate it further?

INSTRUCTIONS TO AUTHORS

For submission of articles: **editor.hmdj@hitec-ims.edu.pk or OJS (https://hmdj.org/)**
For correspondence: **editor.hmdj@hitec-ims.edu.pk**

1. HITEC Medical and Dental Journal (HMDJ) agrees to accept the manuscripts prepared in accordance with the 'Uniform Requirements for a manuscript submitted to the Biomedical Journals' as approved by the International Committee of Medical Journal Editors (ICMJE) guidelines.
2. **GENERAL CONSIDERATIONS**:
   a. Ethical / Legal matters:
      i. Authors are required to send approval letter from Institutional Review Board (IRB)/ Ethical Review Committee (ERC) along with the Original articles.
      ii. A submitted manuscript must be an original contribution, not previously published (except as an abstract or preliminary report), must not be under consideration for publication elsewhere, and if accepted, it must not be published elsewhere in a similar form.
      iii. Manuscript must be accompanied by a certificate, signed by the author and all co-authors that they have seen and approved the final version of the manuscript.
      iv. Randomized Controlled Trial (RCT) should be registered and the trial registration number is mandatory.
      v. It is the author's responsibility to ensure that the patient's anonymity is carefully protected.
   b. Responsibility
      i. Although the editors and reviewers make every effort to ensure the validity of published manuscripts, the final responsibility rests with the authors, not with the Journal, its editors, or the publisher.
   c. Authorship
      i. Each person listed as an author is expected to have participated in the study and is accountable for accuracy and integrity of the work.
      ii. He/She should have substantial contribution to:
         1. Conception and design
         2. Acquisition of data
         3. Analysis and interpretation of data
         4. Drafting the article or revising it critically for important intellectual content.
      iii. Those who provide technical support, writing assistance, or department chair who provided just general support should also be mentioned in acknowledgment.
   d. Conflict of Interest/artificial intelligence tools disclosure: The authors must provide a formal statement including any potential conflict of interest including artifical intelligence tools disclosure at the time of submitting the article. In case of any conflict of interest, the author must submit an ICMJE form for disclosure of potential conflicts of interest.
   e. Financial Disclosure: Each author should submit a financial disclosure, warranting that he or she has no commercial associations that might pose a conflict of interest in connection with the submitted article. All funding sources supporting the work and all institutional or corporate affiliations of the authors are acknowledged.
   f. Copyright: All authors must sign a copy of the HMDJ author's certification proforma including information regarding the responsibilities of authors and copyright transfer and submit it with the article. The authors will be requested to sign an agreement to give copyright to the publishers.
   g. Plagiarism Policy: All the submitted manuscripts will be checked for plagiarism by "TURNITIN" software. Articles with a similarity index of more than 19% will not be published. The plagiarism certificate is sent to the corresponding author and the article is reconsidered after amendments.
   h. Other Publication Misconducts: Other publication misconducts including fabrication (picture as well), falsification, duplicate submission, redundant publication, multiple submission, selective and misleading reporting, selective and 'misleading referencing are liable to strict action.
   i. Peer Review: The editors will select the reviewers from Journal reviewer database according to specialty and expertise. Each manuscript will be sent to two external peer reviewers. Once the reviewed manuscript is received from both the reviewers, their comment/ suggestions (if any) are communicated to the author for correction. The revised manuscript received from the author is re-assessed by the editor and the final decision regarding article acceptance/rejection is also made by the editor.
   j. Article Publishing Charges: There are no publication charges.
3. **SCOPE OF PUBLICATIONS:**
   a. Original Articles: Original articles should report original research of relevance to clinical medicine. These include randomized controlled trials, intervention studies, and studies of screening /diagnostic tests, outcome studies and cost-effectiveness analysis. The article should not exceed 4000 words in length (excluding title page, abstract, tables, figures, and references). The article words count for quantitative study should be in range 2000 - 2500 words (excluding references and abstract) with at least 18-25 references

and 3–5 figures or tables. For qualitative study article word count should be in range of 3000-4000 words (excluding references and abstract) with at least 20-30 references and 3–5 figures or tables. Studies more than three years old at the time of submission are not entertained as per journal's policy. Any study ending three years before the date of submission is judged by the Editorial Board for its suitability as many changes take place over the time period, subject to the area of the study. The original article should contain the following sections.

i. Title page: It should include the following information:
   1. Complete title as well as a short title of the article
   2. Name of author(s)
   3. Department(s)
   4. Institution(s) at which work was performed
   5. Author Affiliation
   6. Subject Specialty
   7. Corresponding authors personal e-mail address and postal address
   8. Short running title for header

ii. Abstract: It should contain a structured abstract of about 250 words and should include following sections
   1. Objective
   2. Study Design
   3. Place and duration of study
   4. Methodology
   5. Results
   6. Conclusion
   7. Keywords 3–10 (Medical Subject Headings – MeSH) in alphabetical order. If suitable MeSH terms are not yet available for recently introduced terms, present terms may be used.

iii. Text
   1. Introduction: This should summarize the purpose and the rationale for the study. It should neither review the subject extensively nor should it have data or conclusions of the study. At the end of the introduction, mention the rationale or scientific significance of the study.
   2. Methodology: This should include exact method or observation or experiment. If an apparatus is used, its manufacturer's name and address should be given in parentheses. If the method is established, give reference but if the method is new, give enough information so that another author is able to perform it. If a drug is used, its generic name, dose and route of administration must be given. Methodology section should contain (without headings) study design, place and duration of study, sample size, sampling technique, inclusion and exclusion criteria, data collection and analysis procedure. Statistical method must be mentioned and specify any general computer programme used. The information system used should be clearly mentioned.
   3. Results: Must be presented in the form of text, tables and illustrations. The contents of the tables should not be repeated in the text. Instead, a reference to the table number may be given. Long articles may need sub-headings within some sections (especially the results and discussion parts) to clarify their contents. Extra or supplementary materials and technical details can be placed in an appendix where it is accessible. It may be omitted from the printed version but may be published in the electronic version of the journal.
   4. Discussion: This should emphasize present findings & the variations or similarities with other work done in the field by other workers. Detailed data should not be repeated in the discussion again. Emphasize the new and important aspects of the study and the conclusions that follow from them. It must be mentioned whether the hypothesis mentioned in the article is true, false or no conclusions can be derived.
   5. Conclusion: Should be in line with the objectives and results and should be same as given in abstract.
   6. Limitations of the study (if any)
   7. Recommendations of the study (if any)
   8. Acknowledgements (if any)
   9. References: References must be numbered as superscript consecutively according to their appearance in the text. References appearing in a table or figure should be numbered sequentially with those in text. Twenty Percent References should be last 05 years and all references listed consecutively as superscript. References should be cited in the correct "Vancouver style".
   10. Tables: All tables should be numbered with numeric numerals. Headings should be placed above tables, left justified.
   11. Figures: All figures should be numbered with numeric numerals. Headings should be placed below figures, left justified.

b. Clinical Case Reports: Must be of academic & educational value and provide relevance of the disease being reported as unusual. It should have a non-structured abstract of about 100-150 words (case specific) with around 5-6 references and 3 keywords.

c. Letters to The Editor (LTE): It is usually a type of short communication that can be written on any topic that attracts the attention of the reader. There are different types of letters to the editor. If the purpose of the LTE is to comment on a published article, the first sentence of the LTE should include the name of the published article's first author along with the title of the published

article and then the comments. If the LTE is a reply to a previously submitted LTE, the first sentence should include the name of the letter's author and cite the letter as a reference. The previously published article should then be referenced as well either in the body of the text or at the end of the response to the LTE.

d. Review Article: Should consist of critical overview/ analysis of some relatively narrow topic providing background and the recent development with the reference of original literature. It should incorporate the author's original work on the same subject. The review article should be 2500 to 3000 words in length. It should have a non-structured abstract of 150 words with a minimum of 3 keywords. An author can write a review article only if he/she has written a minimum of three original research articles.

e. Systematic Review Article: It should consist of a well-defined research question and should provide detailed review of a specific topic based on the existing literature. It should include the collection and analysis of data from all the relevant research in support of the research question being asked. The text should be 2500-3000 words. It should have a non- structured abstract with a minimum of three keywords.

f. Meta-Analysis: It should comprise a statistical analysis of combined results of numerous scientific studies addressing the same research questions. Meta-analysis is a quantitative and epidemiological study design that should critically analyze the results of previous scientific researches, mostly randomized controlled trials.

g. Short communication: Short communication or brief report of research works, containing new findings. The short communication consists of: Title, Abstract (structured - no more than 150 words), Keywords (max. 5), Introduction, Material / Patients and Methods, Results, Discussion, Conclusion, Ethical Consideration, Acknowledgment and References. Short communications should not exceeding 2500 words from introduction through references. Short communications should contain no more than 3000 words totally. The number of tables/figures should be in maximum 3.

h. Photo Essays: The journal accepts manuscripts for consideration as photo essays. These essays include the visual presentation of material where the prima, emphasis is on the images. These images can include colored images, angiograms, optical coherence tomography, histologic sections, x-rays, ultrasounds, and other studies. The images can be an outstanding presentation of classic findings, atypical findings or new findings. These are not case reports, but rather a visual presentation of material as a teaching tool. The images need to be of the highest quality. The accompanying manuscript should be limited to a total of 300 words. A maximum of 5 separate images and 5 references can be included. Please refer to the rest of the author's instructions for other requirements for manuscripts submitted to HMDJ.

4. SUBMISSION OF MANUSCRIPT

a. All manuscript should be typed in double spacing on A-4 paper (8.25" x 11.70" = 21.0 cm x 29.70 cm) with one inch (2.5 cm) margin on both sides.
b. All pages must be numbered starting with the title page being page one.
c. Each figure and table must be submitted separately.
d. All manuscripts must be submitted by email to the address: editor.hmdj@hitec-ims.edu.pk or OJS (https://hmdj.org/).

5. VANCOUVER REFERENCING CONVENTIONS

a. In-text citation

i. At every point in the text where a particular work is referred to by quoting or paraphrasing, include the number which identifies the reference used, as superscript.
ii. References are numbered consecutively in the order in which they are first cited in the text.

b. References list

i. References are presented in numerical order by the order in which they appear in the document.
ii. You should only include sources that you have referenced in your work.
iii. If you are asked to include a bibliography (in addition to, or in place of, a references list), you can include further items that were read that informed your research and thinking for the assignment, in addition to those that you directly referenced**.**

c. How to give a reference

i. Act of Parliament

1. Country. Title of Act and year. Chapter. Place of Publication: Publisher.
2. *Example:* Great Britain. Environment Act 1995. Chapter 25. London: The Stationery Office.

ii. Blog

1. Author(s) surname Initial(s). Title of blog entry. Date blog entry written. Title of blog [online]. Year. [Accessed date]. Available from: URL.
2. *Example:* Welle K. Impressions from the Stockholm World Water Week. 25 August. ODI blog: commentary from leading development experts [online]. 2006. [Accessed 9 July 2007]. Available from: http://blogs.odi.org.uk/blogs/main/archive/category/1020.aspx

iii. Book

1. Author surname Initial(s). Title: subtitle. Edition (if it is not the first edition). Place of publication: Publisher; Year of publication.
   a. *Example:* Cooke A. A guide to finding quality information on the Internet: selection and evaluation strategies. 2nd ed. London: Library Association Publishing; 2001.
2. Two to six authors: First author surname Initial(s), second author surname Initial(s),

third author surname Initials. Title: subtitle. Edition (if it is not the first edition). Place of publication: Publisher; Year of publication.

a. Example: Feldman RS, Meyer JS, Quenzer LF. The American Psychiatric Press textbook of psychopharmacology. 2nd ed. Washington DC: American Psychiatric Association; 1998.

3. Seven or more authors/editors: If there are 7 or more authors/editors, only the first 6 are listed followed by et al. First author surname Initial(s), second author surname Initial(s), third author surname Initial(s), fourth author surname Initial(s), fifth author surname Initial(s), sixth author surname Initial(s), et al., editors. Title: subtitle. Edition (if it is not the first edition). Place of publication: Publisher; Year of publication.
   a. Example: Fauci AS, Braunwald E, Isselbacher KJ, Wilson JD, Martin JB, Kasper DL, et al., editors. Harrison's principles of internal medicine. 14th ed. New York: McGraw Hill; 1998.
4. Book with organisation as author:
   a. SCONUL Advisory Committee on Information Literacy. Learning outcomes and information literacy. London: SCONUL; 2004.
5. Edited book:
   a. Editor(s) surname Initial(s), editor(s). Title: subtitle. Edition (if it is not the first edition). Place of publication: Publisher; Year of publication.
   b. Ennis F, editor. Infrastructure provision and the negotiating process. Aldershot: Ashgate; 2003.
   c. Example: Editors should have editor or editors after their name or list of names. If there are no authors or editors given, the title should be listed first, followed by place of publication.
6. Book chapter from an edited book
   a. Author(s) surname Initial(s). Title of chapter: subtitle. In: Author(s) surname Initial(s). Title of book. Place of publication: Publisher; Year of publication. p. page numbers.
      i. Example: Haefner H. Negative symptoms and the assessment of neurocognitive treatment response. In: Keefe RSE, McEvoy JP, editors. Negative symptom and cognitive deficit treatment response in schizophrenia. Washington DC: American Psychiatric Association; 2004. p. 85-110.
   b. When the author's name is the same for the chapter as for the book it does not need to be repeated.
   c. Example: Greenhalgh T. Checklists for finding, appraising, and implementing evidence. In: How to read a paper: the basics of evidence based medicine. London: BMJ Publishing Group; 2000. p. 177-9.

iv. Conference proceedings

1. Individual conference paper
   a. Author(s) Initial(s). Title of contribution. In: Editor(s) surname Initial(s). editor(s). Title of conference proceedings, date, place of conference. Place of publication: publisher; Year. p. page numbers.
      i. Example: Nelmes G. Container port automation. In : Corke P., Sukkarieh S. editors. Field and service robotics: results of the 5th international conference, 29-31 July 2005, Port Douglas. Berlin: Springer; 2006. p. 3-8.
   b. If conference proceedings are published in a journal, the article / contribution should be cited as for a journal article.
   c. If the proceedings have been published as chapters in a book, treat the entire proceedings as a book, and individual presentations as a book chapter. Add details of the conference to the book title.
2. Conference proceedings as a whole
   a. Editor(s) surname Initial(s). editor(s). Title of conference proceedings, date, place of conference. Place of publication: publisher; Year.
      i. Example: Corke P., Sukkarieh S. editors. Field and service robotics: results of the 5th international conference, 29-31 July 2005, Port Douglas. Berlin: Springer; 2006

v. DVD

1. Title. [DVD]. Place of production: Production company; year.
   a. Example: Acland's DVD atlas of human anatomy: the lower extremity. [DVD]. Philadelphia: Lippincott Williams & Wilkins; 2004.

vi. E-book

1. online
   a. Author(s) surname Initial(s). Title: subtitle [online]. Edition (if not the first edition). Place of publication: Publisher; Year of publication [Accessed Date]. Available from: URL of database / location in which the book is held
      i. Example: Greenhalgh T. How to read a paper: the basics of evidence based medicine [online]. London: BMJ Publishing Group; 2000 [Accessed 8 September 2008]. Available from: http://www.netlibrary.com/Ac-

cessProduct.aspx?ProductId=66703

2. e-book reader format, e.g. Kindle
    a. Author(s)/Editor(s) surname Initials(s). Title: subtitle. Edition (if not the first edition). [Name of e-book reader]. Place of publication: Publisher; Year of publication.
        i. Example: Llewelyn H, Ang HA, Lewis KE, Al-Abdullah A. Oxford handbook of clinical diagnosis. 2nd ed. [Kindle DX e-book]. Oxford: OUP; 2009.

vii. Film

1. Title of film. [film]. Directed by: Full name of director. Place of production: Production company; year.
    a. Example: An inconvenient truth. [film]. Directed by: Davis Guggenheim. USA: Paramount; 2006.
2. If the film is a video recording (on DVD or VHS) use the same format but change [film] to the relevant media. This is because video recording may contain extra footage not shown in the film.

viii. Journal article

1. Journal article (Print)
    a. Author(s) surname Initial(s). Title of article. Abbreviated title of journal. Year of publication;volume number(issue number):page numbers.
        i. Example: Meric F, Bernstam EV, Mirza NQ, Hunt KK, Ames FC, Ross M I, et al. Breast cancer on the world wide web: cross sectional survey of quality of information and popularity of websites. BMJ. 2002;324(7337):577-81.
2. Journal article (Electronic)
    a. Author(s) surname Initial(s). Title of article. Abbreviated title of journal [online]. Year of publication;volume number(issue number):page numbers. [Accessed date]. Available from: URL
        i. Example: Ross CTF. A conceptual design of an underwater vehicle. Ocean engineering [online]. 2006;33(16):2087-2104. [Accessed 6 July 2007]. Available from: http://www.sciencedirect.com/
    b. When citing online journal articles, it is now widely preferred to include a DOI (Direct Object Identifier) where available rather than a URL.
        i. Example: De Pinto M, Jelacic J, Edwards WT. Very-low-dose ketamine for the management of pain and sedation in the ICU. Acute Pain [online]. 2008;10(2):100. [Accessed 8 September 2008]. Available from:<-doi:10.1016/j.acpain.2008.05.023>

ix. Newspaper article

1. Author(s) surname Initial(s). Title of article: subtitle of article. Newspaper title (in full) Year Month and date of publication; section name (if applicable):page numbers of contribution.
    a. Example: Rowbottom M. The Big Question: how prevalent is the use of drugs in sport, and can it be defeated? The Independent 2006 Aug 1;Sect. Sport:5

x. Radio broadcast

1. Title of programme/Series title, Episode number, Episode title. Transmitting organisation/channel. Date and year, Time of transmission.
2. *Example:* Desert island discs, Lily Allen. BBC Radio 4. 29 June 2014, 11:15.

xi. Television broadcast

1. Title of programme/Series title, Episode number, Episode title. Transmitting organisation/channel. Date and year, Time of transmission.
    a. Example: Yes, Prime Minister, Episode 1, The Ministerial Broadcast. BBC2. 16 January 1986, 20:30.
    b. Example: News at ten. ITV. 27 January 2001. 22:00.

xii. Thesis or dissertation

1. Author's surname Initial(s). Title: subtitle. Award level of thesis, Awarding institution; Year of publication.
    a. Example: Deb S. Psychopathology of adults with a mental handicap and epilepsy. MA thesis, University of Leicester; 1991.
    b. Example: Croser C. Biochemical restriction of root extension under mechanical impedance. PhD thesis, University of Birmingham; 1997.

xiii. Twitter(X)

1. Surname(s), Initial(s) (or organisation). Full text of tweet. [Twitter]. Date and year tweet posted [Date accessed]. Available from: URL
2. *Example:* Cruciform Library. MedTech Week 2014 at UCL Institute of Biomedical Engineering (IBME)16-20 June via @UCL_IBME http://bit.ly/1pbWe53 pic.twitter.com/pzXx3P4DlP [Twitter]. 9 June 2014 [Accessed 2 July 2014]. Available from: https://twitter.com/ucl_crucitwit

xiv. Website or webpage

1. Author(s)/Editor(s) surname Initial(s). Title. [online]. Publisher: place of publication; Year [Accessed date]. Available from: URL
    a. Example: SukYin A. Catechol-O-Methyltransferase (COMT) gene and breast cancer. [online]. Human Genome Epidemiology Network, National Office

of Public Health Genomics, Centers for Disease Control and Prevention: Atlanta GA; 2002 Jun [Accessed 8 September 2008]. Available from: http://www.cdc.gov/genomics/hugenet/factsheets/FS_COMT.htm

2. Year can include month if preferred.
3. If a specific author cannot be found, attribute to the organisation or corporation.
   a. *Example:* Overseas Development Institute, Humanitarian Policy Group. Welcome to HPG. [online]. ODI: London; 2007 [Accessed 9 July 2007]. Available from: http://odi.org.uk/hpg/index.html

xv. Wiki

1. Wiki name. Title of article. [online]. Year [Date accessed]. Available from: URL
   a. *Example:* Wikipedia. Jeremy Bentham. [online]. 2014 [Accessed 2 July 2014]. Available from: http://en.wikipedia.org/wiki/Jeremy_bentham

---

DIAGNOSTIC CHALLENGE Answers

Case 1

1. **Diagnosis:**
   Venous Malformation.

   Differential Diagnosis:

Condition	Distinguishing Clinical Features
Hemangioma	Appears shortly after birth, shows rapid growth phase followed by involution
Arteriovenous Malformation (AVM)	High-flow lesion, pulsatile with palpable thrill
Mucocele	Usually seen on the lower lip; non-compressible and lacks color change with Valsalva
Kaposi's Sarcoma	Firm, non-compressible, often multiple purplish nodules; may be associated with immunocompromised states

Discussion:

Venous malformations are congenital, low-flow vascular anomalies formed by dilated venous channels due to developmental errors in embryonic venous formation. Present at birth, they may become noticeable later depending on their depth and location.

Mutations in genes such as TIE2 (TEK) and PIK3CA are associated with these malformations, leading to abnormal endothelial cell signaling and poorly organized venous networks. They can occur anywhere in the body but are most frequent in the head and neck region, particularly on the lips, tongue, and buccal mucosa.

Clinically, venous malformations present as soft, compressible, bluish swellings that enlarge with dependency, crying, or the Valsalva maneuver. They are non-pulsatile, low-flow, and cool to touch, with no thrill or bruit. On aspiration, dark venous blood may be obtained, which stops easily on applying pressure. The lesion may cause pain or swelling, especially if thrombosis occurs, and can result in functional or cosmetic problems depending on its location.

Investigations include Doppler ultrasound, which confirms a low-flow, compressible lesion, and MRI, which is the best imaging method for assessing the extent and depth. Computerized Tomography(CT) scans may show calcified phleboliths. Aspiration and occasionally venography can further support the diagnosis.

Histologically, venous malformations consist of dilated, thin-walled vascular channels lined by normal endothelium without cellular proliferation. Thrombi or phleboliths may be present due to slow blood flow.

Treatment depends on size and symptoms. Small, asymptomatic lesions may be observed, while sclerotherapy is the preferred treatment for most cases. Surgical excision is considered for localized lesions or residual masses after sclerotherapy. Laser therapy can be used for superficial mucosal lesions, and compression therapy is helpful for extremity involvement.

Our Patient:

Our patient was managed by sclerotherapy using sodium tetradecyl sulphate.. A total of three sclerotherapy sessions were performed at regular intervals, producing significant cosmetic and functional improvement. The patient was kept on regular follow-up to monitor healing, assess for recurrence, and ensure complete resolution of the lesion.

Answers

Case 2

1. **Diagnosis**
   Squamous cell carcinoma

2. **Investigation**
   Incisional Biopsy

Discussion:

Oral squamous cell carcinoma is a malignant epithelial tumor arising from the stratified squamous epithelium of the oral cavity. It is the most common type of oral cancer, accounting for more than 90% of cases. The disease is characterized by locally invasive growth and potential metastasis to regional lymph nodes.

Major causative factors include tobacco use, alcohol consumption, and chronic irritation from sharp teeth or dentures. HPV types 16 and 18, poor oral hygiene, nutritional deficiencies, p53 gene mutations, and sun exposure (for lip lesions) also contribute.

OSCC can occur at various sites, most commonly the lateral border and ventral surface of the tongue, floor of the mouth, buccal mucosa, gingiva, and retromolar region.

Clinically, it often presents as a non-healing ulcer or exophytic growth that is indurated, irregular, and may bleed on touch. The lesion may be painful or tender, and in advanced stages can cause difficulty in chewing, swallowing, or speech. The surrounding mucosa may show leukoplakic or erythroplakic changes, and regional lymph nodes are often enlarged and firm due to metastasis.

Histologically, the tumor shows invasive malignant squamous cells with keratin pearls, nuclear pleomorphism, and increased mitotic activity.

Diagnosis is confirmed by an incisional biopsy, while CT or MRI helps assess the extent of the lesion and bone involvement. Fine Needle Aspiration Cytology (FNAC) is used for evaluating lymph nodes, and chest X-ray or PET scan may be done to detect distant metastasis.

Treatment depends on the stage of the disease. Early lesions are treated by surgical excision or radiotherapy, while advanced cases often require combined surgery, radiotherapy, and chemotherapy. Neck dissection is done if nodes are involved, followed by reconstructive surgery, if required.

Our Patient:

A segmental resection of the mandible was performed from the left lower canine to the molar region, followed by reconstruction with a free fibula flap. A left modified radical neck dissection (levels I–IV) was also carried out, and postoperative radiotherapy was planned depending on nodal status and margin involvement.

HITEC MEDICAL AND DENTAL JOURNAL

HITEC Institute of Medical Sciences
Taxila Cantt
www.hitec-ims.edu.pk
Contact: 051-4908582