

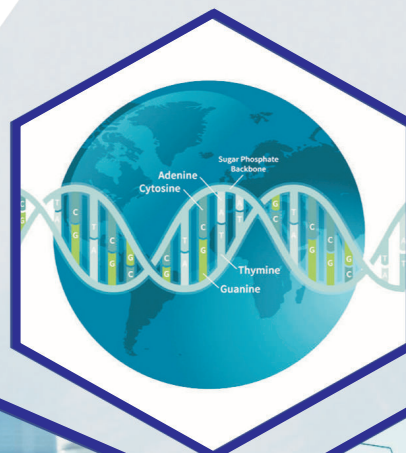


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EDITORIAL

**INTERNATIONAL CONFERENCE ON RAMADAN AND HEALTH:
BRIDGING HEALTH AND SPIRITUAL WELLBEING**Muhammad Afzal^{1*}

Cite this article as: Afzal M. International conference on Ramadan and health: Bridging health and spiritual wellbeing. Baqai J Health Sci. 2026;27(1):01-02

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¹Department of Islamic Studies, Al Ghazali University

INTRODUCTION

It is a matter of great honor and privilege to present the report of the International Conference on “Ramadan: Bridging Health and Spiritual Wellbeing,” which was successfully held on 21–22 April 2026. The conference was jointly organized by Baqai Medical University (BMU), Al-Ghazali University (AGU), and Shaheed Benazir Bhutto Medical University (SMBBMU).

This international conference was designed as a multidisciplinary academic platform to explore the diverse impacts of Ramadan fasting on human health and wellbeing. It brought together scholars, clinicians, researchers, and practitioners from various fields, including medicine, nutrition, psychology, public health, and spiritual studies. The primary objective of the conference was to bridge the gap between scientific research and spiritual understanding, highlighting how fasting during Ramadan contributes not only to physical health but also to mental resilience and spiritual growth.

The conference featured a series of keynote addresses, panel discussions, and scientific presentations delivered by distinguished national and international experts. The inauguration session was held in the morning of 21st April 2026 at BMU. The Chief Guest was the Prof. Dr. Syed Muhammad Tariq Rafi (TI), Chairman, Sindh Higher Education Commission. The Chairmen of the conference, Prof. Nazeer Khan and Dr. Muhammad Afzal Khan welcomed the audience. The Vice Chancellor of

BMU, Prof. Dr. Iftikhar Ahmed Siddiqui, and Vice Chancellor of AGU, Prof. Mufti Ehsan Waqar addressed the august delegates. Prof. Dr. Kashif Ikraam, Pro Vice Chancellor (BMU) presented the vote of thanks.

Four plenary and five contributed papers sessions were held during these two days. Five invited international speakers and eight Pakistani speakers presented their research works in the plenary sessions. The international speakers were from United States of America, United Kingdom, Malaysia, and United Arab Emirates. These sessions provided valuable insights into the physiological effects of fasting, metabolic adaptations, mental health benefits, and the role of spiritual practices in promoting holistic wellbeing. The discussions also emphasized the importance of culturally sensitive healthcare approaches in Muslim populations during the month of Ramadan. About 400 delegates attended this conference.

The closing session was held at Al-Ghazali University in the afternoon of 22nd April 2026. The Chancellor AGU, Mufti Abdur Rahim was the Chief Guest of the session. Prof. Syed Muhammad Tariq Rafi (TI), Chairman, Sindh Higher Education Commission, was the Guest of Honor. These Honorable respected speakers appreciated the efforts of the organizing committee to merge one of oldest private medical universities to a newly emerging university, rooted from an Islamic University through a conference theme embedded

*Corresponding Author:

Chairman, Department of Islamic Studies, Al Ghazali University
Chairperson of the Conference, Email: drmuhammadaafzal@agu.edu.pk

in the vision of both the universities.

The key strengths of the conference were the active engagement of participants, who contributed through research presentations, academic debates, and interactive discussions. This exchange of knowledge fostered interdisciplinary collaboration and encouraged evidence-based approaches to understanding fasting and health. The event also created opportunities for young researchers and students to learn from experienced scholars and professionals, thereby strengthening academic capacity building.

The success of this conference reflects our continued commitment to promoting high-quality research, academic excellence, and community awareness in accordance with the broader objectives of higher education. It also highlights the importance of integrating scientific knowledge with ethical, cultural, and spiritual dimensions of human life.

We extend our sincere gratitude to all speakers, delegates, organizing committees, and supporting staff whose dedication and hard work ensured the smooth conduct of this academic event. We are also deeply thankful to the Higher Education Commission for its continued support and encouragement in promoting impactful academic and research activities across institutions.

It is our firm belief that the outcomes of this conference will contribute significantly to future research initiatives, policy development, and public awareness regarding the health benefits and spiritual dimensions of fasting. The knowledge shared during this event will serve as a foundation for further academic inquiry and collaborative research in the years to come.

Acknowledgements

At an appropriate place in the article is before references, financial support could be at the title page. One or more statements should specify the following:

- (a) contributions that need acknowledging but do not justify authorship, such as general support by a department chairman;
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(Continue to the page number 22)

ORIGINAL ARTICLE

MEDICATION USE AND PATIENT COUNSELING AMONG PREGNANT WOMEN IN KHYBER PAKHTUNKHWA, PAKISTAN: A CROSS-SECTIONAL HOSPITAL-BASED STUDY

Syeda Shahnoor Zainab^{1*}, Hina Khan¹, Wajid Ullah Khan¹, Khadija Bibi¹, Rahal Warda¹,
Mouizza Ahmad¹

ABSTRACT

Objective: This study aimed to assess the medication patterns and its associated factors among pregnant women attending a tertiary care hospital in Dera Ismail Khan.

Methods: A hospital-based cross-sectional study was conducted at the Gynecology and Obstetrics outpatient department of DHQ Hospital, Dera Ismail Khan, from December 2025 to January 2026. A total of 194 pregnant women were enrolled using consecutive sampling. Data were collected through face-to-face interviews using a structured questionnaire covering socio-demographics, obstetric history, and details of medication use. Medications were classified according to the FDA pregnancy risk categories. Data were analyzed using statistical packages for social sciences (SPSS) version 27. Descriptive statistics and chi-square tests were used. A p-value <0.05 was considered statistically significant.

Results: The mean age of participants was 25.4 ± 5.2 years. Overall, 61.9% (n=120) participants reported a use of at least one medication. Multivitamins (35.1%), folic acid (18.6%), and calcium (13.4%) were most frequently used medications. Notably, 22.7% practiced self-medication, and only 38.1% received adequate medication information from healthcare providers. No FDA Category D or X drugs were reported. A significant association was found between medication use and trimester (p=0.033), with highest use in the third trimester (68.9%), and with education level (p=0.042), being highest among graduates (75.0%). The use of Iron sucrose was significantly higher in the third trimester (p=0.026).

Conclusion: Medication use was reported by 61.9% of pregnant women, with 22.7% practicing self medication and 56.7% receiving inadequate counseling. Medication use was significantly higher in the third trimester and among graduate women. No FDA Category D or X drugs were used. While prescribing practices are generally safe, high rates of self medication and poor patient counseling remain significant public health concerns. Targeted interventions to improve healthcare provider communication and promote rational drug use are urgently needed.

Keywords: Medication use; Pregnancy; Drug utilization; Self-medication; FDA pregnancy categories; Pakistan; Patient counseling

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¹ Faculty of Pharmacy, Gomal University Dera Ismail Khan

INTRODUCTION

Pregnancy is a dynamic physiological period characterized by the rapid growth and development of a fertilized egg into a fetus within a uterus [1]. The use of medications during this period has been a significant concern since the thalidomide cases of the 1960s and the discovery of the teratogenic effects of diethylstilbestrol in 1971 [2]. Balancing therapeutic benefits and potential fetal risk for the mother is a significant challenge for clinicians, as many prescription and over-the-counter drugs, along with herbal remedies and dietary supplements, can cross the placental barrier and enter the fetal bloodstream [3]. Globally, medication use during pregnancy ranges from 60-90%, with substantial variation across regions and healthcare settings [4,5].

According to the World Health Organization, drug utilization refers to the use, distribution, prescription, and marketing of medications, with a focus on their medical, social, and economic impacts on society [6]. The primary goal of such research is to ensure and promote the rational use of medications among patients to optimize healthcare outcomes, a concept that is particularly important in pregnancy, where the benefit-risk balance is complex. To guide prescribing decisions, the United States Food and Drug Administration (US FDA) classify medication into A, B, C, D, or X, based on their risk to fetus, with category X drugs being the most dangerous and are strictly contraindicated during pregnancy [7]. However, because of ethical concerns pregnant women are routinely excluded from clinical trials, therefore safety data of new drugs during pregnancy remain limited, and clinicians must rely on post-marketing surveillance and observational studies to guide prescribing practices [8].

In Pakistan, several studies have documented these prescribing trends. A recent cross-sectional study conducted in Lahore reported that among 175 pregnant women, 62 different medications were prescribed, among which 54.9% used over-the-counter medications, 58.3% used dietary supplements and 21.4% reported using herbal

products [7]. Another large-scale multi-center cross-sectional study conducted at five tertiary care hospitals in Karachi, Nawabshah, Larkana, and Quetta analyzed 3,769 prescriptions. The results showed that iron and vitamin/mineral supplements were the most frequently prescribed (79.4%), followed by analgesics in 6.2% and antibiotics in 2.2%. Among all prescribed medications 2.3% were classified as potentially teratogenic, exposing 0.8% of the women in the study to such drugs [8].

Despite these valuable insights, research on medication patterns during pregnancy in Pakistan, specifically in Khyber Pakhtunkhwa remains limited. To our knowledge, no published data are available on this aspect from Khyber Pakhtunkhwa, a province characterized by unique cultural practices, healthcare access challenges, and socioeconomic determinants that may affect medication utilization patterns. This study aims to address this gap by examining the current medication utilization trends in this population. The primary objective of our research is to assess medication utilization patterns among pregnant women in Dera Ismail Khan, including the prevalence of medication use, the types and frequencies of specific medications, and their classification according to US FDA pregnancy risk categories. Secondary objectives are to evaluate medication sourcing behaviors (including the extent of self-medication); to assess the adequacy of patient counseling regarding medications; to identify factors associated with medication use (including trimester, education, and parity); to analyze trimester-specific patterns for key medications such as iron sucrose and folic acid; and to generate evidence-based recommendations for improving rational drug use and patient counseling in this setting [9-11].

By addressing these objectives, this study aims to provide actionable evidence for clinicians, policymakers, and public health practitioners working to improve maternal and fetal safety in the region.

METHODOLOGY

This cross-sectional study was conducted at the DHQ Hospital, Dera Ismail Khan, Pakistan, to assess medication use patterns among pregnant women. DHQ Hospital Dera Ismail Khan is a tertiary care teaching hospital affiliated with Gomal University. It serves as a major referral center for the surrounding districts of Khyber Pakhtunkhwa, including Tank, Lakki Marwat, and South Waziristan. The Gynecology and Obstetrics OPD sees approximately 150–200 pregnant women per week. The study is reported in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies. Data were collected over a one-month period from December 11, 2025, to January 11, 2026.

Ethical approval was obtained from the Institutional Review Board of Gomal University Dera Ismail Khan and also data collection approval was taken from the Medical Superintendent of DHQ Hospital, Dera Ismail Khan. Participants data were strictly maintained confidential and anonymous throughout the study.

The study population comprised of pregnant women visiting the Gynecology and Obstetrics OPD of DHQ hospital. A consecutive sampling technique was used to recruit participants. All pregnant women presenting to the OPD during the study period who met the inclusion criteria and were willing to participate in the study were included until the desired sample size was achieved.

WHO sample size calculator for cross-sectional studies was used to calculate sample size. By assuming a 61.9% prevalence of medication use during pregnancy (derived from the initial phase of data collection), a 95% confidence interval and keeping a 7% margin of error, we required minimum sample size of 185 participants. To compensate for potential incomplete or missing data additional 5% were taken which yield a final sample size of 194 participants.

Participants included in the study were pregnant women of any gestational age (first, second, or third trimester) who attended the hospital OPD during the study period, were between 16 and 37 years of age, and provided informed consent to participate. Pregnant women with severe medical or obstetric complications, those who were hospitalized due to complex medication regimens, and individuals unwilling to provide study data were excluded from the study.

Data were collected through structured face-to-face interviews using a purpose-built questionnaire developed specifically for this study. The questionnaire was constructed following a systematic review of published literature on medication use during pregnancy in similar low- and middle-income country (LMIC) settings. The questionnaire covered the following domains: (i) socio-demographic characteristics, including age, educational attainment, and pregnancy planning status; (ii) obstetric history, including number of previous pregnancies and current trimester of pregnancy; (iii) medication use details, encompassing prescription drugs, over-the-counter (OTC) medications, nutritional supplements, and herbal products; (iv) source of medication or prescribing advice, including physician, pharmacist, self-medication, or other informal sources; (v) patient knowledge and health literacy regarding medication safety during pregnancy; and (vi) counseling adequacy, assessed by asking participants whether they had received sufficient information from a healthcare provider regarding the medications prescribed to them, their indications, potential side effects, and instructions for use.

To ensure content validity, the initial draft of the questionnaire was reviewed by a panel of three subject matter experts, comprising two senior consultant obstetricians and one public health specialist with experience in maternal health research. The panel independently assessed each item for relevance, clarity, and comprehensiveness in relation to the study objectives. Based on their

consolidated feedback, minor modifications were made to the wording and sequencing of certain items to improve clarity and clinical relevance. No items were removed or added at this stage.

Pilot Testing: Following expert review, the revised questionnaire was pilot-tested on 10 pregnant women attending the same OPD who were not included in the final study sample. The pilot was conducted to assess item comprehension, cultural appropriateness, and estimated interview duration. No substantial ambiguities or comprehension difficulties were identified, and no further modifications to the instrument were deemed necessary. All interviews were conducted in Urdu, Saraiki, or Pashto, as appropriate to the participant's preferred language, to minimize language barriers and enhance the accuracy of self-reported responses.

Ethical approval was obtained from the Institutional Review Board of Gomal University, Dera Ismail Khan. Also, data collection approval was obtained from the Medical Superintendent of DHQ Hospital, Dera Ismail Khan. The study was conducted according to the ethical standards of the responsible institution and also with the Helsinki Declaration.

Statistical Analysis

The data were entered and analyzed through statistical packages for social sciences (SPSS) version 27. Descriptive statistics were calculated for all variables. For categorical variables such as age groups, trimesters, education levels, and medication use patterns frequencies and percentages were reported. In order to explore factors associated with medication use, further statistics were applied. A chi-square test of independence was used to examine association between categorical independent variables (e.g. trimester, education level, number of previous pregnancies) and the dependent variables (any medication use: yes/no). Fisher's exact test was used where chi-square was not applicable. A p-

value of less than 0.05 was considered statistically significant for all tests.

RESULTS

This study was conducted on 194 pregnant women having mean age of 25.4 ± 5.2 years. The largest proportion of participants (40.4%, n=78) were aged between 21-25 years, followed by those aged 26-30 years (21.8%, n=42), 16-20 years (18.1%, n=35), and 31-37 years (16.6%, n=32). Age data was missing for one participant (0.5%). Educational status of participants varied considerably. Among all participants, (37.1%, n=72) were illiterate with no formal education, while 28.9% (n=56) had achieved higher education (graduate level), 16.5% (n=32) had secondary education, and 15.5% (n=30) had primary education. Most pregnancies were planned (76.3%, n=148), with only 2.1% (n=4) of participants reported an unplanned pregnancy; for 21.6% (n=42) of participants data on pregnancy planning was missing. A detailed summary of socio-demographics characteristics of participants is presented in table 1.

Majority of participants were in their third trimester (62.9%, n=122), while 20.6% (n=40) were in the second trimester and 16.5% (n=32) were in the first trimester. In terms of parity, 30.9% (n=60) of women were primigravida (no previous pregnancies). Among multigravida women, the proportion of those with one previous pregnancy (22.7%, n=44) was similar to those with two previous pregnancies (22.7%, n=44), while 23.7% (n=46) had three or more previous pregnancies. Only 6.2% (n=12) of the study population was reported having chronic illness, while the vast majority (93.8%, n=182) had no chronic medical conditions. A summary of obstetric and clinical characteristics of all participants is presented in table 1.

Table 1: Socio-demographics and Obstetric Characteristics of Pregnant Women (N=194)

Characteristic	Category	N	Percentage (%)
Age Groups	16-20 years	35	18.1
	21-25 years	78	40.4
	26-30 years	42	21.8
	31-37 years	32	16.6
	Missing	1	0.5
Education Level	No formal education	72	37.1
	Primary education	30	15.5
	Secondary education	32	16.5
	Higher education	56	28.9
Pregnancy Planning	Yes	148	76.3
	No	46	23.7
Trimester	First trimester	32	16.5
	Second trimester	40	20.6
	Third trimester	122	62.9
Previous Pregnancies	No	60	30.9
	One	44	22.7
	Two	44	22.7
	Three or more	46	23.7
Chronic Illness	Yes	12	6.2
	No	182	93.8

Education categories: no formal education = never attended school; primary = 1-5; secondary = grades 6-10 (including Middle and Metric); higher = grades 11 and above (including Intermediate and Graduate).

Among all participants, 61.9% (n=120) reported using at least one medication during their current pregnancy, while 38.1% (n=74) reported no medication use. Antibiotic use was reported by 10.3% (n=20) of women. The study participants have used a total of 11 different medications. Among which, multivitamins were the most commonly used medication, reported by 35.1% (n=68) of all women (n=194). This was followed by folic acid (18.6%, n=36/194), calcium supplements (13.4%, n=26/194), and iron preparations (6.2%, n=12/194). Vitamin D and Vitamin B12 were each used by 5.2% (n=10/194) of participants.

Regarding non-supplement medications, paracetamol and esomeprazole were each used by

4.1% (n=8) of participants. Labetalol and methyldopa (both antihypertensives) were each used by 2.1% (n=4) of women. Aspirin was used by 1.0% (n=2) of participants.

When classified according to FDA pregnancy risk categories, the majority of medications used fell under Category A (safe in pregnancy). Category B medications (no evidence of human risk) included paracetamol, esomeprazole, and methyldopa. Category C medications (risk cannot be ruled out) included labetalol and aspirin. Notably, no Category D or X medications were reported in this study. A complete list of frequently used medications is presented in table 2.

Table 2: Frequently Used Medications Among Pregnant Women (n=194)

Name of medicine	Frequency (n)	Percentage (%)	FDA Category
Multivitamins	68	35.05	A
Folic acid	36	18.6	A
Calcium supplements	26	13.4	A
Iron	12	6.2	A
Vitamin D	10	5.2	A
Vitamin B12	10	5.2	A
Paracetamol	8	4.1	B
Esomeprazole	8	4.1	B
Labetalol	4	2.1	C
Methyldopa	4	2.1	B
Aspirin	2	1.0	C

Iron sucrose use was reported by 48 participants (24.7%). A statistically significant association was found between iron sucrose use and trimester of pregnancy ($\chi^2 = 7.288$, df = 2, p = 0.026). The majority of iron sucrose use occurred in the third trimester (79.2%, n=38/48), followed by the second

trimester (12.5%, n=6/48) and first trimester (8.3%, n=4/48). This indicates that iron sucrose was significantly more likely to be used in the third trimester compared to earlier trimesters. These findings are presented in table 3.

Table 3: Iron Sucrose Use Across Trimesters of Pregnancy (N=194)

Trimester	Iron Sucrose Use - Yes (n)	Iron Sucrose Use - No (n)	p-value	Total (n)
First Trimester	4	28	0.026	32 (8,3)
Second Trimester	6	34		40 (12.5)
Third Trimester	38	84		122 (79.2)

Analysis of other medications across trimesters and parity revealed no statistically significant associations. The use of multivitamin ($p=0.454$) and folic acid ($p=0.279$) did not differ significantly across trimesters. Similarly, no significant associations were found between medication use and number of previous pregnancies for any of the medications studied ($p > 0.05$ for all).

Regarding the source of medication or prescribing advice, physicians were the primary prescribers for the majority of participants (67.0%, $n=130$). However, self-medication was also reported in a substantial proportion of women (22.7%, $n=44$). Recommendations from Pharmacist and other sources (e.g., family, friends) each accounted for 5.2% ($n=10$) of medication sources.

When participants were asked about their awareness of the medications they were taking, an overwhelming majority that's 97.9% ($n=190$) of participants reported being aware and only 2.1% ($n=4$) were unaware. Regarding medication safety behavior, only 11.3% ($n=22$) of participants reported that they stopped medication taking at some point of pregnancy due to fear of harming the fetus, whereas 88.7% ($n=172$) did not discontinue any medication. Concerning the sufficiency of information received, only 38.1% ($n=74$) of women felt that they have received sufficient information from a healthcare provider about medication use during pregnancy. More than half participants (56.7%, $n=110$) reported that they didn't receive adequate information, and 5.2% ($n=10$) were unsure. These findings are summarized in Table 4.

Table 4: Medication Use Patterns and Related Behaviors (N=194)

Characteristic	Category	N	Percentage (%)
Any Medication Use	Yes	120	61.9
	No	74	38.1
Antibiotic Use	Yes	20	10.3
	No	174	89.7
Medication Prescriber	Physician	130	67.0
	Self-decided	44	22.7
	Pharmacist	10	5.2

Characteristic	Category	N	Percentage (%)
	Other	10	5.2
HCP Awareness about medicine use	Yes	190	97.9
	No	4	2.1
Stopped medicines due to fear of harm	Yes	22	11.3
	No	172	88.7
Information Received about medicines	Yes	74	38.1
	No	110	56.7
	Unsure	10	5.2

To examine the association between medication, use and trimester of pregnancy, a chi-square test of independence was applied. A statistically significant association was found ($\chi^2 = 6.821$, $df = 2$, $p = 0.033$) between these two variables. Medication

use was highest among women in the third trimester (68.9%, $n=84/122$), compared to those in the first (50.0%, $n=16/32$) and second trimesters (50.0%, $n=20/40$). This association is shown in figure 1.

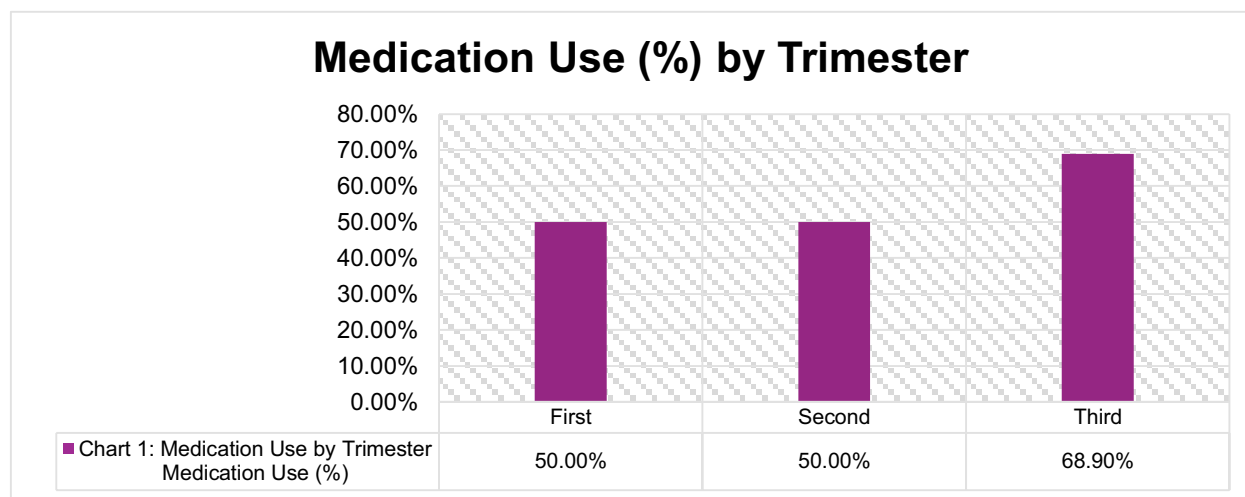


Figure 1. Medication Use by Trimester of Pregnancy

A chi-square test of independence revealed a statistically significant association between education level and medication use ($\chi^2 = 13.084$, $df = 6$, $p = 0.042$). The highest frequency of medication use was observed among women with graduate-level education (75.0%, $n=18/24$), followed by those with primary education (73.3%, $n=22/30$) and intermediate education (68.8%,

$n=22/32$). The lowest medication use was observed among women with matriculation education (37.5%, $n=6/16$). It is important to note that this result should be interpreted with caution, as 2 cells (14.3%) had an expected count of less than 5, with a minimum expected count of 1.53. The details are presented in figure 2.

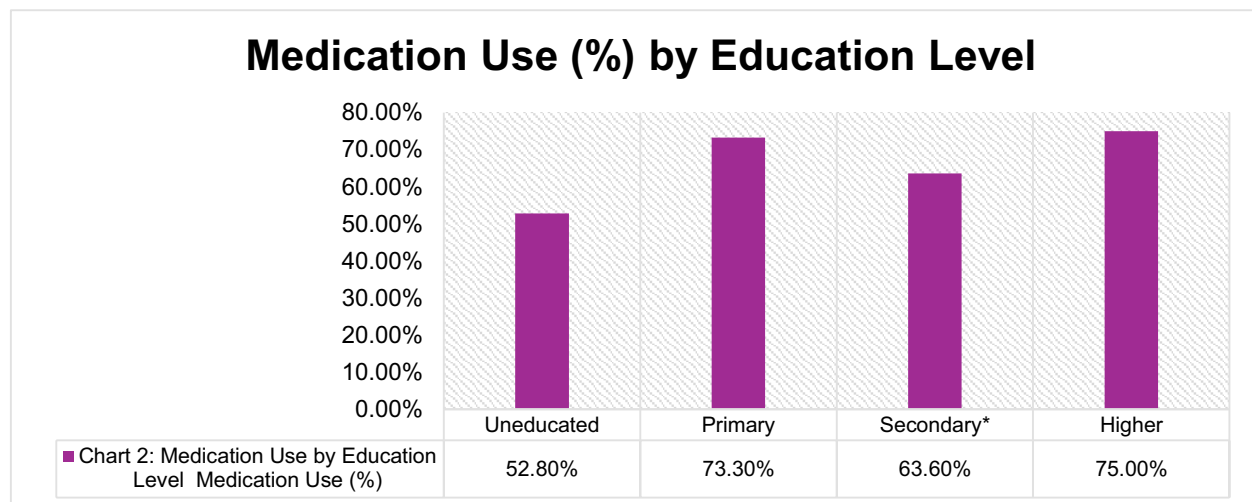


Figure 2. Medication Use by Educational Level

A chi-square test of independence was conducted to examine the relationship between medication use and the number of previous pregnancies. No statistically significant association was found ($\chi^2 = 3.297$, $df = 3$, $p = 0.348$). Although medication use was highest among primigravida women (70.0%,

$n=42/60$) and lowest among women with two previous pregnancies (54.5%, $n=24/44$), these differences were not statistically significant. All expected cell counts were greater than 5, confirming the validity of the test. These findings are presented in figure 3.

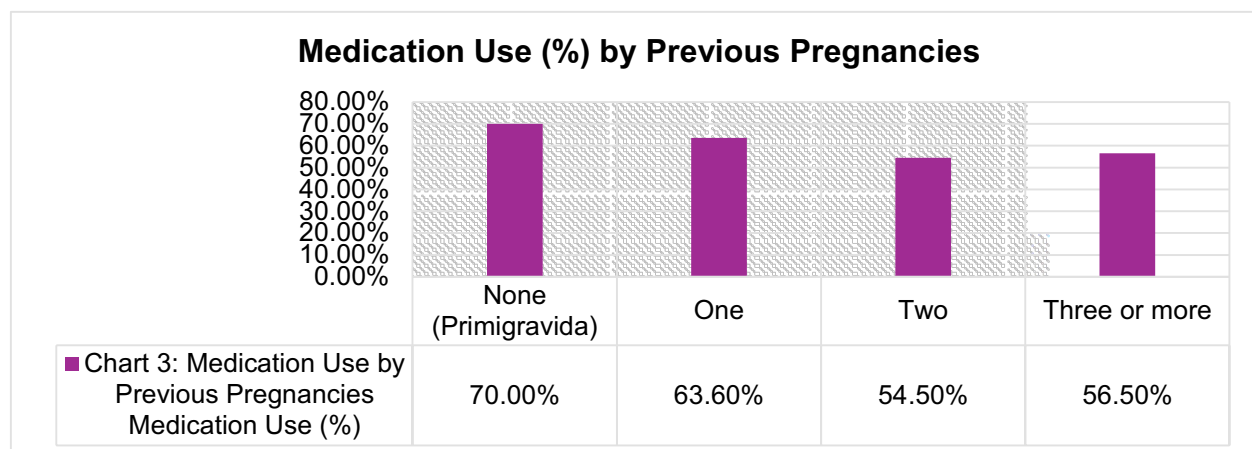


Figure 3. Medication Use by Number of Previous Pregnancies

DISCUSSION

This study provides the first empirical evidence of medication utilization pattern among pregnant women in Dera Ismail Khan, Pakistan. It focuses on both revealing the adherence to recommended practices and significant gaps in patient care. The key findings are 61.9% medication use prevalence, 22.7% self-medication rate, and 56.7% reporting inadequate counseling.

The finding that 61.9% of participants used at least one medication during pregnancy is consistent with previous Pakistani research. A study conducted in Lahore in 2024 reported that 58.3% of pregnant women were using dietary supplements, while another study from multiple tertiary care hospitals in Pakistan documented that iron and vitamin/mineral supplements accounted for 79.4% of all prescriptions [7,8]. The predominance of nutritional supplements (multivitamins, folic acid,

calcium, and iron) in the present study aligns with global antenatal care recommendations. It reflects appropriate prescribing practices for meeting increased physiological demands during pregnancy.

However, the relatively low use of folic acid (18.6%) is concerning, given its critical role in preventing neural tube defects during the first trimester [12]. This may indicate inadequate early antenatal care attendance or missed opportunities for supplementation counseling [13]. Similar patterns have been observed in a study from Ethiopia, where iron-folate supplementation rates remain suboptimal despite national policies promoting their use [14-16].

The 22.7% prevalence of self-medication identified in this study represents a significant patient safety concern because self-medication during pregnancy can lead to inappropriate drug selection, incorrect dosing, drug-drug interactions, and delayed treatment of underlying conditions [9]. While this rate is substantially lower than the 80-90% reported in some low- and middle-income countries [11], but still, it remains unacceptable due to the potential teratogenic consequences of certain medications.

The information gap identified that, 56.7% of women report insufficient medication information from healthcare providers which may directly contribute to self-medication practices. When pregnant women lack adequate counseling, they may turn to family, friends, or previous experiences for guidance. This finding underscores a critical failure in healthcare delivery: the mere prescription of medications without accompanying education undermines rational drug use [15]. As the WHO emphasizes, that optimizing healthcare outcomes not only requires appropriate prescribing but also requires comprehensive patient education [6].

A reassuring finding was the absence of FDA Category D or X medications among study participants. This is in contrast with earlier Pakistani research reporting 2.3% teratogenic medication use [8]. This improvement may reflect

enhanced prescriber awareness of pregnancy-specific risks or stricter formularies in the study setting. The predominance of Category A and B medications suggests that women generally receive appropriate prescriptions.

A very small subset of women was using Category C medications (labetalol and aspirin), which highlights the clinical reality that some medical conditions such as hypertension or thromboprophylaxis requires medications where human safety data are limited. In such cases, the risk-benefit ratio must be carefully documented and discussed with patients.

Trimester of pregnancy emerged as a significant predictor of medication use ($p=0.033$), with highest use in the third trimester (68.9%). This pattern is clinically plausible, as later pregnancy involves increased physiological demands, management of pregnancy-related complications (anemia, hypertension, gastroesophageal reflux), and treatment of pre-existing conditions. The significant association between iron sucrose use and third trimester ($p=0.026$) specifically reflects the increase in prevalence of iron deficiency anemia because as the pregnancy progresses, the fetus takes more iron from the mother [14].

The association between educational attainment and medication use ($p=0.042$) warrants careful interpretation. While medication use was highest among graduate women (75.0%), this likely reflects multiple factors, such as greater health literacy, more regular antenatal care attendance, better ability to recall and report medication use, and potentially higher socioeconomic status enabling healthcare access. The lower medication use among women with matriculation education (37.5%) raises important equity concerns, like less-educated women being undersupplied with essential supplements, or are they more likely to obtain medications outside the formal healthcare system? This question requires further investigation through qualitative research and community-based studies.

The absence of a significant association between

previous pregnancies and medication use ($p=0.348$) suggests that parity alone does not determine medication-taking behavior in this population. However, the non-significant trend toward higher use among primigravida women (70.0%) may represent that healthcare engagement is greater during first pregnancies, a phenomenon documented in other settings.

These findings have several important implications for practice and policy in this region:

Healthcare provider must prioritize patients counselling. The finding that 56.7% of women received insufficient medication information represents a modifiable risk factor. Physicians, pharmacists, and nurses should be trained to provide clear, structured counseling on medication indications, dosing, potential side effects, and reasons for continuation. Simple interventions, such as take-home information leaflets or counseling checklists can significantly improve patient knowledge. Self-medication requires targeted intervention. Public awareness campaigns should emphasize the dangers of medication use without professional consultation during pregnancy. Given that 22.7% of women self-medicated, community-based education through lady health workers, mosques, and women's groups may be effective. Also, early antenatal care engagement must be encouraged. The low folic acid use during first trimester suggests that many women present late for care. Strategies to promote first-trimester registration and supplementation could reduce neural tube defect risk. Prescriber education on FDA categories should continue. While no Category D/X drugs were prescribed, ongoing continuing medical education can maintain this safety standard.

This study possesses several methodological and contextual strengths that enhance the validity and applicability of its findings. First, to our knowledge, this is the first study which comprehensively document medication utilization patterns among pregnant women in this region, therefore, it

addresses a significant evidence gap in the Pakistani literature. Second, the study captured a comprehensive range of medication exposures including prescription drugs, over-the-counter medications, nutritional supplements, and herbal products, which provides a holistic assessment of the pharmacological burden during pregnancy. Beyond documenting prescribing patterns, the study also assessed patient-centered outcomes such as self-medication practices and the adequacy of information received from healthcare providers, which give us actionable insights for clinical practice improvement. The data collection through face-to-face interviews and in local languages (Urdu, Saraiki, and Pashto) minimized language barriers and enhanced the accuracy and completeness of self-reported data. Finally, the identification of statistically significant associations between medication uses and both trimester of pregnancy and maternal educational level provides valuable guidance for targeting future interventions to specific subgroups at risk [16].

This study also has several limitations that should be acknowledged. First, the cross-sectional design captures medication uses at a single time point, without allowing analysis of how regimens change throughout pregnancy. A prospective cohort design would provide more comprehensive data on medication patterns over time [3]. Second, the single-center setting at a tertiary care hospital limits generalizability of this study. Women of remote areas who do not have access to such facilities or attending primary care centers may have different medication use patterns [10]. Third, reliance on self-reported medication use may introduce recall bias, though structured face-to-face interviews mitigated this risk. Fourth, the one-month study period could not capture seasonal variations in medication use. Finally, the high rate of missing data for pregnancy planning (21.6%) limits interpretation of this variable.

CONCLUSION

The findings of this study highlight several important avenues for future investigation. Prospective cohort studies are needed to track medication use across gestation and assess associated maternal and fetal outcomes. Also, multi-center studies across diverse healthcare settings in Khyber Pakhtunkhwa would enhance generalizability. Qualitative research exploring the drivers of self-medication and barriers to effective patient-provider communication would provide essential context for designing culturally appropriate interventions. Furthermore, intervention studies evaluating enhanced counseling protocols, patient education materials in local languages, and healthcare provider training programs are urgently needed to address the information gap identified in this study. Finally, future research should oversample women from lower educational backgrounds and rural areas to investigate potential health inequities in access to essential medications during pregnancy.

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Author Contributions

SSZ: Conceptualization, data collection, writing – original draft, and responsible for data integrity

HK: Data collection, writing, review & editing

WUK: Conceptualization, supervision, writing, review & editing,

KB: Data analysis, writing, original draft

RW: Data collection, writing, original draft

MA: Data analysis, writing, review & editing

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ORIGINAL ARTICLE

AWARENESS AND UNDERSTANDING OF SPEECH AND LANGUAGE DISORDERS AMONG SUPPORT AND AUXILIARY STAFF IN HEALTHCARE SETTINGS

Asma Agha^{1*}, Afshan Rahat²

ABSTRACT

Objective: To assess the awareness, perceptions, attitudes, and exposure of support and auxiliary healthcare staff regarding speech and language disorders.

Methods: A cross-sectional descriptive study was conducted at the Sindh Institute of Physical Medicine and Rehabilitation (SIPMR) from January 2025 to March 2026. A total of 80 support and auxiliary staff were recruited using a convenient sampling technique. Data were collected using a structured, expert-validated questionnaire. Data were analysed using the Statistical Package for the Social Sciences (SPSS) version 20 with descriptive statistics and a p-value of <0.05 was considered statistically significant.

Results: A total of 80 participants were included, with a slightly higher proportion of males (55.0%) compared to females (45.0%). Most participants were aged 36–45 years (31.3%), followed by 46+ years (27.5%), 18–25 years (25.0%), and 26–35 years (16.3%). Regarding designation, cleaners formed the largest group (30.0%), followed by guards and others (22.5% each), attendants (15.0%), and technicians (10.0%). More than half (53.8%) had heard of SLDs, while 68.8% had encountered affected individuals. Awareness of speech-language therapists was high (85.0%), and 72.5% recognized the importance of early intervention. However, misconceptions were observed, including beliefs that late talking is always serious (41.3%) and that poor parenting causes speech problems (43.8%). Only 31.3% had interacted with a speech-language therapist. Despite knowledge gaps, most participants showed positive attitudes, with 82.5% supporting helping affected individuals and 77.5% willing to attend training.

Conclusion: Support and auxiliary healthcare staff demonstrated moderate awareness and generally positive attitudes toward SLDs, but notable gaps in knowledge and professional exposure remain. Targeted training and interprofessional education are recommended to improve awareness, referral practices, and patient care.

Keywords: Speech and Language Disorders (SLDs), Auxiliary Staff Awareness, Healthcare Communication, Stigma Reduction

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¹ Speech Language Pathologist, Sindh Institute of Physical Medicine and Rehabilitation

² Department of Special Education, University of Karachi

INTRODUCTION

Speech and language disorders (SLDs) are communication impairments that affect an individual's ability to speak, understand, read, write, or express language effectively. These disorders may be developmental or acquired and can significantly impact social interaction, academic achievement, employment opportunities, and overall quality of life [1,2]. Early identification and intervention by speech-language pathologists are essential for improving communication outcomes and reducing long-term functional limitations [3].

The SLDs represent a significant public health concern worldwide. Studies estimate that approximately 7% of children experience speech, language, or communication difficulties, while communication disorders affect millions of individuals across all age groups globally [4,5]. Timely recognition of communication difficulties is therefore crucial for ensuring access to appropriate assessment and rehabilitation services.

Within healthcare settings, support and auxiliary staff including attendants, technicians, reception staff, security personnel, and cleaners frequently interact with patients and their families. Although they are not directly involved in clinical management, their attitudes, awareness, and understanding of communication disorders can influence patients' experiences, comfort, and access to healthcare services [6]. Adequate awareness among these personnel may facilitate effective communication, reduce stigma, and encourage timely referral to speech-language pathology services. Despite their important role, support and auxiliary staff often receive little or no formal education regarding speech and language disorders. Limited knowledge and misconceptions may contribute to communication barriers and negatively affect patient centered care [7]. Furthermore, existing research has primarily focused on healthcare professionals, with relatively little attention given to auxiliary staff, particularly in developing countries [8].

Therefore, this study aimed to assess the awareness, understanding, and attitudes of support and auxiliary staff toward speech and language disorders in healthcare settings. The findings may help identify knowledge gaps and support the development of targeted awareness and training programs to promote inclusive and effective patient care.

METHODOLOGY

This cross-sectional descriptive study was conducted at the Sindh Institute of Physical Medicine and Rehabilitation (SIPMR) from January 2025 to March 2026 to assess the awareness, understanding, and perceptions of speech and language disorders (SLDs) among support and auxiliary staff working in healthcare settings. A total of 80 participants, including technicians, attendants, security guards, and cleaning staff, were recruited using a convenient sampling approach. Staff members with a minimum of three months of work experience were eligible to participate in the study. Individuals with formal education or professional training in speech-language pathology were excluded to minimize bias in the assessment of awareness and knowledge regarding SLDs.

Data were collected using a structured questionnaire developed following an extensive review of the relevant literature. The questionnaire was reviewed by experts in speech-language pathology to establish content validity, and revisions were made according to their recommendations. The final questionnaire consisted of five sections covering demographic characteristics, awareness of speech and language disorders, attitudes toward individuals with communication difficulties, exposure to speech-language pathology services, and knowledge of referral pathways and communication-related terminology.

Ethical approval for the study was obtained from the ethical review authority of SIPMR prior to data collection. Participation was voluntary, and written informed consent was obtained from all

participants. Respondents were informed of their right to withdraw from the study at any stage without any consequences. Confidentiality and anonymity were maintained throughout the study by excluding personal identifiers from the data collection forms and restricting access to the data to the research team only.

Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and questionnaire responses. Associations between categorical demographic variables and awareness levels were examined using the Chi-square (χ^2) test. A p-value of less than 0.05 was considered statistically significant. Responses to open-ended questions were analyzed using thematic analysis, whereby recurring themes and patterns were identified and categorized.

RESULTS

The study included 80 support and auxiliary healthcare staff. Males constituted 55.0% and females 45.0%. Most participants were aged 36–45 years (31.3%), followed by 46+ years (27.5%), 18–25 years (25.0%), and 26–35 years (16.3%).

Regarding designation, cleaners were the largest group (30.0%), followed by guards and other staff (22.5% each), attendants (15.0%), and technicians (10.0%). Most participants had primary education (37.5%), followed by secondary education (27.5%), no formal education (13.8%), intermediate (11.3%), and graduate level (10.0%).

For work experience, 35.0% had 1–3 years, 31.3% had more than 6 years, 20.0% had less than 1 year, and 13.8% had 4–6 years of experience (table 1).

Table 1: Sociodemographic Characteristics of Study Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	44	55.0
	Female	36	45.0
Age (years)	18–25	20	25.0
	26–35	13	16.3
	36–45	25	31.3
	46+	22	27.5
Designation	Technician	8	10.0
	Attendant	12	15.0
	Guard	18	22.5
	Cleaner	24	30.0
	Other	18	22.5
Education Level	No Education	11	13.8
	Primary	30	37.5
	Secondary	22	27.5
	Intermediate	9	11.3
	Graduate	8	10.0
Years of Experience	<1 year	16	20.0
	1–3 years	28	35.0
	4–6 years	11	13.8
	>6 years	25	31.3

More than half of the participants (53.8%) had heard of speech and language disorders, while 42.5% reported no awareness. Most (60.0%) recognized that people may have difficulty speaking clearly. A high proportion (85.0%) correctly identified the role of speech therapists, and 57.5% acknowledged a link between hearing and speech problems.

Regarding misconceptions, 41.3% believed late talking is always serious, while 33.8% were unsure. Most participants (72.5%) agreed that early intervention is beneficial. However, only 45.0% were aware that speech therapy helps adults. Overall, 68.8% had encountered a person with speech and language disorders.

Table 2: Awareness of Speech and Language Disorders Among Study Participants

Variable	Yes n (%)	No n (%)	Not sure n (%)
Heard of speech and language disorders	43 (53.8)	34 (42.5)	3 (3.8)
Difficulty speaking clearly exists	48 (60.0)	21 (26.3)	11 (13.8)
Awareness of speech therapist role	68 (85.0)	4 (5.0)	8 (10.0)
Knowledge of hearing–speech link	46 (57.5)	12 (15.0)	22 (27.5)
Belief that late talking is always serious	33 (41.3)	20 (25.0)	27 (33.8)
Awareness that early intervention helps	58 (72.5)	11 (13.8)	11 (13.8)
Awareness that therapy helps adults	36 (45.0)	15 (18.8)	29 (36.3)
Ever seen a person with SLD	55 (68.8)	24 (30.0)	1 (1.3)

Most participants (53.8%) agreed that speech problems are common. Regarding attitudes, a large majority (82.5%) felt it is important to help individuals with speech difficulties. However, 60.0% believed that only doctors can manage speech problems. Most participants (65.0%) agreed that staff patience improves communication, while 43.8% attributed speech problems to poor parenting.

In terms of experience, 72.5% had seen a person with speech and language disorders, but only 31.3% had interacted with a speech-language therapist. Less than half (45.0%) reported awareness activities in their workplace. A majority expressed interest in learning more (76.3%) and willingness to attend training sessions (77.5%).

Table 3: Perceptions, Attitudes, Experience, and Exposure of Participants Regarding Speech and Language Disorders (N = 80)

Variable	Agree n (%)	Neutral n (%)	Disagree n (%)
Speech problems are common	43 (53.8)	22 (27.5)	15 (18.8)
Importance of helping individuals with speech difficulties	66 (82.5)	13 (16.3)	1 (1.3)
Only doctors can manage speech problems	48 (60.0)	22 (27.5)	10 (12.5)
Staff patience improves communication	52 (65.0)	23 (28.8)	5 (6.3)
Poor parenting causes speech problems	35 (43.8)	26 (32.5)	19 (23.8)
Seen a person with SLD	58 (72.5)	—	22 (27.5)
Interacted with speech-language therapist	25 (31.3)	—	55 (68.8)
Workplace awareness activities available	36 (45.0)	17 (21.3)	27 (33.8)
Want to learn more about SLDs	61 (76.3)	—	19 (23.8)
Willing to attend training sessions	62 (77.5)	9 (11.3)	9 (11.3)

DISCUSSION

The present study identified a moderate level of awareness regarding SLDs among support and auxiliary healthcare staff; however, important knowledge gaps and misconceptions were evident. Although more than half of the participants (53.8%) had heard of SLDs and a substantial proportion (68.8%) had encountered affected individuals, overall understanding remained inconsistent. Similar gaps in awareness among non-clinical healthcare staff have been reported in previous studies, highlighting the lack of structured training and formal education in communication disorders within healthcare systems [9,10].

In this study, awareness of the professional role of speech-language therapists was relatively high (85.0%), and most participants recognized that early intervention is beneficial (72.5%). However, only 31.3% had interacted with a speech-language therapist, indicating limited professional exposure. This limited interaction may contribute to incomplete understanding of referral pathways and service delivery. Similar findings have been reported in studies emphasizing that lack of interprofessional contact reduces awareness of allied health roles and delays appropriate referrals [11,12].

Misconceptions were also evident. A notable proportion of participants believed that late talking always indicates a serious problem (41.3%) and that poor parenting is a cause of speech difficulties (43.8%). These findings reflect persistent cultural beliefs and limited awareness regarding the multifactorial nature of speech and language disorders. Comparable misconceptions have been documented in other low-resource and non-specialist populations, where lack of awareness contributes to stigma and delayed intervention [13,14].

Despite these gaps, the study demonstrated a generally positive attitude among participants. Most respondents expressed willingness to help individuals with speech difficulties (82.5%) and showed interest in attending training sessions

(77.5%). This readiness suggests strong potential for improvement through targeted educational interventions. Evidence indicates that short, structured, and workplace-based training programs can significantly improve knowledge and confidence among healthcare support staff [15].

System-level limitations were also identified, including low interaction with speech-language therapists (31.3%) and limited workplace awareness activities (45.0%). These findings suggest inadequate institutional emphasis on communication disability awareness. Strengthening interprofessional collaboration and integrating communication-focused training into routine staff development programs may enhance early identification and referral practices. Previous studies highlight that inclusive workplace policies and multidisciplinary engagement improve patient outcomes and service quality [16]. Overall, while attitudes toward individuals with SLDs were positive, knowledge and exposure remained limited. A multifaceted approach involving structured training, increased interprofessional collaboration, and institutional awareness programs is required to bridge these gaps and improve the role of support and auxiliary staff in facilitating effective communication care.

Future efforts should focus on co-designed training programs for speech-language pathologists and auxiliary staff to address knowledge gaps, including referral pathways and early warning signs. Studies should also assess the impact of visual aids and assistive tools on staff awareness and communication. Interprofessional workshops may enhance collaboration among healthcare workers. Long-term studies are needed to evaluate whether such interventions improve referral practices and service use over time.

CONCLUSION

This study highlights important gaps in awareness and understanding of speech and language disorders among support and auxiliary healthcare staff, particularly regarding referral pathways and common misconceptions. Despite these gaps, the

generally positive attitudes and strong willingness to learn indicate good potential for improvement. Targeted training, interprofessional education, and institutional support can strengthen staff competence, improve referral practices, and enhance early identification and intervention. Strengthening inclusive communication policies and integrating supportive tools within healthcare settings may further improve patient care and reduce stigma associated with speech and language disorders.

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Author's Contribution

AA: Concept & design, data collection, statistical analysis, interpretation of results, manuscript writing and editing, and final approval of the manuscript and responsible for integrity of research.

AR: Supervision, review and final approval of manuscript

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ORIGINAL ARTICLE

PATTERNS, RISKS, AND THE KNOWLEDGE PARADOX OF SELF-MEDICATION WITH PAINKILLERS AND SLEEP DRUGS AMONG UNIVERSITY HOSTEL STUDENTS IN PAKISTAN

Mouizza Ahmad¹, Rahal Warda¹, Wajid Ullah Khan^{1*}, Khadija Bibi¹, Hina Khan¹,
Syeda Shahnoor Zainab¹, Naeem Ur Rehman¹

ABSTRACT

Objectives: This study aims to assess the patterns, risks, and the knowledge paradox of self-medication with painkillers and sleep drugs among university hostel students in Pakistan.

Methods: This cross-sectional study was conducted among hostel students of Gomal University, Dera Ismail Khan, Pakistan, from February to March 2026. Data were collected using a structured, self-administered questionnaire on self-medication practices, non-steroidal anti-inflammatory drug (NSAIDs) use on an empty stomach, knowledge of NSAIDs-related problems, and future self-medication intentions. Associations between categorical variables were analyzed using chi-square and Fisher-Freeman-Halton Exact tests in statistical packages for social sciences (SPSS) version 27.

Results: The prevalence of self-medication was 65.3%, with NSAIDs being the most commonly used drugs (89.4%). A significant gender disparity was observed, with males using nearly four times more sleep medications than females (12.5% vs. 3.3%, $p = 0.035$). Also, a knowledge paradox revealed showing that medical students had significantly higher awareness of NSAIDs risks than non-medical students (60.9% vs. 30.8%, $p = 0.008$), yet this knowledge was associated with stronger intentions to self-medicate in the future (47.6% vs. 13.6%, $p < 0.001$, $\phi = 0.32$). Additionally, 28.8% of NSAIDs users were taking these medications on an empty stomach.

Conclusion: Self-medication is common among hostel students, with males using sleep medications more than females. The knowledge paradox suggests that simply teaching students about drug risks is not enough to change behavior. We need to address overconfidence bias and improve healthcare access. We also need to target the unique vulnerabilities of students living on their own.

Keywords: Self Medication; Anti-Inflammatory Agents; Non-Steroidal; Hypnotics and Sedatives; Health Knowledge; Attitudes; Practice; Students; Universities; Pakistan

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¹ Faculty of Pharmacy Gomal University, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan

*Corresponding Author: Faculty of Pharmacy Gomal University, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. Email: wajidullah2004@gmail.com

INTRODUCTION

Self-medication is defined as the use of pharmaceutical products to manage self-diagnosed conditions without consulting a professional healthcare. It is a growing global health concern [1]. Although, it is acceptable for minor and temporary ailments, but taking medicine without supervision carries well-documented risks, such as adverse drug reactions, drug interactions, masking of serious diseases, and delay in appropriate care [2,3].

The risk of self-medication is particularly high in university students because of different factors like living away from home, facing academic pressures, and having easy access to over-the-counter (OTC) medications. All these factors create a suitable and conducive environment for unsupervised drug use [2]. According to a systematic review and meta-analysis, approximately 70% of university students are engaged in self-medication globally [3]. Interestingly, medical students reported higher rates of self-medication than their non-medical peers [3,4]. Analgesics and antipyretics were listed as most commonly self-administered drugs, used for headaches and minor illnesses [3,4].

A similar picture emerges in Pakistan. A study conducted in Lahore shows that academic stress, time constraints, easy access to pharmacies, and prior medication knowledge are the key factors that encourage students to treat themselves rather than consulting a doctor [5]. A recent cross-sectional study conducted in Pakistani universities found that 64.9% of medical and non-medical students were treating themselves. The primary contributors were advice from their peers and access to pharmacies [6]. Among medical students specifically, 68.5% reported self-medicating with analgesics [6].

However, several important questions remain unanswered. Despite the growing literature on self-medication in Pakistani universities, research on hostel residents is limited. The hostel residents face a qualitatively different set of circumstances compared to students who live at home. Separated from family oversight, they tend to rely on peers for health advice, skip meals irregularly, and often have

no quick or affordable way to see a doctor when they fall ill. A day scholar who develops a headache or cannot sleep can consult a parent or family physician the same evening; a hostel student in the same situation is far more likely to reach for whatever medication is available in the room. Shared living spaces also mean that medications circulate informally between students, which adds another layer of risk that is simply absent in home-dwelling populations. For these reasons, findings from broader university-based studies cannot be straightforwardly applied to hostel students, who represent a subgroup with their own vulnerabilities, behaviors, and exposure to unsupervised drug use [7-11].

Therefore, this study aimed to assess the prevalence, patterns, and determinants of self-medication with painkillers, sleeping pills, and stress-relief medications among medical and non-medical hostel students at Gomal University, Dera Ismail Khan, Pakistan. We put a particular focus on examining the relationship between pharmacological knowledge and self-medication intentions, with the aim of exploring whether greater knowledge is associated with higher rates of intended self-medication rather than safer practices. It is a paradox that would have important implications for medical education and health policy, if confirmed by future longitudinal research.

METHODOLOGY

This cross-sectional questionnaire-based study was conducted among hostel students of Gomal University, Dera Ismail Khan, Pakistan. The study evaluated the pattern of self-medication with painkillers (NSAIDs) and sleep medicines in both male and female hostels. Students of both medical and non-medical disciplines are present in these hostels. Data were collected from 20 February 2026 to 22 March 2026 over a period of one month. Participation was open to all hostel residents at Gomal University. The study included only those students who gave informed consent and filled the questionnaire. Written informed consent was obtained from all eligible participants prior to data collection. Participation was entirely voluntary, and

students were free to withdraw at any time without consequence.

This study used a structured, self-administered questionnaire specifically designed for this study to collect data from participants. The questionnaire was developed in Google Forms and also print copies were available for students who did not have access to a reliable internet connection. It was reviewed by two faculty members for content validity, and a preliminary version was tested on a small group of students before finalizing. Items that yielded inconsistent responses during this pre-testing phase were revised or removed. The following questions were asked from participants in the questionnaire; Demographics (gender, field of study), self-medication practices (types of medications used, frequency, duration), NSAIDs use on an empty stomach, self-reported gastrointestinal side effects, knowledge of NSAIDs-related problems, and future intentions to self-medicate. NSAIDs included commonly available over the counter analgesics such as ibuprofen, diclofenac, and mefenamic acid. Sleep medications referred to any self-administered sedative, hypnotic, or anxiolytic drugs used to aid sleep, including antihistamines with sedative properties such as diphenhydramine, as well as benzodiazepines.

The sample size was calculated using the formula: $n = Z^2 \times p \times q / d^2$, with $Z = 1.96$ (95% confidence level), $p =$ expected prevalence of self-medication (0.685 based on [6]), $q = 1-p$, and $d = 0.05$ (5% margin of error). The total number of students at hostels of Gomal University is approximately 2,000. After applying the finite population correction, a sample of 285 participants was required. To account for non-response an additional 10% was added which gave a target of 314. The achieved sample ($n = 202$) was lower than the calculated target ($n = 314$), mainly because data collection coincided with university examinations, which reduced student availability. A post hoc calculation showed that with $n = 202$ and an observed prevalence of 65.3%, the margin of error

at 95% confidence level is approximately $\pm 6.6\%$, compared to the planned $\pm 5\%$. This modest reduction in precision is acknowledged as a limitation and discussed further in the Limitations section.

Students were selected using stratified random sampling technique combined with systematic sampling. The male and female hostels were divided into four wings. Within each wing, rooms were selected systematically at a fixed interval of every third room. The starting room in each wing was chosen randomly (could be room number 1, 2, or 3). All eligible students in the selected rooms were invited to participate. However, since participation was voluntary, only those who completed the questionnaire were included in the final analysis.

Data were collected using a structured, self-administered questionnaire. The questionnaire was developed in Google Forms and was also printed as hard copies for students who did not have reliable internet access. A simple non-technical language was used in the questionnaire to ensure understanding by non-medical students. The questionnaire asked students whether they had taken any painkillers (NSAIDs) or sleep medications without a doctor's prescription during the one-month period preceding the survey.

The final version of the questionnaire included information on: gender, field of study (medical or non-medical), self-medication practices (types of medications used, frequency, duration), use of NSAIDs on an empty stomach, self-reported gastrointestinal side effects (burning sensation, acidity, black stools or vomiting), knowledge of NSAIDs-related problems, and future intentions to self-medicate. Several questions that were tested during the development phase were excluded from the final analysis because their responses were inconsistent.

To maintain anonymity, personal information (such as names or registration numbers) of students was

not collected. In hostels where hard copies were distributed, questionnaires were placed in sealed envelopes. Since up to three students shared a room, individual responses could not be traced back to a specific student, which ensured complete confidentiality.

Statistical Analysis

Data were exported from Google Forms and analyzed using statistical packages for social sciences (SPSS) version 27. Descriptive statistics including frequencies and percentages were calculated for all variables. Association between categorical variables was assessed using the Pearson chi-square test of independence. For comparisons involving small expected cell frequencies (less than 5), the Fisher-Freeman-Halton Exact Test was applied. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 202 hostel students participated in this study. Of these, 80 (39.6%) were male and 122 (60.4%) were female. The majority of participants were medical students ($n=172$, 85.1%), while 30 (14.9%) were from non-medical fields. Overall, 132 students (65.3%) reported taking at least one medication without a prescription during the one month preceding the survey. Of those using medication ($n=132$), NSAIDs were the most regularly used with 118 (89.4%) students reporting their use. Sleep medications were used only by 14 students (10.6% of the medication users). These results revealed that NSAIDs were the most prevalent medication in this cohort. Table 1 shows participant demographic characteristics and medication use prevalence.

Table 1. Participant demographic characteristics and medication use prevalence

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	80	39.6
	Female	122	60.4
Field of Study	Medical	172	85.1
	Non-Medical	30	14.9
Medication Use	Using Medications	132	65.3
	Not Using Medications	70	34.7
Total		202	100.0

Values are expressed as frequency (n) and percentage (%)

Among 132 self-medicated students, the use of sleep medication was infrequent. Only 14 medication users reported using sleep medications. Among these, 57.1% ($n=8$) used them once, 28.6% ($n=4$) used them 2–3 times, and 14.3% ($n=2$) used them weekly or more frequently. The majority $n=116$ (87.9% of self-medicated students) reported no sleep medication use. This pattern indicates that use of sleep medication is less common in this student population, and mostly they are used occasionally not regularly.

The patterns of painkiller use varied. Among the 132 self-medicating students, 50 (37.9%) used NSAIDs 2–3 times per month, 48 (36.4%) used them once, 14 (10.6%) used them weekly or more, and 4 (3.0%) used them daily. Sixteen students (12.1%) reported no NSAIDs use. Overall, 83.1% of NSAIDs users (98/118) were taking them on an occasional basis (once to 2–3 times per month), which shows episodic use of these medications rather than chronic pain management.

Regarding duration, most students (n=82, 62.1%) used NSAIDs for 1–2 days, which suggests self-management of acute pain. A smaller proportion

used them for 3–5 days (n=14, 10.6%) or more than 5 days (n=20, 15.2%). Table 2 shows patterns of medication use by their types and frequency.

Table 2. Patterns of medication use - types and frequency

Medication Use Pattern	Category	Frequency (n)	Percentage (%)
Medication Type	NSAID*	118	89.4
	Sleep Medications	14	10.6
Sleep Medication Frequency	Once	8	6.06
	2-3 times	4	3.03
	Weekly or more	2	1.5
	No sleep medication use	118	89.39
NSAID Usage Frequency	Once	48	36.4
	2-3 times	50	37.9
	Weekly or more	14	10.6
	Daily	4	3.0
	No NSAID use	16	12.1
Duration of NSAID Use	1-2 days	82	62.1
	3-5 days	14	10.6
	More than 5 days	20	15.2
	No painkiller use	16	12.1

NSAIDs*= non-steroidal anti-inflammatory drug, N = 132 (self-medicated students)

A chi-square test revealed a statistically significant association between gender and the type of medication used ($\chi^2 = 6.726$, $df = 2$, $p = 0.035$). Use of sleep medications among male participants were nearly four times more than females (12.5% vs. 3.3%). Among the 14 sleep medication users, 10

(71.4%) were male and 4 (28.6%) were female. NSAIDs use was reported by 52.5% of males and 62.3% of females. The proportion of students reporting no medication use was similar between males (35.0%) and females (34.4%). Table 3 shows gender distribution by medication type.

Table 3. Gender distribution by medication type (N=202)

Medication Type	Male n (%)	Female n (%)	p-value	Total n (%)
NSAID	42 (52.5)	76 (62.3)	0.035	118 (58.4)
Sleep	10 (12.5)	4 (3.3)		14 (6.9)
No Medication	28 (35.0)	42 (34.4)		70 (34.7)
Total	80 (39.6)	122 (60.4)		202 (100.0)

Among the 132 self-medicating students, 84 (63.6%) reported never taking NSAIDs on an empty stomach. However, 18 (13.6%) students reported that sometimes they did so. Sixteen students (12.1%) reported that they often take NSAIDs on empty stomach. Overall, 28.8% (n=34/118) of NSAIDs users engaged in this risky behavior.

Two cross-tabulation analyses examined the relationships between field of study, knowledge of NSAIDs related problems, and intentions for future self-medication. Medical students showed significantly higher awareness of NSAIDs-related problems compared to non-medical students (60.9% vs. 30.8%, $p = 0.008$). However, this knowledge did not ensure safer medication practices. Paradoxically, medical students

possessing more knowledge about the risks of NSAIDs showed high intentions of self-medication in future. About 48% of them said yes, compared to only 14% of those without that knowledge (47.6% vs. 13.6%, $p < 0.001$), which is a big difference of 34 percentage points. The effect size was medium ($\phi = 0.32$). Table 4 shows the full breakdown.

This paradoxical finding shows that knowledge alone is not sufficient to change health behavior. We also need to address its root causes such as, overconfidence bias among medical students, which feel them capable of diagnosing themselves. Barriers in easy access to healthcare system may push students to use their own knowledge rather than seeking professional help.

Table 4. Knowledge of NSAIDs problems and future self-medication intentions: analysis summary and effect sizes

Analysis Type	Statistical Test	Result	p-value
Field of Study vs. Knowledge of NSAID Problems	Fisher-Freeman-Halton Exact Test	Medical: 60.9% (78/128), non-medical: 30.8% (8/26)	0.008
Knowledge of NSAID Problems vs. Future Self-Medication Intentions	Pearson Chi-Square test	With Knowledge: 47.6% (40/84), Without Knowledge: 13.6% (6/44)	<0.001

Note. N=154 valid cases (Field vs. Knowledge), N=152 valid cases (Knowledge vs. Self-Medication). Fisher-Freeman-Halton Exact Test is appropriate due to expected cell frequencies <5. ϕ = Phi coefficient (effect size for categorical variables).

DISCUSSION

Our initial hypothesis that greater pharmacological knowledge among medical students would be associated with higher rates of intended self-medication rather than safer practices was supported by the data. Medical students showed significantly higher awareness of NSAIDs-related risks (60.9% vs. 30.8% in non-medical students, $p = 0.008$). Despite higher knowledge, they showed 3.5 times greater intentions to self-medicate in the future (47.6% vs. 13.6%, $p < 0.001$).

The 65.3% prevalence of self-medication documented in this study is backed by previous Pakistani research. A previous study conducted among University Students in Lahore, documented a 64.9% prevalence of self-medication among medical and non-medical students [6, 12, 13], while the global prevalence among university students is approximately 70.1% [4]. These consistent figures show that self-medication is a common habit among students throughout the world. Similar findings have been reported in other Pakistani studies. A study conducted among pharmacy students in Karachi by Anjum et al. found high self-medication rates, suggesting that this behavior is not limited to medical institutions [14]. A recent systematic review covering Pakistani studies confirmed that analgesics are consistently the most self-administered drug class across student populations [15]. Rehman et al. similarly noted that overconfidence in self-diagnosis is a major driver among medical students, which aligns with the knowledge-behaviour discrepancy we observed [16].

However, in our study, the use of NSAIDs was 89.4% (among those who self-medicated) that is much higher than the 68.5% reported in a study conducted at Superior University [6]. This difference might be because our study specifically focuses on hostel students, which are more vulnerable, as they have limited access to timely medical care. Similar high rates of self-medication with analgesics have been reported in other international studies, such as 95.4% among university students in Nepal [7] and 40.8% in

Portugal [8].

A notable finding of this study was a significant gender disparity in sleep medication use. Prevalence of self-medication was four times higher in males than females (12.5% vs. 3.3%, $p = 0.035$). Male participants comprised 71.4% of all sleep medication users. This finding is particularly interesting if we look at the overall prevalence of sleep medication use in our study (10.6% among medication users), which is comparable to the global average of 13.1% reported among university students [9]. Several factors may explain this gender disparity. First, cultural norms around masculinity and mental health may make male students less likely to seek professional help for sleep difficulties. Second, female students often have stronger social support and coping strategies, which may reduce their reliance on sleep medication. Third, it is also possible that male students experience higher academic or social stress, though this needs more research. It is important to note that gender differences in self-medication vary depending on the institution and culture. For example, a study among nursing students found that self-medication was most common among female nursing students than males because they felt it was harder to see a doctor [10].

The most striking finding of this study was the knowledge-behaviour discrepancy: medical students understood NSAIDs risks far better than non-medical students (60.9% vs. 30.8%), yet that knowledge didn't lead to safer practices. On the contrary, they were 3.5 times more likely to plan future self-medication than those without knowledge (47.6% vs. 13.6%). This paradoxical finding directly challenges the assumption that health education alone is enough to promote rational medication use. Similarly, another study also reported a high prevalence of self-medication among medical students (65.3%) compared to non-medical students (35.9%) [11]. This suggests that rather than preventing, pharmacological knowledge may increase self-medication. Similarly, a study found that 83% of medical and pharmacy students self-medicated during the COVID-19 pandemic,

which is a remarkably high rate despite their advanced training [12]. This discrepancy can be explained through several ways. First, overconfidence bias may lead medical students to overestimate their diagnostic abilities, which makes them feel qualified enough to treat themselves without professional consultation [17]. Second, students may know the risks but barriers like lack of time, financial constraints or just finding it a hassle make them treat themselves instead of seeing a doctor [18]. Third, past success with self-medication may be associated with a higher likelihood of repeating the behavior. Over time, knowledge may become associated with justification of self-medication rather than safer practices. These findings have important implications for medical education, such as simply teaching the drug side effects to students is not enough, instead curricula should also address the cognitive biases, that may lead students to believe that they are immune to those same risks. Training should emphasize the importance of seeking professional help despite one's own knowledge.

A concerning finding was that 28.8% of NSAIDs users reported taking these medications on an empty stomach. This practice can significantly increase the risk of gastrointestinal irritation, bleeding, and ulceration [19]. This finding is consistent with Ahmad et al., who reported that despite very high awareness of drug side effects among nursing students (97.8%), unsafe medication practices still persisted [10]. A similar pattern was also noted by Yasmin et al., where medical and pharmacy students showed high self-medication rates despite their clinical training [20]. This knowledge-practice gap reinforces the knowledge-behavior discrepancy observed in this study. It suggests that awareness of risks and giving information about risks isn't enough. Interventions are also needed to address the behaviors and circumstances that drive unsafe practices.

Our study has several strengths. First, it specifically focused on hostel students which is a unique vulnerable subgroup that has received limited attention in Pakistan's self-medication research.

Second, the study not only examined the prevalence of self-medication but also examined risky behaviors (like taking NSAIDs on an empty stomach) and the relation of knowledge to future intentions. That's how we uncovered the knowledge paradox. Third, the inclusion of both medical and non-medical students enabled direct comparison of knowledge and behavior between these groups.

Several limitations must be acknowledged. First, the final sample size was smaller than the calculated target due to lower-than-expected participation. This limits the statistical power and generalizability of the findings. Second, the cross-sectional design precludes causal inferences; we can identify associations but cannot determine causality. Third, data were self-reported, which introduces the possibility of recall bias (students may not accurately remember their medication use) and social desirability bias (students may underreport behaviors they know are unsafe). Fourth, most of our participants were medical students (85.1%), which simply reflects the fact that Gomal University hostels have more medical students. However, this limits the generalizability of our findings to non-medical student populations. Fifth, since the study was conducted at a single university, so its findings may not be representative of hostel students at other institutions in Pakistan. Finally, another study found that pharmacy students who knew more about drug risks were less likely to self-medicate, which opposes our knowledge paradox finding [13]. This difference highlights that the association between knowledge and self-medication is not uniform across healthcare programs and warrants further investigation.

The findings of this study have several implications for policy and practice. Universities should make on-campus health services which are affordable and easy to access. They should also focus on sleep and stress related issues especially for male students, since they're more likely to self-medicate with sleep aids. For medical schools, simply teaching about drug risks isn't enough. They also need to tackle the overconfidence that pushes students to treat themselves. Finally, pharmacies should reconsider

how easily NSAIDs and sleep medications are sold without a prescription. These drugs may seem harmless, but taking them without medical guidance such as on an empty stomach can cause serious side effects.

CONCLUSION

This study found a high prevalence of self-medication among hostel students at Gomal University, with NSAIDs being the most commonly used drugs. A significant gender disparity was observed, showing that male students took sleep medications nearly four times more often than female students. Most importantly, we found a knowledge-behaviour discrepancy about medical students having greater awareness of NSAIDs risks, yet they were showing more intentions of self-medication in the future. This finding suggests that health education alone is insufficient to promote safe medication practices. Interventions must address overconfidence bias, improve healthcare access, and target the unique vulnerabilities of hostel-dwelling students. Without such measures, the gap between knowledge and safe practice will likely continue.

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Authors' Contribution:

MA, RW: Substantial contributions to the conception of the work; and the acquisition of data for the work;

WUK: Substantial contributions to the conception of the work; and the acquisition of data for the work;

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

KB, HK: Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

SSZ, NUR: Analysis and interpretation of data for the work; drafting the work and revising it critically for important intellectual content; final approval of the version to be published

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ORIGINAL ARTICLE

PREVALENCE OF OSTEOPOROSIS AND OSTEOPENIA IN PATIENTS PRESENTING WITH BODY ACHES AND PAINS PREVIOUSLY TREATED AS A CASE OF DEPRESSIVE ILLNESS

Nafid Ullah Khan¹ Tahir Ullah Khan^{2*}, Wajid Ullah Khan³, Mohib Ullah Khan⁴, Naeem Ur Rehman³, Syeda Shahnnor Zainab³, Hina Khan³, Ahmad Yar³

ABSTRACT

Objective: To determine the prevalence of osteoporosis and osteopenia in patients presenting with body aches and pains who had been previously treated for depressive illness.

Methods: In this cross-sectional study, 144 consecutive patients referred for Dual-energy X-ray Absorptiometry (DXA) due to unexplained musculoskeletal pain were analyzed. Patients were stratified into two diagnostic groups per ISCD guidelines: Group A were comprised of pre-menopausal women and men aged less than 50 years, where osteoporosis was defined as a bone mineral density (BMD) Z-score ≤ -2.0 . Group B includes post-menopausal women and men aged ≥ 50 years, where the standard T-score ≤ -2.5 was applied. Osteopenia was defined as a BMD between -1.0 and the diagnostic threshold for osteoporosis in each group.

Results: A total of 144 patients were enrolled: 68 aged 30–49 years (Group A) and 76 aged 50–80 years (Group B). Both groups were predominantly female (94.1% and 92.1%, respectively). Normal BMD was observed in 44.1% of Group A versus 31.6% of Group B. Osteopenia prevalence was similar between groups (44.1% vs. 42.1%). However, osteoporosis was markedly higher in Group B (26.3%) compared to Group A (11.8%).

Conclusion: A significant proportion of patients presenting with body aches and pains previously treated for depression have underlying osteopenia or osteoporosis. These findings underscore the importance of considering bone health assessment in depressive patients, even in younger and pre-menopausal population, to prevent underdiagnosis and future fracture risk.

Keywords: Osteoporosis, Osteopenia, Depressive Disorder, Musculoskeletal Pain, Bone Density.

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¹ Medicine, Medical Teaching Institution Bannu

² Endocrinology, Medical Teaching Institution Bannu

³ Faculty of Pharmacy, Gomal Univeristy Dera Ismail Khan

⁴ 1st year PG internal medicine, Medical Teaching Institution Bannu

*Corresponding Author:

Endocrinology, Medical Teaching Institution Bannu. Email: Tahirnurar@yahoo.com

INTRODUCTION

Osteoporosis is a systemic bone disease characterized by decreased bone mass and disruption of bone microarchitecture followed by increased tendency of bone fractures. Key ranges for bone mineral density as per WHO standards are: normal (-1 or higher), osteopenia (-1 to -2.5) and osteoporosis (-2.5 or lower).

Osteoporosis poses major health risks, including disabilities and deaths. Most commonly affected individuals are post-menopausal women, mainly because of hormonal changes. In 2021, over 450000 deaths were attributed to Osteoporosis worldwide [1]. But projections show, that 50 percent of all the osteoporotic fractures in 2050 worldwide will happen in Asia. Possible causes are sedentary lifestyle, genetic predisposition and lack of balanced diet including insufficient intake of Vitamin D and calcium [2].

The mechanism of Osteoporosis is well understood, where increased turnover through Osteoclasts leads to low bone mass density. Primary Osteoporosis, responsible for 95 percent of all cases, is mainly found in postmenopausal women. While secondary osteoporosis can be attributed to immobilization, endocrine conditions (such as hypercortisolism), and iatrogenic causes like chronic corticosteroid use.

Only manifest osteoporosis presents with osteoporotic fractures, mainly in vertebra and as femoral neck fractures. Rest of the times, this condition progresses either asymptotically or presents nonspecifically with body aches. The aim of the study was to evaluate prevalence of osteoporosis and osteopenia in such patients, presenting with such nonspecific symptoms.

Osteoporosis and osteopenia can be diagnosed by calculating bone mass density through DXA scans. It works by a simple but elegant mechanism. Basic principle of DXA scan is that it uses two x ray beams of different energy levels (low energy x ray beam, high energy x ray beam) in order to differentiate between soft tissue and bone. These beams pass

through bones and soft tissues where bone absorbs more beams than the soft tissue. Soft tissue absorption is subtracted out leaving behind bone absorption only, a phenomenon called as differential absorption. A detector is at work which measures how much of each beam emerges after passing through the body. Then by using two energy levels, the system calculates bone mineral content and bone area and finally BMD is calculated by dividing Bone mineral content over bone area and translating it to T-Score (comparison with a young healthy adult) and Z-Score (compared to age and gender peers). Early detection of osteoporosis and osteopenia is important to avoid osteoporotic fractures, related complications and eventually osteoporosis related deaths [3,4].

A significant number of osteoporotic patients remain undiagnosed and sometimes it may be wrongly attributed to conditions like depression, particularly in older age population complaining of chronic pain and fatigue. These symptoms closely mimic depressive disorders, resulting not only in delayed evaluation of bone health but also significant lapse in early treatment initiation. This clinical overlap between osteoporosis and chronic pain or depression is significant in terms of future research. To make this clinical overlap more complicated, depression in itself is associated with lower bone mineral density through hormonal, behavioral, and inflammatory pathways. This overlap signifies the importance of maintaining a high index of suspicion for osteoporosis in at-risk patients presenting with depressive features [5].

Osteoporosis primarily affects old age population and postmenopausal women because of combination of factors like imbalance in bone remodeling, reduced calcium and vitamin D metabolism, decline in metabolic hormones (IGF1, Growth hormone, estrogen, testosterone), reduction in physical activity and contribution from drugs (steroids) and other comorbidities [3,4].

In low-income population like in Bannu, symptoms related to osteoporosis can be easily misinterpreted for other conditions like depressive illness because

of limited resources and facilities in this particular area of interest. There is a clear research gap in southern KPK about osteoporosis which needs to be explored. Our study shows prevalence of osteoporosis in such patients, facilitating future studies and trials in order to decrease the prevalence of osteoporosis, osteopenia and related complications.

METHODOLOGY

This retrospective, cross-sectional study was conducted at Department of Rheumatology and metabolic disease at DHQ hospital Bannu over a period of 4 months from September 10, 2025 till January 10, 2026. Patient initial clinical evaluation took place at the hospital OPD from where they were referred by the attending Physician to the laboratory of the Binor Cancer Hospital, Bannu for performing Dual-energy X-ray absorptiometry (DXA) scans. Our study included 144 consecutive adult patients of age 30 or greater, who visit the hospital OPD during our study duration complaining about body aches and pains, and had a documented diagnosis of depressive illness made by attending physician based on DSM 5 criteria. It was confirmed by review of outpatient medical records, and had received ongoing or past treatment for that depressive illness. Patients who were pre-diagnosed of Osteoporosis, Osteopenia, Osteomalacia, Paget's disease of bone, or any other bone disease or history of pathological fractures were excluded from the study. Also, Patients suffering from chronic kidney disease, primary hyperparathyroidism, uncontrolled hyperthyroidism or those patients who have used chronically medications which affects bone metabolism such as corticosteroids, antiepileptics, proton pump inhibitors at high dose were excluded from our study.

Data were collected through face-to-face interviews and review of medical records. The body mineral density results were classified by age and menopausal status in accordance with the International Society for Clinical Densitometry (ISCD) guidelines:

Group A (Pre-menopausal women and men aged <50 years): In this group BMD was expressed as a Z-score, which compared BMD of an individual to the average BMD of same age, sex and ethnicity. Osteoporosis in this group was defined as a Z-score ≤ -2.0 .

Group B (Post-menopausal women and men aged ≥ 50 years): In this group BMD was expressed as a T-score, which compares an individual's BMD to a young healthy individual. Diagnosis was made using the World Health Organization criteria: Normal: T-score ≥ -1.0 , Osteopenia: T-score between -1.0 and -2.5 , Osteoporosis: T-score ≤ -2.5 or lower.

A sample size of 144 patients was taken based on convenience sampling method within the study duration time. Data were analyzed using IBM SPSS version 27. The study protocol was reviewed and granted an exemption from full ethical review by the DHQ Hospital Bannu Ethics Committee, as it involved the anonymized analysis of existing diagnosis records (DXA scans) without any patient intervention.

Results

Participant Characteristics

A total of 144 patients were enrolled, divided into two groups based on age. Group A comprised 68 patients aged 30–49 years, while Group B comprised 76 patients aged 50–80 years. The demographic and clinical characteristics of both groups are presented in Tables 1 and 2.

In Group A, the majority of participants were aged 40–49 years ($n=40$, 58.8%), and most were female ($n=64$, 94.1%). In Group B, the largest proportion fell in the 50–60 years age bracket ($n=52$, 68.4%), with females again predominating ($n=70$, 92.1%).

Table 1: Baseline Characteristics of Group A

Characteristic	Category	Frequency (%)
Age	30–39 years	28 (41.2%)
	40–49 years	40 (58.8%)
Gender	Female	64 (94.1%)
	Male	4 (5.9%)
Bone Health Status	Normal BMD	30 (44.1%)
	Osteopenia	30 (44.1%)
	Osteoporosis	8 (11.8%)

Table 2: Baseline Characteristics of Group B (Age 50–80 Years)

Characteristic	Category	Frequency (%)
Age	50–60 years	52 (68.4%)
	61–70 years	20 (26.3%)
	71–80 years	4 (5.3%)
Gender	Female	70 (92.1%)
	Male	6 (7.9%)
Bone Health Status	Normal BMD	24 (31.6%)
	Osteopenia	32 (42.1%)
	Osteoporosis	20 (26.3%)

Bone Mineral Density Findings

Table 3 compares the bone health status between group A and group B. In Group A, normal BMD was observed in 30 participants (44.1%), osteopenia in 30 (44.1%), and osteoporosis in 8 (11.8%). In Group B, the prevalence of normal BMD was lower at 31.6% (n=24), while osteopenia was observed in 32 participants (42.1%) and osteoporosis in 20 (26.3%). Group B demonstrated a markedly higher prevalence of osteoporosis compared to Group A, whereas the prevalence of osteopenia remained comparable between the two groups.

Table 3: Comparison of Bone Health Status Between Group A and Group B

Bone Health Status	Group A, n=68 Frequency (%)	Group B, n=76 Frequency (%)	p-value	Total N=144 Frequency (%)
Normal BMD	30 (44.1%)	24 (31.6%)	0.066	54 (37.5%)
Osteopenia	30 (44.1%)	32 (42.1%)		62 (43.1%)
Osteoporosis	8 (11.8%)	20 (26.3%)		28 (19.4%)

DISCUSSION

Overall, this study shows high prevalence of reduced bone mass density in patients who were previously labeled and treated as depressive illness. None of the male patients had reduced bone mass density. High prevalence of osteoporosis and osteopenia in female patients can be attributed to limited weight bearing physical activity, reduced opportunities for outdoor exercise inadequate nutrition, and post-menopausal hormonal changes.

Similar findings have been reported from a study conducted at Dow University of Health Sciences, Karachi [7]. This study also showed that female population in Pakistan have high prevalence of low bone mass density in both pre- and post-menopausal groups, although osteoporosis prevalence was higher in post-menopausal group, as in our study, which can be explained by the hormonal changes in such patients. A study in Faisalabad showed the prevalence of osteopenia 56.3 percent in female population aged between 18 and 60 with statistically significant correlation between osteopenia and low socioeconomic status [8]. A study in India demonstrated that overall prevalence of osteopenia and osteoporosis was 49.9 and 18.3 percent respectively [9]. These similar numbers reflect the relatively similar socio-economic conditions and similar demographic changes.

Chronic body aches are one of the symptoms of reduced bone mass density which arises because of high turnover of the bone and microfractures. Such patients can be easily misdiagnosed as depressive illness because of overlapping symptoms. Misdiagnosis can have complications, for example progression of osteopenia to osteoporosis and eventually osteoporotic fractures, which can be the cause of further morbidities. High prevalence of osteopenia can be explained by lack of mobility in female population mainly due to cultural and religious reasons. Lack of access to health care and routine visits, nutritional deficiencies and hormonal changes in female population explain the difference of prevalence in male and female population. Lack of health education and low socioeconomic status

are the other factors responsible for high prevalence of reduced bone mass density in our region. This study shows us the importance of taking low BMD as a differential diagnosis in patients presenting with body aches. It can prevent unnecessary use of anti-depressants, reduces the risk of osteoporotic fractures by detecting low BMD early and can improve quality of life. It also emphasizes early screening of selected patients with DXA scans.

Osteoporosis is a highly prevalent condition particularly in depressed population and most of the time its presentation is vague in the form of body aches and pains and myalgias [10]. Most of the cases remain undiagnosed either because of the unavailability of the DXA scan in the peripheries or it is not often suspected by the treating physician [11]. Majority of the patients (58%) had an age above 40 years with predominant female gender (94%). This gender difference is in accordance with a study conducted in USA where 70-80% female patients had osteoporosis [12,13]. Reason for this gender difference is oestrogen deficiency in post-menopausal state, thin bone structure in female, longer life expectancy, inadequate calcium and vitamin D intake, limited physical activity and high contribution from autoimmune or thyroid related illnesses in female patients [14]. In our study, risk of osteoporosis increased with age which is an established phenomenon in medical literature and reasons are slowing down of bone remodeling process, inadequate physical activity, chronic illnesses and steroid intake, and age-related changes in bone microarchitecture [15]. Whooley, et al reported that patients with major depressive disorder were more prone to fractures as compared to normal population [16]. The probable explanation for this increased prevalence of osteoporotic fractures is hypercortisolism due to over reactivity of the hypothalamic pituitary axis in depressed patients [17]. This in turn causes accelerated bone loss and increased rates of fracture [18]. According to a study in Germany, a significant reduction in BMD was observed at the lumbar spine in a depressed female population. Additionally, there was significant difference between Osteocalcin and crosslaps, the former is a marker of

bone remodelling and the latter is a marker of bone loss. Also, an increase in tumor necrosis factor- α was observed in depressed patients as compared to normal population [19]. In another study, it was identified that osteoporosis has a significant contribution to major depressive disorder. In addition, a co-prevalence of osteoporotic fractures and depressive disorder was identified. Conceptually, the pathophysiologic mechanisms linking osteoporosis and depression consist of behavioral factors like increased use of tobacco or decreased physical activity, biological factors like dysregulation of HPA (Hypothalamic Pituitary axis) or metabolic dysfunction, and iatrogenic factors like effect of anti-depressants on bone mineral density [20]. According to a meta-analysis in Israel, BMD was significantly reduced in depressed patients as compared to nondepressed people. Also, it was noted that association between osteoporosis and depression is more significant in women than men and in premenopausal population; the latter finding was a contradiction to our findings [21]. Patients in the study under discussion were diagnosed by psychiatrists through detailed history and examination rather a questionnaire. Another study examined the co-prevalence of both depression and osteoporosis along with the strong observation that depression adversely affects bone mineral density [22]. A recently conducted study in China observed that low serotonin levels in depressed patients contribute to low bone mineral density in postmenopausal women [23]. Though research studies about osteoporosis do not exist in south KP, but a study from Abbottabad revealed that a substantial proportion of the studied population had a low bone mass [23]. Also, in this study female and older age group people were more affected with osteoporosis.

There are certain limitations of this study. Retrospective cross-sectional design of the study prevents causality between body aches, depressive symptoms and low BMD as body aches could result from multiple unknown factors. Prospective study design will establish this relationship in a more conclusive way. Because the study included patients who had already been referred for DXA due

to unexplained musculoskeletal pain, the sample may have a higher chance of low BMD than the general depressed population, so the prevalence figures should be viewed with some caution and may not directly apply to everyone with depression and body aches. Also, confounders like BMI, vitamin D levels etc. were not addressed. Further studies by using prospective designs, probability sampling and biochemical factors are needed in this regard.

Conclusion

This study highlights a clinically significant burden of reduced bone mineral density among patients diagnosed with depressive illness. The high prevalence of osteopenia and osteoporosis, particularly in older female patients, underscores the need for routine BMD screening using DXA in this population. Incorporating bone health assessment in patients presenting with unexplained body aches can prevent diagnostic delay, reduce unnecessary antidepressant use, and improve patient outcomes.

Conflict of Interest: The authors declare that they have no financial or non-financial conflict of interests to disclose.

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Author's Contribution:

NUK: Contributed to conceptualization, methodology, supervision, validation, and writing of the original draft.

TUK: Contributed to conceptualization, data curation, investigation, methodology, project administration, and writing of the original draft.

WUK: Contributed to data entry, statistical analysis using SPSS software, writing of the Results section, and critical revision of the manuscript for important intellectual content.

MUK & NUR: Contributed to investigation, resources, validation, and critical review of the original draft.

SSZ & HK: Contributed to data collection, data entry, and formal analysis.

AY: Contributed to resource management and procurement necessary for the conduct of the study, approved the final version of the manuscript.

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ORIGINAL ARTICLE

RELATIONSHIP OF EMOTIONAL INTELLIGENCE AND DEMOGRAPHIC CHARACTERISTICS WITH ANNUAL EXAM SCORE IN MEDICAL STUDENTS

Romaisha Shahbaz¹, Sanila Shaikh¹, Rafia Karim¹, Syeda Areeba Hasan¹, Aena Syed¹, Amjad Khan¹, Muhammad Humayun¹, Muhammad Israr¹, Syed Muhammad Zulfiqar Hyder Naqvi^{2*}

ABSTRACT

Objectives: To assess relationship between emotional intelligence and annual exam score in undergraduate medical students, and to determine demographic predictors of annual exam score in undergraduate medical students.

Methods: A cross-sectional study was conducted at Baqai Medical College, Baqai Medical University, Karachi from December, 2024 to August, 2025. Students of second to final year MBBS were included in the study. Data were collected by means of a study questionnaire that contained questions on demographic characteristics, Wong and Law Emotional Intelligence Scale and percentage obtained in the previous examination. Data were analyzed on SPSS version 21.

Results: The mean age of the students was 22.39 ± 1.57 years, 129 (53.5%) of them were male, 75 (31.1%) of the students were in 2nd year MBBS whereas 101 (41.9%) were in 3rd year MBBS while their mean passing percentage in the last examination was 68.24 ± 9.31 . The emotional intelligence of students was not found to be significantly correlated with their annual exam score. Moreover, multivariable analysis showed that gender of student (Male: $B = 0.058$, 95%CI 0.024-0.092, $p=0.001$) and education of father (Intermediate or less: $B = 0.098$, 95% CI 0.016 – 0.180, $p = 0.019$) were significant predictors of their annual exam score.

Conclusion: It was concluded that though the emotional intelligence of students was not significantly correlated with their annual exam score, certain demographic characteristics were indeed significant predictors of their annual exam score.

Keywords: Emotional Intelligence, Annual Exam Score, Demography, Risk Factors, Students, Medical

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¹ MBBS Student, Baqai Medical College, Baqai Medical University

² Community Medicine, Baqai Medical College, Baqai Medical University.

INTRODUCTION

The word 'Emotional Intelligence' was first defined by Peter Salovey and John D Meyer [1]. According to Colman "Emotional intelligence is the key to both personal and professional success; it is the ability to monitor people's emotions, to discriminate between different emotions and label them appropriately and to use emotional information to guide thinking and behavior" [2]. High emotional intelligence involves adjusting emotions to adapt to environments [3]. According to a recently conducted systematic review it may have a protective effect against the emotional burden experienced in some professions [4].

Academic achievement represents the accomplishments by a student in an educational institute, be it a school, college, or university [5]. Academic achievements is valued as an important aspect of student life and future success, and policymakers recognize the significance of social and emotional factors including emotional intelligence, self-awareness and empathy affecting academic achievement. According to a meta-analysis published in 2021, the factors that have the most effect on academic achievement are socio-demographic and individual attributes, teaching methods and educational theories [6]. A recent systematic review reported age, gender, socioeconomic background and parental education as the main factors affecting students' academic performance [7]. All these factors are interconnected and play a vital role in shaping students' psychological growth and future success. By acknowledging the importance of these factors, a supportive learning environment can be created that fosters students' welfare and success [8].

Literature reports that a higher emotional intelligence leads to a better emotional wellbeing which in turn helps generate motivation and devise learning strategies that results in greater academic achievements [9]. Emotionally intelligent students tend to know how to cater their emotions regarding their needs which can be utilized for effective communication, stress management, and increased

resilience [10]. All these qualities in a student can immensely contribute towards academic success.

Though previous research has evaluated this association in management students [11], to the best of investigators' knowledge, relevant local evidence from medical students about this relationship is limited at best [12]. This study was therefore conducted 1) to assess the relationship between emotional intelligence and annual exam score in undergraduate medical students, and 2) to determine the demographic predictors of annual exam score in undergraduate medical students. It was hypothesized that students with higher emotional intelligence would have a better annual exam score than those with lower emotional intelligence, and that certain demographic characteristics of students such as gender and parental education would have a significant association with their annual exam score. The study results are expected to add to the limited local evidence base and aid in devising effective strategies for enhancing the academic achievement of medical students in Pakistani context.

METHODOLOGY

After taking ethical approval, a cross-sectional study was conducted at Baqai Medical College, Baqai Medical University, Karachi from December, 2024 to August, 2025. Students of second to final year studying at Baqai Medical College were included in the study whereas first year students because of not yet appearing in any annual exam and those refusing to provide verbal informed consent were excluded from the study.

Using value of correlation coefficient as 0.30 for medium effect size, with 5% alpha error and 20% beta error, the required sample size was calculated to be 85 respondents by using an online sample size calculator [13]. Against the calculated sample size, a total of 241 students were included in the study using non-probability convenience sampling technique.

The study questionnaire consisted of two sections.

Section A consisted of demographic information and percentage obtained in the previous examination whereas Section B comprised of Wong and Law Emotional Intelligence Scale [14,15]. The Wong and Law Emotional Intelligence Scale is 16 items, 7-point Likert scale that is divided into 4 sub-sections i.e. Self-emotion appraisal, Others' emotion appraisal, Use of emotion and Regulation of emotion. Self-emotion appraisal consisted of question 1-4, Other's emotion appraisal consisted of question 5-8, Regulation of emotion consisted of question 9-12 and Use of Emotion consisted of question 12-16.

The students were given all the relevant information about the study and their verbal informed consent was taken. The questionnaire was then distributed among them and was collected once everyone had filled it.

Ethical approval of the study was taken from Baqai Medical University [Ref: BMU-IREB/12-2024/012/ (FRREC-FM/11-2024/01)]. Moreover, verbal informed consent was taken from all the participants prior to collecting data from them.

Data were entered and analyzed in SPSS version 21. Categorical variables were reported as frequencies and percentages whereas continuous variables were summarized as means and standard deviations. After checking normality using Shapiro Wilk's test, inferential analysis was performed by calculating Spearman's correlation coefficients to check correlation between emotional intelligence and annual exam score. Moreover, a generalized linear model with B coefficients and 95% confidence intervals was also generated to determine association between demographic characteristics and annual exam score. The level of significance was kept at 0.05.

RESULTS

The response rate of the study was 98%. The mean age of the students was 22.39 ± 1.57 years, 129 (53.5%) of them were male, 77 (32.0%) of the fathers had bachelors whereas 101 (41.9%) had

master's education, 61 (25.3%) of the mothers had bachelor's education whereas 70 (29.0%) had master's education, 143 (59.3%) lived in a nuclear family, 75 (31.1%) of the students were in 2nd year MBBS whereas 101 (41.9%) were in 3rd year MBBS while their mean passing percentage in the last examination was 68.24 ± 9.31 (table 1).

Table 1: Baseline Characteristics of Participants

Student Characteristics (n=241)	Mean $\pm$ SD/Count (%)
Age (Years)	22.39 $\pm$ 1.57
Gender	
Male	129 (53.5)
Female	112 (46.5)
Father's Education	
Intermediate or less	44 (18.3)
Bachelors	77 (32.0)
Masters	101 (41.9)
PhD	19 (7.9)
Mother's Education	
Intermediate or less	99 (41.1)
Bachelors	61 (25.3)
Masters	70 (29.0)
PhD	11 (4.6)
Family Type	
Nuclear	143 (59.3)
Joint	98 (40.7)
Study Year	
2 nd	75 (31.1)
3 rd	101 (41.9)
4 th	39 (16.2)
5 th	26 (10.8)
Last Exam Percentage	68.24 $\pm$ 9.31

The correlation analysis between total emotional intelligence score, emotional intelligence subscale scores and annual exam score of students showed that none of them were significantly correlated with annual exam score of students ($p > 0.05$ for all) (table 2).

Table 2: Correlation Analysis between Emotional Intelligence and Annual Exam Score

Emotional Intelligence Scores	Annual Exam Score	
	p	p
Total Emotional Intelligence	-0.040	0.532
Self-Emotion Appraisal	-0.110	0.089
Others Emotion Appraisal	0.087	0.179
Regulation of Emotion	-0.009	0.889
Use of Emotion	-0.100	0.122

The multivariable analysis of association between participant characteristics and their annual exam score showed that gender of student (Male: B=0.058, 95%CI 0.024-0.092, p=0.001) and education of father (Intermediate or less: B=0.098, 95% CI 0.016-0.180, p=0.019) were significant predictors of their annual exam score (table 3).

Table 3: Multivariable analysis of association between Participant Characteristics and Annual Exam Score

Participants Characteristics (n=241)	B	95% CI		p
		Lower	Upper	
Gender				
Male	0.058	0.024	0.092	0.001
Female				Reference
Father Education				
Intermediate or less	0.098	0.016	0.180	0.019
Bachelors	0.054	-0.020	0.129	0.154
Masters	0.034	-0.035	0.103	0.336
PhD				Reference
Mother Education				
Intermediate or less	-0.003	-0.096	0.090	0.950
Bachelors	0.006	-0.087	0.099	0.899
Masters	0.014	-0.074	0.102	0.750
PhD				Reference
Type of Family				
Nuclear	0.017	-0.019	0.052	0.362
Joint				Reference

DISCUSSION

The study results showed that total emotional intelligence score was not significantly correlated

with annual exam score of students. Unlike the study results, previously published literature reports a positive relationship between emotional

intelligence and academic achievement of students [9,12,16-18]. Though not found in this study, it can be argued that students who possess a higher emotional intelligence are better equipped emotionally to successfully meet the academic challenges presented to them and thus fare better academically.

The study results further showed that among the sub scales of emotional intelligence, self-emotion appraisal score was negatively correlated with annual exam score of students, though the correlation was marginally insignificant. Contrary to the study result, two earlier studies reported self-emotion appraisal to be positively associated with academic achievement of students [19,20]. Though not found in this study, students with higher level of emotional awareness may regulate their stress levels more effectively which make them tackle academic challenges with a positive mindset. Moreover, students who have high self-emotion appraisal may have greater understanding of their limitations and thus can use this knowledge to effectively handle them and excel academically.

Moreover, gender of the student being male was a significant predictor of better annual exam score by students. In line with the study results, an earlier study also reported male gender to be significantly associated with better academic performance in medical students [21]. It should be borne in mind though that due to the cultural differences in upbringing of genders and different societal expectations and pressures on them, their academic motivation can vary in different populations.

Interestingly, father's education being intermediate or less was found to be a significant predictor of students' better annual exam score. Though it could be expected that students whose father had a higher educational degree would have fared better in their exam, it is likely that this relation is a complex one and may be influenced by other related factors such as father child interaction, presence of other highly educated members or older siblings in family and the level of self-interest of a student in his or her studies. Nevertheless, further research is needed to draw any meaningful conclusion about this

relationship.

The study results further showed that maternal education was not significantly associated with annual exam score of students. Likewise, an earlier study also reported no significant association between maternal education and academic performance of students [22]. Maternal educations are unlikely to directly influence the performance of children getting higher education nowadays because of the increased availability of external support systems such as group studies and online learning tools. Moreover, as students increasingly grow independent of their parents for academic support in higher education, such a finding was not unexpected.

Moreover, the study results showed that type of family was not a significant predictor of annual exam score of students. The authors recommend further exploration of this finding as due to non-availability of comparable literature, a meaningful comparison could not be made with previous studies.

Limitations

The investigators acknowledge that being a single center study, the study findings have limited generalizability. Moreover, only the percentage obtained in the previous examination was used to assess the annual exam score of students.

CONCLUSION

It was concluded that though the emotional intelligence of students was not significantly correlated with their annual exam score, certain demographic characteristics were indeed significant predictors of their annual exam score.

Based on study findings, it is recommended that medical students with personal or family traits that predispose them to perform poorly in academics should continuously be monitored and facilitated if the need arises during their educational years by their parents and teachers alike. This may take the form of formal or informal one to one interactions or special counseling sessions. This will ensure timely

identification of educational difficulties and challenges and will facilitate successful achievement of desired educational outcomes by these students.

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RS, SS & RK: Substantial contributions to the conception of the work; and the acquisition of data for the work; AND drafting the work

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SMZHN: Substantial contributions to the design of the work; and the analysis and interpretation of data for the work; AND drafting the work and revising it critically for important intellectual content; AND Final approval of the version to be published

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CASE REPORT**SUSPECTED HIRSCHSPRUNG DISEASE PRESENTING IN ADULthood
WITH CHRONIC CONSTIPATION AND ACUTE LARGE BOWEL
OBSTRUCTION: A CASE ON NEGLECTED DIAGNOSIS**Naila Jamal Khattak^{1*}**ABSTRACT**

Hirschsprung disease (HD) is classically diagnosed in infancy. However, rare presentations in adulthood may be overlooked due to their atypical course. We present a 26-year-old male with lifelong constipation and a recent acute bowel obstruction. His early history included failure to pass meconium and a missed follow-up rectal biopsy in infancy. Imaging revealed megacolon with distal narrowing, raising suspicion of HD. The diagnosis of HD however was not confirmed histologically and remained a clinical and radiological suspicion, due to refusal of the patient and family for biopsy. Delayed recognition of HD may result in serious complications. Clinicians should maintain vigilance for congenital motility disorders in adults with refractory constipation.

Keywords: Hirschsprung Disease; Chronic Constipation; Adult Presentation; Megacolon; Intestinal Obstruction; Congenital Aganglionosis

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¹ Medical Officer, City Hospital, Multan

INTRODUCTION

Hirschsprung disease (HD) is a congenital enteric neuropathy characterized by the absence of ganglion cells in the distal bowel, resulting in functional intestinal obstruction and proximal bowel dilatation [1]. The estimated incidence is approximately 1 in 5000 live births, with a marked male predominance. Although HD is typically diagnosed during infancy or early childhood, delayed presentations in adulthood have increasingly been reported in the literature [2]. Adult HD usually presents with longstanding refractory constipation, abdominal distension, and episodic bowel obstruction, often leading to significant diagnostic delays [3].

Current guidelines emphasize rectal biopsy as the

gold standard for diagnosis, while anorectal manometry and contrast studies remain important adjuncts in evaluation [1]. In resource-limited settings, delayed diagnosis may occur because of inadequate follow-up, limited access to specialized diagnostic modalities, and low clinical suspicion for congenital motility disorders in adults. We report a rare case of suspected adult HD presenting with chronic constipation and acute large bowel obstruction, highlighting the diagnostic challenges associated with delayed recognition.

CASE REPORT

A 26-year-old male presented with sudden-onset, progressive, generalized abdominal pain, severe bloating, and a single episode of feculent, projectile

*Corresponding Author: Medical Officer, City Hospital, Multan. Email: aries541999@gmail.com

vomiting. His history revealed lifelong constipation, initially manifesting as delayed meconium passage necessitating manual rectal evacuation. At 18 months, he was hospitalized for intractable constipation and underwent a rectosigmoid biopsy. The reports however were unavailable. Throughout childhood and adolescence, he self-managed with enemas, herbal remedies, and bulk-forming agents like psyllium husk. Over recent months, his symptoms worsened, culminating in the acute event that led to hospitalization.

On examination, he appeared dehydrated. His abdomen was distended, tympanic, and tender, with sluggish bowel sounds and visible peristalsis.

Rectal examination revealed an empty rectal vault. Laboratory investigations were largely unremarkable. Abdomen and Pelvis ultrasound report showed fecal loaded bowel loops seen with reduced peristaltic activity. Abdominal radiography showed significant colonic dilation with fecal loading, consistent with large bowel obstruction. A contrast enema and manometry were planned but deferred due to acute presentation. Due to patient's and the families lack of awareness despite extensive counselling, these procedures were refused. A CT scan abdomen and pelvis with I/V contrast was performed with which showed right sided megacolon with fecal loading of ascending colon and narrowing at the lower end of rectum(Figure 1A and B).



Figure 1A: CT scan (axial view) revealing right-sided megacolon



Figure 1B: CT scan (sagittal view) revealing distal rectal narrowing, consistent with suspected HD

However, water- soluble contrast was not instilled via tube during imaging. Based on this, a suspicion of HD was given. The patient was stabilized with IV fluids, bowel rest, and nasogastric decompression. Surgical referral was made for rectal biopsy and planned definitive resection. However, there was loss to follow-up as the patient did not present to the surgeon.

In the presented case, the probable diagnosis may be HD based on clinical history and imaging, but the diagnosis cannot be confirmed without barium enema, anorectal manometry or rectal biopsy. Especially, pathological examination remains the gold standard for diagnosis of HD. While this may reflect the realities of acute care and resource limitations, the diagnosis remains presumptive until histological confirmation is obtained.

DISCUSSION

HD is a congenital disorder caused by failed migration of neural crest cells during embryogenesis, resulting in aganglionosis of the distal bowel and consequent functional obstruction [4]. Although most patients are diagnosed during the neonatal period, adult presentations continue to be increasingly recognized, particularly in patients with short-segment disease and longstanding constipation [2,3].

In adults, HD commonly presents with chronic refractory constipation, abdominal distension, recurrent fecal impaction, and episodes of intestinal obstruction. A history of delayed passage of meconium during infancy remains an important clinical clue that may help differentiate HD from functional constipation and other secondary causes [1,3]. In the present case, the combination of neonatal symptoms, lifelong constipation, megacolon on imaging, and distal rectal narrowing strongly supported the clinical suspicion of HD.

Current ERNICA guidelines recommend rectal biopsy as the definitive diagnostic modality for HD,

while anorectal manometry and contrast enema serve as supportive investigations [1]. Histopathological confirmation could not be obtained in this patient because the patient and family declined further invasive investigations despite counseling. Therefore, the diagnosis remained presumptive based on clinical and radiological findings.

Adult HD remains underrecognized, particularly in low-resource settings where specialized pediatric surgical and diagnostic services may be limited [5]. Delayed diagnosis may lead to complications including recurrent obstruction, enterocolitis, chronic malnutrition, and impaired quality of life [6,7]. Greater awareness among clinicians regarding adult presentations of congenital gastrointestinal motility disorders is essential for timely recognition and referral.

CONCLUSION

This case highlights the importance of maintaining a high index of suspicion in adults presenting with lifelong refractory constipation, delayed passage of meconium, and features of large bowel obstruction. Early recognition and timely referral for definitive diagnostic evaluation, including anorectal manometry and rectal biopsy, are essential to prevent serious complications and improve patient outcomes.

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