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EDITORIAL

REEVALUATING THE ROLE OF SERUM VITAMIN D LEVELS IN A RESOURCE-LIMITED COUNTRY – THE CASE OF PAKISTAN

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This article may be cited as: Shafi M. Reevaluating The Role Of Serum Vitamin D Levels In A Resource-Limited Country – The Case Of Pakistan. J Med Sci 2025 April - June;33(2):59-60

Vitamin D deficiency has emerged as a global public health issue with wide-ranging implications on musculoskeletal, immunological, and even psychological health. While much of the global discourse has focused on the epidemiology of vitamin D deficiency in temperate regions and its implications on bone metabolism, emerging evidence suggests a paradoxical and widespread deficiency in sun-rich developing countries, including Pakistan. Despite abundant sunlight, Pakistan continues to report alarmingly low serum vitamin D levels across all age groups and socioeconomic strata.

Several population-based and hospital-based studies have reported a prevalence rate of vitamin D deficiency ranging from 60% to over 90% in various cohorts of the Pakistani population, including healthy individuals, pregnant women, children, and hospitalized patients. The etiology appears multifactorial; cultural clothing practices, limited outdoor exposure, urban indoor lifestyles, and poor nutritional intake are commonly cited. However, emerging hypotheses suggest a deeper biological underpinning: altered vitamin D metabolism due to high-affinity vitamin D binding receptors and variability in genetic polymorphisms associated with the vitamin D receptor (VDR) in South Asian populations, including Pakistan, could be playing a crucial role in this epidemic.[1, 2]

The normal physiological range of serum vitamin D levels (25-hydroxyvitamin D) has not been locally validated in Pakistan. Most diagnostic cutoffs are based on international consensus from Western populations, which may not be entirely applicable to the South Asian genetic and environmental milieu. This lack of region-specific reference ranges raises concerns about overdiagnosis, underdiagnosis, and misclassification of deficiency and insufficiency, which can affect both clinical management and public health policymaking.[3] Furthermore, vitamin D plays an immunomodulatory role beyond its skeletal functions, especially in regulating inflammatory responses, autoimmune diseases, and infectious conditions — a vital consideration in resource-limited healthcare systems with high burdens of tuberculosis, hepatitis, and respiratory infections.[4, 5]

Given the limited resources and constrained healthcare budgets in countries like Pakistan, the integration of cost-effective screening, supplementation strategies, and fortification policies is urgently needed. However, such interventions must be guided by high-quality, locally relevant data. Despite the high prevalence, there is still no nationally representative data on vitamin D levels in the general Pakistani population. Most studies are limited in scope, geographical coverage, and population diversity.[6]

There is also a pressing need to investigate population-level determinants of vitamin D deficiency, including genetic predispositions, dietary patterns, and sun exposure behavior. Clinical trials exploring optimal dose-response relationships for supplementation and outcome-based endpoints are lacking. In this regard, Pakistan should prioritize establishing a national task force or registry to conduct cross-sectional surveillance and standardize vitamin D diagnostics in collaboration with universities, public health authorities, and international partners.

In conclusion, Pakistan presents a unique case in global vitamin D research — a paradox of high sunlight but high deficiency. A deeper understanding of the biological, cultural, and systemic factors contributing to this epidemic is essential. Local research initiatives must be promoted to revise reference ranges, inform screening guidelines, and develop affordable preventive interventions. Until then, a cautious but proactive public health approach should be adopted, particularly targeting vulnerable groups such as women of reproductive age, children, and the elderly.

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ORIGINAL ARTICLE

EVALUATION OF QUALITY OF LIFE AMONG STUDENTS AT REHMAN MEDICAL INSTITUTE USING THE WHOQOL-BREF TOOL

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ABSTRACT

Objective: This study aimed to evaluate the quality of life (QoL) of medical and dental students across four major domains and investigate the impact of age, gender, and academic level on QoL.

Material & Methods: In February 2020, a cross-sectional study was carried out at the Rehman Medical Institute, where 620 medical and dental students in years 1 through 5 at Rehman Medical College (RMC) and years 1 through 4 at Rehman College of Dentistry (RCD) made up the study population, The World Health Organization Quality of Life questionnaire (WHOQOL-BREF), which has 26 items, was used as a sample collection tool.

Results: The WHOQOL-BREF questionnaire's overall Cronbach's alpha coefficient was 0.81. Students' overall satisfaction with health was 3.81 ± 0.85 (satisfied), and their self-reported QoL mean score was 4.07 ±0.78 (good). The social domain had the lowest quality of life (QoL), while the environmental domain had the highest mean score (67.81 ± 17.39). Compared to male students, female students' impairment in the physical health domain of QoL was significantly greater (p=0.005).

Conclusions: Medical schools should implement innovative curricula and provide medical students with the required support to enable them to manage the influencing factors of quality of life. Medical schools must create tailored policies and ensure better learning environments for all of their students, but especially for female students.

Keywords: Medical students, Dental Students, Quality of life

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INTRODUCTION

Quality of life is defined by the World Health Organization (WHO) as an individual's evaluation of their position in life concerning their goals, standards, expectations, and concerns, as well as the culture and value systems they live in. [1] Emotions, social interaction, and well-being are all connected to quality of life (QOL). As a result, the idea of QOL is always regarded as multifaceted and multicultural, lacking a consensus definition at this time. [2] The number of medical students has increased significantly over the past ten years in Pakistan in tandem with the growing enrollment of medical colleges. In contrast, there is a lot of pressure on medical students during their education because of exams, a busy schedule, a rigorous curriculum, less free time, a large number of assignments, deadlines, and novel ethical dilemmas. [3, 4] Additional factors include the demanding patients, the peer pressure to achieve academic excellence, the demanding transition from basic to clinical years, the overwhelming amount of new material to learn, and, of course, the difficulty of balancing daily responsibilities with academic obligations. [5] There is mounting worry about the welfare of medical students. [6] Several observations suggest that, in contrast to the broader populace, medical students are more vulnerable to psychological and emotional disturbance. [7, 8] Compared to the general population, medical students are more likely to experience burnout, suicidal thoughts, and depression as a result of this intense academic pressure. [9] The World Health Organization Quality of Life-Brief (WHOQOL-BREF), a condensed version of the WHOQOL-100 questionnaire, is a QOL assessment tool that is

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comparable across national borders and cultures. Health professionals receive training in various aspects of quality of life (QoL) during their medical education. However, during their time in medical college, their personal QoL tends to decline. These aspects include psychological health, physical well-being, environmental conditions, and social relationships. [10] Despite research utilizing WHO-QOL-BREF to evaluate medical students' quality of life, few studies have been conducted on Pakistani medical students. [11-12] Good physical and mental health, however, makes medical students more resilient to the demands of the classroom. [10] Monitoring QoL is a comprehensive valuation of health in the milieu of an individual's insight into well-being. Rather, it is an expansive assessment paralleled by the recognition of a specific problem or condition in a stratified population. [13]

Medical education affects students' health, as permanent stress can lead to permanent personality changes that will lead to clinicians with undesirable personality traits, which have an impact on patient care quality and communication. Several studies have been conducted over the last three decades to assess the QoL in the healthcare sector. Research on the quality of life (QoL) of medical students is relatively well-established in the West, but in developing nations such as Pakistan, it is lacking. This study aims to evaluate undergraduate medical students' quality of life (QoL) during their medical education by looking at four main domains and comparing them to sociodemographic variables.

MATERIALS AND METHODS

The institutional board granted the ethical approval (RMI/ RMI-REC/Approval/67) for a cross-sectional study that was conducted in one month from 1st to 28th February, 2020. All the students of Rehman Medical College (RMC) and Rehman College of Dentistry (RCD) were selected, including students from both pre-clinical years and Clinical years. The questionnaire was discussed among four teaching faculty members of RMC and RCD. To eliminate any doubt in the questionnaire, a pilot study involving twenty medical students was carried out; the results of this study were excluded from the final analysis. Following the completion of the pilot study, the questionnaire remained unchanged. To gather data, census or complete enumeration type sampling was employed. Copies of the questionnaires were sent to teaching faculty members who received thorough training on the research process and the questionnaire. They distributed the questionnaires to all students in individual years in the last 15 minutes of the teaching session. Ten minutes were given to the students to finish the questionnaire on their own. Students were free to ask the faculty member any questions they had at any moment about the questionnaire. The sample included 700 medical students from five classes of years 1 to 5 at RMC and four classes of years 1 to 4 at RCD. Six hundred twenty completed and valid questionnaires were returned. The questionnaire was removed from the study if it contained more than four missing items.

A simplified version of the World Health Organization Quality of Life Instrument, the WHOQOL-BREF questionnaire, was the instrument used to collect data (World Health Organisation,1998) and sociodemographic details of the respondents to obtain information on medical school year, sex, marital status as well as known illness/ problem status were also included. WHOQOL-BREF questionnaire is accessible for both developed and developing nations in a variety of languages and it is a general QOL tool created by WHO and is composed of a pre-validate questionnaire comprising 26 items in total, 8 covering the environmental domain, seven the physical health domain, six the psychological health domain, and three the social relationship domain. 14, 15 Two additional stand-alone questions on overall quality of life and satisfaction with health were included in the WHOQOL-BREF. Higher ratings on the Likert scale (1–5) indicate a higher quality of life for each item in the WHOQOLBREF. The options for responding are 1 (extremely poor or dissatisfied) to 5 (very good or very satisfied). The questionnaire was piloted, and it showed more emphasis on the subjective responses than the objective living conditions. Four domains were included in the questionnaire: environment, social relations, psychological health, and physical health. 16

Medical students' QOL was evaluated using the WHOQOL-BREF instrument. The correlations between QOL and the variables like gender and academic year level were examined using the t-test or one-way ANOVA. For each variable, both qualitative and quantitative, descriptive statistics were computed. SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) for Windows was used to analyze the data. A p-value of 0.05 was found to be statistically significant. Every participant was fully aware of the purpose and content of the questionnaire. The survey was anonymous, and the answers were kept private. There was no identifying information about the individual subjects in the questionnaire. The study was entirely voluntary, and participants could choose not to participate by checking the box next to any questions or by not answering any questions at all. The RMI Institution Ethical Committee approved the protocol (RMI/ RMI-REC/Approval/67), which adhered to the ethical guidelines established by the Declaration of Helsinki and required consent from each subject before they could participate in the study. All phases of the study complied with data protection regulations. To maintain their anonymity, students were asked to place their completed questionnaires in a sealed box rather than giving them to the faculty members.

RESULTS

Among a total of seven hundred students at RMC and RCD, sixty-three subjects could not be included for

the following reasons: attending exams (12), not being available (16), and refusing to participate without providing a reason (35). Of the 637 questionnaires distributed, 620(88.57%) qualified for analysis. The remaining 17 responses were discarded because they were incomplete. Throughout the entire study group, the average age of the students was 21.46 years (range=18-27 years). See Figure 1 for details. The sample (620 students) consisted of 321 (51.8 %) male and 299 (48.2%) female students. Among all respondents, 434 (70%) were medical students and 186 (30%) were dental students. Only 67 students self-reported some form of illness/problem, like depression (34), stress (15), anxiety (12), obsessive-compulsive disorder (2), migraine, stress, gastrointestinal problems, and neck pain. According to the medical students' self-assessment, their overall self-reported quality of life had a mean score of 4.07 ±0.78. Overall, students rated their quality of life as "very good" in 28.9% of cases, "good" in 53.1%, and "very poor" in 1.5% of cases (Fig. 2). Conversely, their self-rated satisfaction with their current state of health had a mean score of 3.81 ± 0.85. Just 1.8% of respondents said they were "very dissatisfied" with their health, compared to 17.4% who were "very satisfied" and 55.8% who were "satisfied" (Fig. 3). The majority felt content with their health.

According to the various years of MBBS and BDS, we discovered significant differences in the environmental (F = 3.53, p 0.01), social relations (F =3.53, p = 0.01), and psychological (F =2.88, p = 0.04) domains. The scores among different domains, out of a total of 100, are shown in Figure 4. Second-year BDS and final-year BDS students had the lowest scores in the psychological and environmental domains, respectively.

In the physical domain, the 4th-year MBBS scored higher (Mean = 63.5), and the 3rd-year MBBS scored lower (Mean = 56.2) among all academic years. Next, in the psychological domain, the 4th-year MBBS scored higher (Mean = 63.22), and the 2nd-year BDS scored lower (Mean = 50.41). The 1st-year BDS scored higher (Mean = 56.14), while the final-year BDS scored lower (Mean = 44.94) in the social domain. In the environmental domain, the 1st-year BDS scored higher (Mean = 69.6), and the final-year BDS scored lower (Mean = 56.3). Gender and academic year comparisons of medical students revealed no statistically significant differences in the mean score across all domains, as shown in Table 1.

About the items, the degree of internal uniformity was expressed by Cronbach's coefficient. The overall Cronbach's coefficient of the WHOQOL-BREF questionnaire was 0.81, while the Cronbach's coefficients for the

Table No 1: QoL Domain scores of medical/dental students in different academic years

Variable	N (%)	Physical Domain Mean ±S.D		Psychological Domain Mean ±S.D		Social Domain Mean ±S.D		Environmental Domain Mean ±S.D	
Male	321/620 (51.8%)	63.04 ± 10.3	p-value 0.005	56.37 ± 10.95	p-value 0.131	50.8 ± 12.28	p-value 0.217	63.60 ± 10.64	p- value 0.02
Female	299/620 (48.2%)	56.12 ± 10.14		56.88 ± 11.44		50.64 ± 13.18		63.48 ± 11.01	
First Year MBBS	83 (13.4%)	56.76 ± 8.8	p-value 0.092	56.93 ± 10.2	p- value 0.04	56.93 ± 10.2	p- value 0.017	63.01 ± 11.19	p- value 0.01
Second Year MBBS	84 (13.5%)	56.52 ± 1.43		56.27 ± 10.54		56.27 ± 10.54		63.81 ± 11.2	
Third Year MBBS	91 (14.7%)	56.20 ± 9.78		56.07 ± 11.81		56.07 ± 11.81		63.15 ± 9.87	
Fourth Year MBBS	96 (15.5%)	63.54 ± 10.40		63.22 ± 9.47		63.22 ± 9.47		69.06 ± 9.98	
Final Year MBBS	80 (12.9%)	56.86 ± 11.10		56.94 ± 10.84		56.94 ± 10.84		63.04 ± 11.01	
First Year BDS	43 (6.9%)	63.0 ± 7.21		56.70 ± 11.31		56.70 ± 11.31		69.6 ± 8.93	
Second Year BDS	46 (7.4%)	56.52 ± 11.04		50.41 ± 12.26		50.41 ± 12.26		56.7 ± 12.31	
Third Year BDS	47 (7.6%)	56.62 ± 7.6		56.83 ± 11.83		56.83 ± 11.83		69.4 ± 9.67	
Final Year BDS	50 (8.1%)	56.54 ± 11.03		56.24 ± 13.3		56.24 ± 13.3		56.3 ± 10.84	
	Total=620								

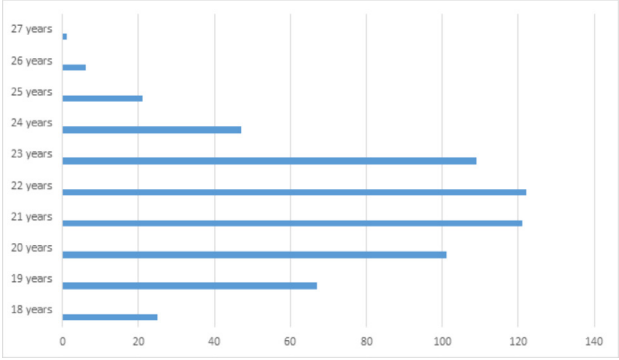

Figure 1: Number of Students in each Age group

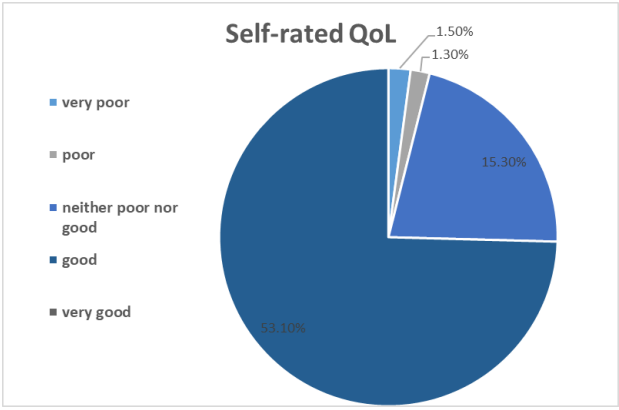

Figure 2: Self-reported QoL among students

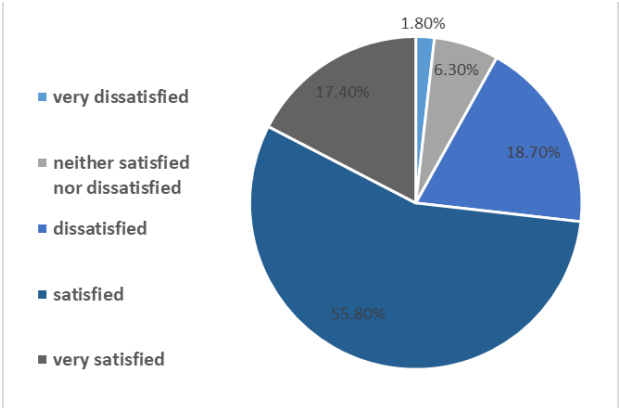

Figure 3: Self-reported Health satisfaction among students

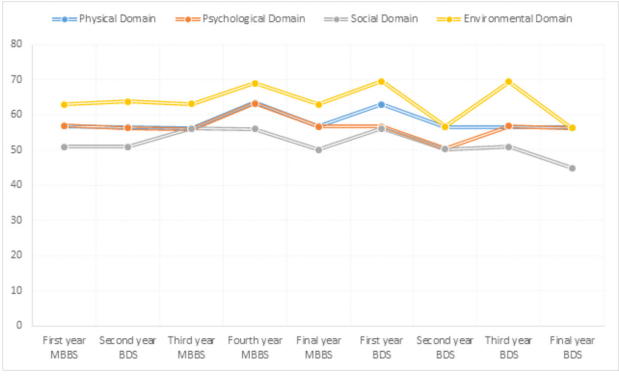

Figure 4: Quality of Life among all domains in academic years

physical health, psychological health, social relations, and environment domains were 0.66, 0.69, 0.36, and 0.74, respectively. There was no significant difference (p-0.05) in all four domains among different academic years. The male gender had a significantly higher score ($p<0.05$) in the Physical Health domain than females.

DISCUSSION

The study's response rate, which stands out at 88.57%, indicates that the data gathered is suitably representative of the target population and also shows how eager students are to engage in studies that are being done on them, particularly those that aim to determine their health status. Depression and stress were more frequently detected among Brazilian medical students, similar to the findings in our study. [17] Dahlin et al. have shown that students experience depressive symptoms more frequently than people in the general population and that female students are more likely than male students to experience these symptoms. [18] With a mean age of 21.46 years, the participants demonstrated that the students were comparatively younger than those on whom prior research has been conducted. [19]

Overall, in the physical domain, females scored (Mean=56.12) less than males (Mean=63.04); in the other three domains, there was no significant difference between genders. Furthermore, a Brazilian study found that female students performed worse across the board. 19 On the other hand, female students outperformed male students in the social relations domain, according to Naseem S et al. [12] Another study in China reported in the psychological health domains, male students outperformed female students by a significant margin, contrary to our study, where there was no difference between the psychological domains of both genders. The quality of life (QOL) of medical students is influenced by numerous factors across multiple domains. According to some researchers, it's because women are more emotional and pressure-sensitive. [21] Studies indicate that women are more adept than men at navigating a variety of social relationships. [20]

Students in years 3 and 4 of RMC and RCD, like those in all other medical colleges in Pakistan, had lower QOL scores and made their first patient contacts before entering clinical years. In this study, 3rd-year MBBS students showed the lowest in physical and psychological domains among all MBBS years. While fourth-year MBSB, QoL scores were highest among all four domains, contrary to an Indian study, students in the second and third year had higher scores compared to other years. [22] In a study at Shifa College of Medicine, Islamabad, in every domain, third-year students scored the highest, while first- and final-year students had the lowest scores. [12] Female students had significantly more impairment in the physical health domain of QoL than male students ($p=0.005$), similar to another study in Peshawar. [23] In one study, the ap-

proach of integrated courses and Early clinical internship exposure gave students a chance to decompress from the stress and anxiety of practicing medicine and increased interaction between the theoretical and practical fields. [24] Amongst dental students, first-year BDS had higher QoL scores in physical, social, and environmental domains, while final-year BDS had the lowest in social and environmental domains.

Medical colleges in the US and Canada have started health promotion programs and are working to lessen the detrimental effects of mental stress on their students' academic performance and general health. [7] Our findings indicated that despite cultural and societal norms, which enforce disparities in modes of living between males and females in Pakistan, there is no definite qualitative variance in terms of their QoL. Medical colleges need to improve reforms in medical education to relieve some of the burden of courses in medical training, and offer students all the basic support to improve. WHOQOL-BREF is a valuable tool for health policy research and will be a significant component of regular health and social service audits. Frequent counseling sessions may aid students in adjusting to the new environment more successfully. Healthier accommodation conditions and opportunities for greater physical activity must be provided. The information in this study will benefit academic performance management and will help in delivering affirmative action. Due to the cross-sectional nature of our study, there are a few limitations: we were unable to determine the cause-and-effect relationship. All the students were part of the same educational curriculum provided by the same university. It also involved students from one city; hence, generalizability cannot be applied in every context.

CONCLUSION

Medical education affects students' health in multiple ways. Therefore, timely identification is very important. Gender or level of education did not affect the quality of life of medical students. Overall, fourth-year MBBS and 1st year BDS scored a little higher than in other years. Social relationships, environmental domain, and physical and psychological progress were satisfactory in the Rehman Medical Institute.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Khan M	✓	×	✓	×	✓	×
Jamil B	✓	✓	×	✓	✓	×
Muhammad F	×	✓	×	×	✓	×
Basharat S	✓	✓	✓	×	✓	✓
Gul A	✓	✓	×	✓	✓	×
Khan MI	×	✓	×	×	✓	×

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FRAX (FRACTURE RISK ASSESSMENT TOOL) PREDICTION WITHOUT BMD (BONE MINERAL DENSITY) FOR ASSESSMENT OF OSTEOPOROTIC FRACTURE RISK IN THE GENERAL POPULATION OF PESHAWAR

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ABSTRACT

Objective: To identify fracture risk assessment without using bone mineral density in assessing osteoporotic fracture risk using a FRAX prediction model among the general population of Peshawar.

Materials and Methods: A descriptive cross-sectional study was conducted from January to June 2024 among adults aged 40 and older residing in Peshawar. A sample of 240 was selected through a multistage sampling technique. Inclusion criteria were those who were residents in Peshawar and were willing to participate, and those having chronic illnesses like liver disease, cancer, or kidney disease were excluded. The FRAX tool was implemented after informed verbal consent. Data was analysed using SPSS version 20. The fracture probability was calculated and stratified according to relevant demographic and clinical factors.

Results: Among 240 participants, 39 (16.4%) had osteoporosis, of which 12 (4.8%) and 27 (11.6%) were males and females, respectively. Risk factors included previous fractures (31.2%), smoking (15.6%), steroid use (17.2%), rheumatoid arthritis (8.8%), and secondary osteoporosis (20.4%). Hip fracture risk was low in 191 (79.6%), moderate in 33 (13.6%), high in 12 (5.2%), and very high in 4 (1.6%). For major osteoporotic fractures, 194 (80.8%) had low risk, 31 (13.2%) had moderate risk, 9 (3.6%) had high risk, and 6 (2.4%) had very high risk. Females had a higher probability of major osteoporotic fractures (3.05) and hip fractures (0.67) compared to males (2.14 and 0.48, respectively). A statistically significant association was observed between gender and major osteoporotic fracture risk ($p = 0.005$).

Conclusion: Osteoporosis among adults aged 40 and above in Peshawar is high, with women being affected more. This highlights the importance of early risk assessment and timely intervention to prevent complications.

Keywords: Osteoporosis, Bone mineral density, Fracture risk assessment, Major Osteoporotic Fracture, Hip Fracture.

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INTRODUCTION

Osteoporosis, a silent epidemic, affects millions worldwide, causing devastating fractures and impacting quality of life. It is characterized as a systemic skeletal disease with low bone mass and microarchitectural degeneration of bone tissue, increasing fracture risk and bone fragility. [1] Osteoporosis is a growing concern in Pakistan, with a prevalence of 16.4%. [2] Globally, the prevalence of osteoporosis is 18.3%, with Africa having the highest rate of 39.5%. [3]

Considering the significance of osteoporosis, the World Health Organization (WHO) created the Fracture Risk Assessment Tool (FRAX) that estimates the likelihood of a fracture within the next 10 years using easily accessible clinical risk factors (CRFs). [4] FRAX accurately predicts the risk of Major Osteoporotic Fracture (MOF) and hip fracture in both men and women, regardless of whether osteoporosis is defined by WHO or National Osteoporosis Foundation (NOF) criteria. [5]

The FRAX tool is based on the principle that osteoporosis treatment decisions cannot be made exclusively on bone mineral density (BMD) values, but should also consider clinical risk factors for fractures. By incorporating

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clinical risk factors, FRAX predicts fracture risk more accurately than BMD alone. [6] The FRAX computation remains unchanged even when BMD is taken into account. For individuals who are at high risk of fracture, treatment can begin before densitometry when the FRAX tool is used without including BMD data. Strong evidence suggests that the FRAX score, which does not take BMD into account, can effectively identify individuals who are at higher risk and reduce the unnecessary use of resources related to BMD. [7]

FRAX-based intervention thresholds for Pakistan are lower than those recommended by the WHO, reflecting the higher fracture risk and limited healthcare resources in Pakistan. [8]

It is particularly important to study osteoporosis and fracture risk in Peshawar because of its unique demographic, socio-economic, and healthcare contexts. The population of Peshawar may have different risk factors for osteoporosis compared to other regions due to variations in lifestyle, dietary habits, genetic predispositions, and access to healthcare facilities. By focusing on this specific population, the research can provide targeted insights that are more applicable and beneficial for local healthcare providers and policymakers. By offering insightful information on the usefulness of the FRAX tool without BMD in a resource-constrained environment, this study contributes to the body of existing literature. It highlights the potential for using FRAX as a cost-effective and accessible method for assessing fracture risk, which can be particularly beneficial in regions where access to advanced diagnostic tools like BMD measurements is limited. This research not only enhances our understanding of osteoporosis risk factors in Peshawar but also offers a practical approach to improving osteoporosis management and fracture prevention in similar settings globally.

MATERIALS AND METHODS

A descriptive cross-sectional study was conducted from January to June 2024 across four union councils in Peshawar. The sample included adults aged 40 years and older who were permanent residents of Peshawar, defined as having lived there for over 10 years and holding Pakistani nationality.

A sample size of 240 was determined using Cochran's formula, where p = 18.6%.[8] A multistage simple random sampling technique was employed: four union councils were randomly selected, and participants were randomly chosen from each council, resulting in 60 individuals per council. Inclusion criteria were permanent residency in Peshawar and willingness to participate. Exclusion criteria included chronic illnesses such as liver disease, cancer, or kidney disease.

Ethical approval was obtained from the Khyber Medical College Institutional Research and Ethical Approval Board (KMC-IREB) (Ref no: 56 /DME/KMC), and informed consent was secured from all participants. Data was collected through face-to-face interviews using a predesigned, validated, and structured FRAX questionnaire, which is open access and does not require permission for use. [4] The questionnaire consisted of three parts: the first part covered demographics, including participants' BMI; the second addressed fracture risk factors. Previous fractures were defined by asking if participants had ever broken any of their bones. Osteoporosis was identified based on whether a doctor had informed them of weak, porous bones and by inquiring about relevant medications. Current smoking was determined by asking if participants had been actively smoking cigarettes for the past six months. Glucocorticoid use was assessed by asking whether they had taken steroids at a dose of more than 5 mg per day. Alcohol intake was evaluated by asking if they consumed a glass of alcohol (30 ml) or more per day. Secondary osteoporosis was identified through questions about conditions such as diabetes, hyperthyroidism, premature menopause, or malabsorption disorders. The third part was FRAX score calculation, determining the ten-year probability of a major osteoporotic fracture, categorizing individuals as Low risk (3% - 7%), Moderate risk (10% - 20%), or High risk (>20%). Confidentiality, anonymity, and participants' rights were upheld throughout the study.

Data was analysed using SPSS-20. Descriptive statistics summarized the demographic characteristics and fracture risk profiles of participants. Fracture probabilities were calculated and stratified according to relevant demographic and clinical factors. Finally, the results were presented in the form of text, graphs, and tables.

RESULTS

Among 240 participants, 116 (48.8%) were males and 124 (51.2%) were females. The mean age was 58 years (±1.02 SD). Geographically, participants were from University Town (28.4%), Palosi (28.0%), Tehkal Bala (24.0%), and Shaheen Town (19.6%), reflecting varied access to healthcare and environmental factors. According to WHO, the BMI cut-off values for Asian populations are: underweight (<18.5), normal weight (18.5-23), overweight (23.1-27.5), and obese (≥27.6); in this study, the mean BMI was 27 (± 4.79), with the following distribution: 1.6% underweight, 18.4% normal weight, 44% overweight, 28.4% obese, 5.4% severely obese, and 2.4% morbidly obese. Our study showed 39 (16.4%) previously diagnosed cases of osteoporosis. Among these 12 (4.8%) were males, and 27 (11.6%) were females. A substantial proportion of respondents have experienced bone health issues, with a notable percentage currently dealing with fractures (Figure 1). There appears to be a potential genetic predisposition, as indicated by a significant portion reporting a history of parental fractures. Lifestyle factors such as smoking also play a role, with recent smoking being a significant risk factor. The use of steroids (dose<2.5mg) is prevalent among respondents, which may contribute to decreased

bone density. In terms of medical conditions, a portion of respondents reported having rheumatoid arthritis, with a notable number diagnosed with secondary osteoporosis, often comorbid with other conditions such as insulin-dependent diabetes. On a positive note, a large proportion of respondents are taking proactive measures by using calcium or vitamin D supplements, which is encouraging for bone health maintenance. [15]

Table No 1: Probability of MOF and HF in both genders

	GENDER OF PARTICIPANTS	
	Male	Female
Probability of Major osteoporotic fracture	2.14	3.05
Probability of hip fracture	0.48	0.67

Table No 2: MOF risk and various factors related to osteoporosis

	Major osteoporotic fracture risk			
	Low risk	Moderate risk	High risk	Very high risk
Did you ever had a fracture?	42	24	7	5
Are you currently taking steroids ?	26	12	5	
Have you been diagnosed with Rheumatoid arthritis?	6	11	4	1
Have you been diagnosed with osteoporosis?	18	12	7	4
Have you been diagnosed with secondary osteoporosis ?	26	15	6	4
Are you taking any calcium or vitamin D supplements?	77	22	7	5

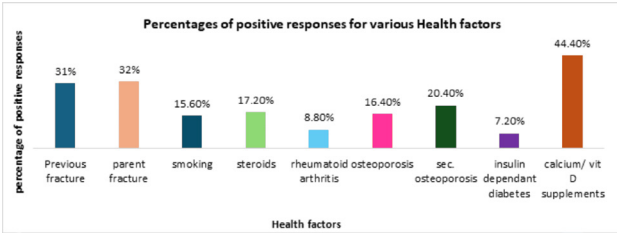

Figure 1: Percentages of positive responses for various Health factors

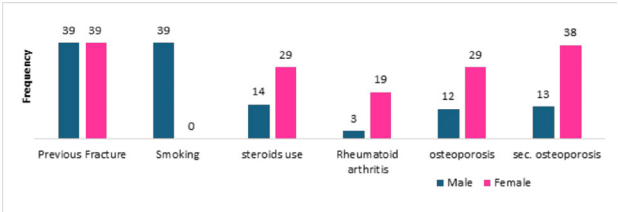

Figure 2: Risk factors of osteoporosis in males and females

The analysis of hip fracture probability categorized individuals into low risk (191 participants, 79.6%), moderate risk (33 participants, 13.6%), high risk (12 participants, 5.2%), and very high risk (4 participants, 1.6%), with a mean probability score of 2.0280 ± 3.99. This indicates a generally low average risk while highlighting a minority at higher risk. For major osteoporotic fractures, low risk was observed in 194 participants (80.8%), moderate risk in 31 participants (13.2%), high risk in 9 participants (3.6%), and very high risk in 6 participants (2.4%). Gender-specific differences in health conditions and behaviours related to fracture risk were evident (Figure 2).

Females had a higher likelihood of experiencing major osteoporotic fractures and hip fractures compared to males (Table 1). Cross-tabulation and chi-square tests showed a significant association between gender and MOF risk (Pearson Chi-Square value: 12.909, $p = 0.005$), indicating a significant linear relationship between gender and MOF risk.

Correlation analysis revealed significant negative correlations between MOF risk and various factors such as previous fracture history, rheumatoid arthritis, osteoporosis, secondary osteoporosis, and the use of calcium or vitamin D supplements, suggesting lower fracture risk among individuals with these conditions due to precautionary measures or supplement use (Table 2).

DISCUSSION

Osteoporosis affects all segments of society, including families with affected individuals and government agencies, due to treatment expenses and healthcare provision. According to self-reported data, 16.4% of the participants stated that they had been previously diagnosed with osteoporosis, with a prevalence of 4.8% in males and 11.6% in females. Globally, osteoporosis prevalence is 23.1% in women and 11.7% in men. [9]

The prevalence of osteoporosis and major osteoporotic fractures increases with age. Among osteoporotic individuals, 39 % were below 60 years of age and 61% were above 60 years. [10]

Our analysis of hip fracture probability revealed that 191 (79.6%) participants were at low risk, 33 (13.6%) were at moderate risk, 12 (5.2%) were at high risk, and 4 (1.6%) were at very high risk. For major osteoporotic fractures, 194 (80.8%) participants were at low risk, 31 (13.2%) were at moderate risk, 9 (3.6%) were at high risk, and 6 (2.4%) were at very high risk. [11]

Gender-specific risk factors showed that females were more likely to have rheumatoid arthritis, while smoking was more prevalent among males. Studies suggest that smoking raises the risk of hip fracture in men, particularly current smokers, underscoring the negative impact of smoking on bone health. [11]

Additionally, there was a strong negative correlation between gender and secondary osteoporosis diagnosis, suggesting that females are more likely to be diagnosed with secondary osteoporosis. This is in line with earlier research that indicated females had a higher rate of secondary osteoporosis. According to a study, a history of previous osteoporotic fracture was linked to a higher risk of distal forearm fractures in women but not in males. [12]

Individuals with a history of fractures were less likely to be at higher risk for future fractures, suggesting they should take preventive measures. A study has shown that the risk of a second MOF was high immediately after the first fracture and thereafter decreased with time, though it remained higher than the normal population. [13] This supports the concept of "imminent risk" and suggests that early intervention is crucial to prevent subsequent fractures.

Current steroid users (low dose) were found to be at low risk of major osteoporotic fractures, potentially due to factors like lifestyle modifications that counteract the negative effects of steroids on bone health. Low-dose steroid use (<2.5 mg daily of prednisolone or equivalent) may decrease the probability of major fractures by about 20%, suggesting a protective effect at low dose. [14]

Patients diagnosed with rheumatoid arthritis (RA) are at an increased risk of developing secondary osteoporosis due to chronic inflammation and glucocorticoid therapy. However, our study found that individuals with RA who managed their condition through a combination of treatments and lifestyle modifications had a lower risk of osteoporotic fractures. Specifically, participants who took vitamin D or calcium supplements as part of their treatment regimen showed a reduced risk of fractures. Additionally, those who managed their disease with steroids under regular medical supervision and made lifestyle changes promoting bone health, such as exercise and a balanced diet, also contributed to the lower fracture risk observed in our study.[15]

The collective impact of these factors led to the unexpected finding of a lower fracture risk among patients with RA in our study, highlighting the importance of comprehensive management and preventive measures in reducing the risk of osteoporotic fractures. FRAX prediction without BMD suggests bone mineral density measurements may not always be necessary for estimating fracture risk. [16] By using FRAX, healthcare professionals can accurately identify individuals at risk and intervene early, thereby contributing to global efforts aimed at preventing osteoporotic fractures. Future advancements will likely focus on improving FRAX input parameters and algorithms by incorporating more risk factors such as genetic markers or advanced imaging data, and making FRAX more user-friendly through mobile applications. [17-19] The strengths of the study include clinical relevance and applicability to elderly people in Peshawar. FRAX considers multiple factors beyond bone strength, providing a comprehensive risk assessment. FRAX without BMD is simple and easy to use, incorporating readily available clinical risk factors. A few of the study's limitations are its cross-sectional design and its dependence on self-reported risk factors, which could lead to bias.

CONCLUSION

This study reveals a significant burden of major Osteoporotic fracture risk among adults aged 40 and above in Peshawar, with women being disproportionately affected. The high fracture probabilities identified underscore the importance of early risk assessment. Utilizing the FRAX tool without BMD proves to be an effective approach in identifying individuals at risk, thereby facilitating timely intervention and treatment strategies to prevent fractures. These insights can guide healthcare providers and policymakers in developing targeted strategies to address osteoporosis and improve bone health outcomes in the community.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Fazal F	✓	×	✓	×	✓	×
Zaman H	✓	✓	×	✓	✓	×
Gul R	×	✓	×	×	✓	×
Ullah A	✓	✓	✓	×	✓	✓
Khan AA	✓	×	✓	×	✓	×
Asghar A	✓	✓	×	✓	✓	×
Khan S	×	✓	×	×	✓	×
Ullah R	✓	✓	✓	×	✓	✓
Shams M	✓	×	✓	×	✓	×
Ahmad J	✓	✓	×	✓	✓	×
Ullah MN	✓	×	✓	×	✓	×
Salman S	✓	✓	×	✓	✓	×

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

Ethical Approval:

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Dated: 30 01 2024

ORIGINAL ARTICLE

LEARNING MANAGEMENT SYSTEMS (LMS) IN MEDICAL EDUCATION: INSIGHTS FROM UNDERGRADUATE MEDICAL STUDENTS IN PESHAWAR

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ABSTRACT

Objectives: To determine students' perceptions regarding the usability and efficacy of the Learning Management System (LMS).

Materials & Methods: This Descriptive cross-sectional study was carried out in public and private sector medical colleges of Peshawar from October 2023 to February 2024. The data collected was analysed using SPSS ver.29 to determine students' perceptions of LMS usability and effectiveness.

Results: The average mean score for students' attitudes and experiences with the LMS's ease of use and overall user experience was 3.32, exceeding the criteria score of 3. Additionally, students' mean score for the LMS's effectiveness in supporting their learning was 3.48, also greater than the criterion score of 3. Furthermore, an independent samples t-test revealed that students from private medical colleges found the LMS to be significantly more user-friendly and effective ($p = 0.011$). However, there was no statistically significant difference in LMS perceptions between clinical and preclinical students ($p = 0.723$).

Conclusion: According to our research findings, both the students of public and private medical colleges perceive LMS as user-friendly and efficient. This implies that LMS has the potential to streamline medical education irrespective of the institutional variations, ensuring a cohesive learning environment for every student.

Keywords: Efficacy, Learning management system, Perception, Usability

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INTRODUCTION

Learning management systems (LMS) are online software systems that are operated to support miscellaneous instructional, learning, and assessment activities and are major constituents of many university course delivery techniques. [1] The learning management systems Blackboard, Canvas, e-College, Moodle, and Sakai are a few examples. An LMS can assist tutors and make students' lives easier by arranging an online classroom. The simplicity of use for students and tutors is one of their most substantial attributes. [2] A study performed in RUSSIA Learning Management Systems (LMS) has been ascertained to streamline active learning and foster a positive strategy for learning acquisition. The stakeholders' adoption and perception of this learning tool are the keys to its effective and successful utilization. [3]

According to the current 4th annual LMS data update, more than 90% of educational institutions in the US, Australia, Canada, and the UK are actively operating LMS. [4] Due to the global menace of the novel coronavirus, an unprecedented crisis prevailed throughout the country, which attracted the usage of LMS instruments for learning objectives. [5] With the evolution of the Internet and new technology, LMS has arisen as a feasible alternative for universities presently experiencing rapid modification. Since the end user's perspective towards the application of information technology is one of the critical standards for the flourishing expansion of academic programs, considering pupils' perceptions of LMS technologies is necessary for their expertise in the field. [6] In one of the studies performed in Pakistan, it was noted that during

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COVID-19 times, due to the closure of schools and colleges to restrain the spread of the virus, educational institutions quickly transitioned to remote learning, and many universities started their online education systems as per their feasibility for students and educators. [7] According to a Study performed in Indonesia, LMSs are now the most demanded instruments in the educational sector. Many universities utilize LMSs to sustain and improve learning and teaching methods. [8] A study carried out in Indonesia regarding information systems like LMS often combines human, hardware, communication network software, and data resources to gather, modify, and transmit information inside an organization to enable decision-making and control of organizations. [9] A study conducted in Saudi Arabia emphasized important cultural differences between students attending different types of higher education institutions, specifically, public institutions mainly rely on standalone personal computers in computing laboratories, with no internet access available at their place of study. [10]

The significance of Learning Management Systems (LMS) in academic contexts is universally recognised; nonetheless, their contextual efficacy and user experience might differ markedly among various educational institutions. Despite the growing adoption of LMS platforms by private and public medical institutions, empirical research regarding students' perceptions of their usability and effectiveness remains scarce. This study seeks to fill this vacuum by examining students' perceptions in private and public-sector medical institutions, thereby offering context-specific insights to guide the strategic integration and enhancement of LMS utilisation in analogous academic settings. The primary objective of this research is to explore students' perceptions of the usability and effectiveness of the Learning Management System (LMS) in supporting their education.

MATERIALS AND METHODS

This analytical cross-sectional study was conducted in public and private medical colleges of Peshawar. The duration of the study was 5 months. This sample size was computed using Open Epi based on a proportion of medical students utilizing LMS for their academic courses. Assuming a 50% prevalence, a sample size of 424 participants was calculated. A multistage sampling technique was used, and all students enrolled in public and private medical colleges from 1st to the final year of MBBS were included in the study. Participants who failed to complete the questionnaire were excluded.

After ethical approval from the institutional ethical board (approval #1625), data were collected from the students of the 1st to final-year MBBS in one public and two private medical colleges. The questionnaire used was taken from previously published literature[11] and is a validated tool, which was converted into a Google form for data collection. The students were selected in equal numbers from each academic year, ranging from first to final year MBBS, as illustrated in the flow chart. The responses were then analysed using SPSS version 29 to assess students' perceptions of LMS usability and effectiveness.

RESULTS

The mean analysis of the attitudes and experiences of private and public medical college students toward the ease of use, navigability, and overall user experience of the LMS is presented in Table 1. The average mean score is 3.32, which is greater than the criterion score of 3. This shows that LMS is perceived as highly usable by the students, with a higher degree of user satisfaction. The term "Accepted" indicates that the mean scores reflect general agreement or positive endorsement of the statements by the students, consistent with established threshold criteria in similar attitudinal studies.

The mean analysis of the students' views on the efficacy of LMS in supporting their learning is presented in Table 2. The average mean score is 3.48, which is greater than the criterion score of 3. This shows that LMS is perceived by students as highly efficient in supporting their learning. Additionally, no significant difference was observed in LMS perceptions between students from public and private medical colleges.

The comparison of students' perceptions of LMS efficacy between private and public medical colleges is presented in Table 3. The independent samples t-test revealed a statistically significant difference in students' perceptions of LMS efficacy between public and private medical colleges ($t = -4.44$, $p = 0.011$). The mean LMS efficacy score was 3.18 ($SD = 0.749$) for public medical college students and 3.47 for private medical college students, indicating that students from private institutions perceived the LMS as more effective in supporting their learning.

The comparison between the perception of LMS among clinical and preclinical years students in private and public medical colleges is presented in Table 4. The results indicate that the difference is not statistically significant ($p > 0.05$), leading to the retention of the null hypothesis. This suggests that there is no statistically significant difference in LMS perception between clinical and preclinical years.

DISCUSSION

The primary finding of this research highlights that students perceive the Learning Management System (LMS) as efficient and highly user-friendly, leading to a high level of satisfaction. They consider it a valuable platform for effortless communication and idea exchange with their peers. The perceived advantages of learning management systems were also brought to light by Alumona

Table No 1: Mean analysis of the students' attitudes and experiences towards the ease of use, navigability, and overall user experience of the LMS.

Statement	3.03	1.076	Remarks
I can easily connect and share data and information with my classmates using the LMS tools in class.	3.2	1.038	Accepted
I can efficiently and effortlessly move and access my contents and activities from one technological application to another application.	3.95	1.288	Accepted
I find it helpful that I can revisit online content (videos, texts, etc) whenever I find something hard to understand.	3.19	1.001	Accepted
I can easily control how fast or slow I go through the lesson in LMS.	3.26	1.069	Accepted
I found out that there is always more to a topic that I already know through the LMS.	3.4	0.962	Accepted
I am free to look up further on my own topic discussed in out-of-class activities.	3.51	0.912	Accepted
I find mid-assessments helpful because I will know if I need to revisit the first few parts before proceeding.	3.25	1.011	Accepted
I am properly given meaningful feedback to improve my performance in class.	3.38	1.001	Accepted
I can get a better idea of what works better and needs improvement with the scores given after every assessment.	3.36	1.019	Accepted
I can improve my own learning by using the immediate feedback given through LMS.	3.21	1.072	Accepted
I can effectively communicate and exchange ideas with my teacher and classmates on topics being discussed in and outside the classroom.	3.13	1.005	Accepted
I get to experience a learning session that encourages a group participation with the aid of the LMS.	3.13	1.005	Accepted
Average Mean Score = 3.32			
Criterion Mean = 3			

Table No 2: Mean analysis of the students 'views on the efficacy of LMS in supporting their learning.

Statement	Mean	SD	Remarks
I am able to access the appropriate videos, links, and other content that I need using LMS.	3.4	1.085	Accepted
I am well-guided by the well-stated instructions and requirements on LMS, so I can work confidently on my own.	3.13	1.098	Accepted
I find the activities given through LMS engaging.	3.18	1.085	Accepted
I find the content collected in the LMS relevant to me and possibly my other classmates.	3.43	0.94	Accepted
I learn better and faster because I communicate with my fellow learners when I am doing the activities/tasks given through LMS.	3.2	1.052	Accepted
I am able to save time in taking down notes because I have access to the slides, presentations, instructional videos and online textbooks used in class.	3.47	1.056	Accepted
I find my learning experience flexible because of the varied class activities in the LMS.	3.27	1.02	Accepted
I find the combined use of online and classroom resources effective in learning new concepts.	3.55	0.969	Accepted
Average Mean Score= 3.48			
Criterion Mean= 3			

Table No 3: T-test analysis of the difference between the perception of private and public sector medical colleges' students regarding LMS

Status	n	Mean	SD	P	t
Public	214	3.18	0.749	0.011	-4.44
Private	210	3.47	0.604		
□=0.05					

Table No 3: t-test analysis of the difference between the perception of private and public sector medical colleges' students regarding LMS

Year of Study	n	Mean	SD	P	t
Preclinical	233	3.41	0.675	0.723	2.831
Clinical	191	3.22	0.709		
□=0.05					

in his research. [12]

The other key aspect of LMS usability is the flexibility it provides in accessing learning materials. The ability to revisit online content, such as videos, texts, and other resources, was particularly beneficial for students. Similarly, a study by Simanullang and Rajagukguk found that Moodle enhances student learning by offering access to diverse learning materials. [13] Our findings also align with Sayfouri, who emphasized that LMS platforms provide a comprehensive set of features, such as interactive books, assignments, announcements, quizzes, discussion forums, chat options, labels, and external resource links. [14] LMS also facilitated group participation, enabling students to engage in collaborative learning experiences. This is consistent with the study conducted by Steven D. Lonn, which demonstrated that students found LMS useful to facilitate their groups' peer interaction and collaboration within the context of a course-related group project. [15] The findings of this study also suggest that LMS is perceived by students as highly efficient in supporting their learning.

One of the significant advantages of LMS perceived by students, was its time-saving capability. LMS allows students to engage with the material at their own pace. These findings are supported by Cao Thi, indicating that LMS helps students manage course content effectively and saves them time traveling between their homes and campus. [16] Students also found the combined use of online and classroom resources—an approach commonly referred to as blended learning the proven potential to enhance both the effectiveness and efficiency of meaningful learning experiences, as highlighted by Garrison and Kanuka. [17]

Private college students found it more user-friendly than public sector students, which is similar to a Pakistani study that concluded that student satisfaction in Pakistani educational institutions is contingent on a variety of factors, which highlights the need for targeted improvements in teaching methods, resource provision, and infrastructure development. [18]

Our results indicated no significant difference in how clinical and preclinical year students perceived the LMS. This finding is supported by previous research, which discovered that both preclinical and clinical students recognized the value of LMS integration in their curriculum, emphasizing its role in enhancing their overall learning experience. [19]

However, a key limitation of our study is the relatively small sample size, which may not fully represent the broader population of medical colleges. Future research with a larger and more diverse sample is recommended to strengthen the generalizability of these findings.

CONCLUSION

This study aims to offer context-specific insights on students' experiences with learning management systems (LMS) at both public and private medical colleges, despite the consensus on their advantages in medical education. The findings not only emphasise strengths, including usability and perceived efficiency, but also indicate opportunities for focused enhancement in implementation and assistance. This information will feed future initiatives for improving the integration of learning management systems across diverse institutional contexts.

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Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Afridi SG	✓	×	✓	×	✓	×
Zain K	✓	✓	×	✓	✓	×
Mahsood N	×	✓	×	×	✓	×
Noor N	✓	✓	✓	×	✓	✓
Noori M	×	✓	×	×	✓	×
Kashif L	✓	✓	✓	×	✓	✓

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

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EXPLORING THE RELATIONSHIP BETWEEN THYROID STIMULATING HORMONE (TSH) AND FERRITIN IN THE THIRD TRIMESTER: IMPLICATIONS FOR FETAL OUTCOMES

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ABSTRACT

Objective: Thyroid diseases affect 2%-33% of pregnant women. Maintaining TSH levels during pregnancy is crucial for normal thyroid function, and iron deficiency undermines thyroid hormone synthesis and metabolism. Understanding these relationships can optimize maternal and neonatal health. This research aims to explore this connection.

Materials & Methods: This cross-sectional study was conducted at Darul-Sehat Hospital, involving 174 participants with a 13.2% prevalence of thyroid dysfunction in the third trimester of pregnancy. Convenience sampling was used, enrolling women with singleton pregnancies in labor regardless of iron supplementation status. Demographic and medical details were recorded. Blood specimens were collected for CBC, TSH, and Ferritin during the third trimester or at the onset of labor. Neonatal outcomes included birth weight, Apgar score, birth defects, low birth weight, preterm birth, birth asphyxia, hyperbilirubinemia, hypothyroidism, and NICU admissions.

Results: In this study, 20.6% of neonates were preterm, and 47.7% were admitted to NICU. TSH and Apgar scores were significant, with p-values of 0.05 and 0.03. A significant weak inverse correlation was seen between TSH and serum ferritin levels (P-value<0.05).

Conclusion: The research findings indicate a notable negative association between maternal TSH and serum ferritin concentrations, demonstrating a connection where decreased iron reserves are associated with elevated TSH levels

Keywords: Pregnancy, Thyroid Stimulating Hormone, Serum Ferritin, Third Trimester, Neonate

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INTRODUCTION

Pregnancy embodies a significant phase of physiological adjustment distinguished by complex hormonal and metabolic alterations. Within this context, the maternal thyroid function and iron metabolism are pivotal in facilitating fetal growth and development. [1] Thyroid hormone is vital for fetal neurodevelopment, while adequate iron stores are essential for erythropoiesis and oxygen transport. [2] Despite their significance, emerging evidence suggests a potential interplay between thyroids function and iron metabolism during pregnancy. [3]

In women of reproductive age, thyroid diseases are the second leading cause of endocrine disorders affecting at least 2%–3% of pregnant women. [4] Pregnancy-related hypothyroidism is more common in low and middle-income nations than in developed nations, with reports ranging from 5 to 31.6%. [5] According to recommendations of the European Endocrine Society, TSH levels should be maintained between 0.2-<2.5 mU/L in the first trimester of pregnancy and between 0.3-3 mU/L in the 2nd and 3rd trimesters. [6] A variety of trace elements are necessary for normal thyroid function, and iron is one of them. Iron deficiency undermines the synthesis and metabolism of thyroid hormones. [7]

Given the intertwined roles of thyroid hormones and iron in fetal development, understanding their relationship may provide valuable insights into optimizing maternal and neonatal health outcomes. Prior research has suggested a possible connection between thyroid

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dysfunction and iron deficiency in pregnant women. To our knowledge, not much work is done on Pakistani women. Nonetheless, the exact dynamics of this association and its influence on the health of the fetus are not fully grasped. The primary objective of this research is to address this knowledge gap by thoroughly examining the correlation among maternal TSH levels, serum ferritin levels in the third trimester of pregnancy, and fetal outcome

MATERIALS AND METHODS

After receiving approval from the institutional review board (DSH/IRB/2022/0014), this cross-sectional study was carried out in the Obstetrics and Gynecology and Pediatric department at Darul Sehat Hospital from March 2022 to October 2022. To achieve a 95% confidence level with a ±5% margin of error, a sample size of 174 participants was determined based on a 13.2% prevalence of thyroid dysfunction in the third trimester of pregnancy, utilizing the WHO sample size calculator. [8] A non-probability convenience sampling approach was utilized, enrolling women with singleton pregnancies in their third trimester who were in labor, regardless of their iron supplementation status during pregnancy. Exclusion criteria encompassed women with multiple pregnancies or underlying conditions such as diabetes mellitus, hypertension, renal disorders, or other medical ailments.

Following the acquisition of verbal informed consent, interested individuals were enrolled in the study. Comprehensive demographic and medical details of the participants were recorded, and a thorough general physical examination in addition to a pelvic ultrasound was performed to determine gestational age and ensure normal pregnancy progression. Blood specimens were collected from all participants during the third trimester, and for those who were unbooked, samples were obtained at the onset of labor to analyze complete blood count (CBC), thyroid-stimulating hormone (TSH), and serum ferritin levels. The gathered data was duly documented, and upon delivery, information regarding the mode of delivery and neonatal outcomes was meticulously noted. Neonatal assessments involved parameters such as birth weight, Apgar score, presence of birth defects, occurrence of intrauterine growth restriction (IUGR), low birth weight, preterm birth, birth asphyxia, hyperbilirubinemia, hypothyroidism, as well as Neonatal Intensive Care Unit (NICU) admissions, accompanied by the reasons for admission.

Data analysis will be done using SPSS version 23. For quantitative variables such as demographic features and lab investigations mean and standard deviation is recorded. Qualitative variables are reported as frequency and percentages. To test for association, a chi-square test will be applied keeping a p-value of <0.05 as statistically significant. Normality of the data was checked by the Shapiro-Wilk test. Due to the non-normal distribution of all continuous variables, they were presented as Median (interquartile range) while categorical variables were presented with frequency (percentages). Mann Whitney U test and chi-squared test were applied to compare variables between groups. Spearman correlation was used to check the relationship between variables. A correlation coefficient of <0.3 was considered a weak correlation, a correlation coefficient between 0.3 to 0.7 was considered a moderate correlation, and a correlation coefficient of >0.7 was considered a strong correlation. P-value<0.05 was statistically significant.

RESULTS

Overall, 174 pregnant women participated in the study with a median (IQR) age of 30 (25-33) years. The median (IQR) of the gravida, parity, and non-viable pregnancies were 2 (1-4), 1 (0-2) and 0 (0-1) respectively. The Median (IQR) of Hemoglobin, Hematocrit, MCV, MCH, MCHC, and TLC in 3rd trimester were observed to be 10.45(9.9-11.3), 32(31-34), 82.5(79-87), 28(26-30), 32(31-33), and 8400(7400-9850) respectively. Eight-eight (50.6%) women had serum ferritin levels between 15-30 mcg/L. Peripheral film at booking visit demonstrated that normocytic normochromic was present in the majority of women (66.7%), followed by microcytic hypochromic in 24.1%, normochromic anisocytosis in 4.6 %, normocytic hypochromic in 2.9 %, and macrocytic presented in only 1.7% women. Most of the women (78.7%) were taking oral iron supplements whereas the rest were taking injectable iron supplements (21.3%). The frequency of hypothyroidism was found to be 12.1%. Table 1 presented a comparison of baseline characteristics between women with euthyroid and hypothyroid. No significant difference was observed in any parameter.

Most of the women had elective LSCS 71 (40.8%), followed by normal vaginal delivery 60 (34.5%) and emergency LSCS 38(21.8%). Only 03 had VBAC (1.7%) while 02 had instrumental vaginal delivery (1.1%).

Data presented as n (%) or median (interquartile range); P-value<0.05 is considered to be statistically significant.

In this study 36(20.6%) neonates were born Preterm, with low birth weight being 28(16%). 83 (47.7%) neonates were admitted to NICU. Moderate to severe hyperbilirubinemia was seen in 37(21.2%) neonates requiring Phototherapy. The analysis revealed no significant difference in mode of delivery, gestational age, NICU admission, and various neonatal parameters including birth weight and bilirubin level (P-value$>$ 0.05). Notably, TSH and Apgar scores were significant with p values of 0.05 and 0.03 respectively as shown in Table 2 Data presented as n (%); P-value<0.05 considered to be statistically significant

DISCUSSION

Thyroid dysfunction during pregnancy has been increasingly recognized for its potential to adversely affect both maternal and fetal health. [9] Iron deficiency impairs thyroid function by disrupting thyroid peroxidase activity, essential for hormone synthesis, leading to elevated TSH levels and potential hypothyroidism during pregnancy. [10, 11]

The results of our study discovered a weak but significant inverse link between maternal TSH and serum ferritin levels in the third trimester, implying that lower iron stores are linked to higher TSH levels. Maternal hypothyroidism was associated with elevated neonatal TSH levels, while no significant associations were found with other fetal outcomes.

Iron deficiency may impair thyroid function during pregnancy, emphasizing the necessity for integrated monitoring and treatment of both conditions. The weak inverse correlation between maternal TSH and serum ferritin levels suggests that pregnant women with higher TSH levels may have lower iron stores, potentially impacting iron metabolism. Monitoring and managing both thyroid function and iron levels is crucial for optimal maternal and fetal health outcomes.

A study conducted in China in 2022 showed an association in pregnant women between their iron status and thyroid hormone levels, SF and Hb were negatively correlated with TSH, and a similar result was found in our study. [12] Similar results were found in a study conducted in India by Gupta et al. but it was conducted in the first trimester so the fetal outcome was not assessed.

The results suggest that lower ferritin levels are linked to higher TSH levels, indicating a potential relationship between iron deficiency and thyroid function in pregnant females during the first trimester. [13] A study conducted in Bulgaria during the third trimester of pregnancy showed a strong positive correlation between TSH (thyroid-stimulating hormone) and serum ferritin levels. This correlation indicates a parallel increase of TSH secretion induced by decreased thyroxine concentration, reflecting the dynamic interplay between iron and thyroid status in pregnant women, as compared to this our study discovered a weak but significant inverse link between maternal TSH and serum ferritin levels in the third trimester implying that lower iron stores are linked to higher TSH levels. [14]

A study conducted in Hyderabad showed the frequency of thyroid disorders in anemic pregnant women to be 23.5% during 1st trimester of pregnancy, highlighting the fact that screening for thyroid disorders in iron-deficient anemic women should be considered to offer well-timed treatment for avoiding the related complications. However this study only iron-deficient women were screened. [15]

Iron deficiency was not found to be significantly associated with hypothyroidism in the study conducted at JSS Hospital in India, contrary to expectations based on previous research and the results of our study linking iron and thyroid status in pregnant women. [16]

Our findings are consistent with other studies which showed an inverse relationship of maternal ferritin with the weight of newborns at birth. [17 and 18] Maternal iron accumulation has been proposed to raise blood viscosity, which could lead to poor uteroplacental circulation and, ultimately, poor fetal development. [19]

Our study has revealed a weak insignificant correlation between maternal ferritin and neonatal hyperbilirubinemia. A nested case-control study by Mohamad Ali Moghimi et al. compared excess iron supplementation

Table No 1: Baseline characteristics of participants concerning thyroid categories

Parameters	Euthyroid	Hypothyroid	P-value	Overall
N	153(87.9%)	21(12.1%)		174
Maternal age (years)	30(25-33)	30(25-33.5)	0.937	30(25-33)
Gravida	2(1-4)	2(1-4)	0.705	2(1-4)
Parity	1(0-2)	1(0-3)	0.501	1(0-2)
Non-viable pregnancies	0(0-0)	0(0-1)	0.620	0(0-1)
Hemoglobin	10.5(10-11.3)	10.4(9.5-11.3)	0.666	10.45(9.9-11.3)
Hematocrit	32(31-34)	32(28-33)	0.129	32(31-34)
Serum ferritin	15(9.35-22.5)	12(8.8-22.5)	0.592	15(9.38-22.25)
Serum ferritin < 15 mcg/L	75(49%)	11(52.4%)	0.773	86(49.4%)
Serum ferritin 15-30 mcg/L	78(51%)	10(47.6%)		88(50.6%)
Iron supplementation				
Oral iron	123(80.4%)	14(66.7%)	0.149	137(78.7%)
Injectable iron	30(19.6%)	7(33.3%)		37(21.3%)

Table No 2: Association with mother's ferritin levels with neonatal outcome

		weight of baby at birth				P value	Total
		<1.5	**1.6-2.4**	2.5-3.5	>3.5		
	serum ferritin < 15 mcg/L	1(33.3)	9(36)	70(51)	6(66.6)		86
	serum ferritin >15-30mcg	2(66.6)	16(64)	67(48.9)	3(33.3)	0.34	88
Total		3(1.7)	25(14.4)	137(78.7)	9(5.2)		174
		total bilirubin				**P value**	**Total**
		<9.9	10-15.9	16-19.9	>20		
	serum ferritin < 15 mcg/L	37(56)	35(49.2)	12(36.3)	2(50)		86
	serum ferritin >15-30mcg	29(43.9)	36(50.7)	21(63.6)	2(50)		88
Total		66(37.9)	71(40.8)	33(19)	4(2.3)		174
		gestational age at delivery				P value	Total
		32-36	37-42				
	serum ferritin < 15 mcg/L	17(47.2)	69(50)			0.76	86
	serum ferritin >15-30mcg	19(52.7)	69(50)				88
Total		36(20.7)	138(79.3)				174
		TSH of baby				P value	Total
		<8	>8				
	serum ferritin < 15 mcg/L	82(48.2)	4(100)				86
	serum ferritin >15-30mcg	88(51.7)	0			*0.05	88
Total		170(97.7)	4(2.3)				174
		NICU admission				P value	Total
		yes	no				
	serum ferritin < 15 mcg/L	35(42.1)	51(56)				86
	serum ferritin >15-30mcg	48(57.8)	40(43.9)			0.67	88
Total		83(47.7)	91(52.3)				174
		Apgar score at 1 minute				P value	Total
		4-6	>7				
serum ferritin	serum ferritin < 15 mcg/L	5(26.3)	81(52.2)			*0.03	86
	serum ferritin >15-30mcg	14(73.6)	74(47.7)				88
Total		19(10.9)	155(89.1)				174

Data presented as n (%); P-value<0.05 considered to be statistically significant

Table No 3: Association of maternal ferritin with neonatal outcomes

Parameters	r	P-value
Weight of baby at birth	-0.135	0.037
Apgar score at 1 minute	-0.162	0.016
TSH of baby	-0.155	0.020
Total bilirubin	0.124	0.051
Gestational age at delivery	-0.023	0.384
NICU admission	-0.139	0.034

r: correlation coefficient; P-value<0.05 considered to be statistically significant

may be associated with neonatal hyperbilirubinemia. [20]

This study is subject to various limitations. To begin with, its observational methodology does not permit the establishment of a causal relationship between thyroid function and iron levels. Moreover, the relatively small sample size of 174 female participants may lack representativeness of the broader population, thus affecting the generalizability of the results.

This research emphasizes the importance of monitoring thyroid function and iron levels in pregnant women to optimize maternal and fetal health. An analysis shows a correlation between maternal TSH and serum ferritin levels, indicating a thyroid-iron interplay. Maternal hypothyroidism may influence neonatal TSH levels, but further research is needed on other fetal outcomes. More investigation is warranted to understand the interconnected mechanisms and support updated clinical guidelines. The findings are consistent with the hypothesis, showing a strong link between elevated maternal TSH levels and decreased serum ferritin levels, backing the anticipated connection between thyroid activity and iron processing. Moreover, the documented relationship between maternal hypothyroidism and increased neonatal TSH levels validates the assumption about its impact on fetal thyroid operation.

CONCLUSION

The research findings indicate a notable negative association between maternal TSH and serum ferritin concentrations, demonstrating a connection where decreased iron reserves are associated with elevated TSH levels. This implies that insufficient iron levels could hinder thyroid functionality in pregnant individuals. Analysis of neonatal results revealed no substantial distinctions, apart from elevated TSH levels in the offspring of mothers with hypothyroidism. These results emphasize the importance of comprehensive monitoring of both iron and thyroid levels in pregnancy to enhance the well-being of both the mother and the fetus.

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Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Munaver SA	✓	×	✓	×	✓	×
Bham SQ	✓	✓	×	✓	✓	×
Shaheen N	×	✓	×	×	✓	×
Akhter AN	✓	✓	✓	×	✓	✓

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

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ORIGINAL ARTICLE

ATTITUDE OF MEDICAL STUDENTS TOWARDS THE USE OF MENTAL HEALTH SERVICES AND OBSTACLES FACED BY THEM

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ABSTRACT

OBJECTIVES: Mental health problems affect a person's mental as well as physical abilities. The medical community is considered to be free of mental disorders, but this is not true in practice. Medical students suffer from illnesses like other students. There is also a high prevalence of stigma among medical students regarding mental illnesses. Therefore, in this study, we wanted to assess medical students' attitudes toward using mental healthcare services and the obstacles they face in accessing mental health facilities in Khyber Pakhtunkhwa, Peshawar.

METHODS AND MATERIALS: A cross-sectional study was conducted among medical students in Peshawar. A questionnaire-based online survey was used to collect data through Google Forms. Our sample size was 197. Data analysis was done using the IBM SPSS Version 20, and MS Excel Version 2010 was used to make graphs and figures.

RESULTS: In our study, 197 medical students participated voluntarily. The attitude of the majority of the medical students (68%) towards the use of mental health services was negative, while the rest (32%) showed a positive attitude. The obstacles with the highest mean value of 11.99 were attitudinal. Some other important obstacles were a lack of awareness about the availability of mental health services, stigma, confidentiality concerns, and fear of documentation.

CONCLUSIONS: Our study findings showed that the majority of the participants had negative attitudes towards seeking mental health services. And the most important barrier to getting medical assistance was the attitudinal barrier.

KEYWORDS: Mental health, mental illnesses, stigma, medical students, depression, mental health services, obstacles

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INTRODUCTION

Mental illness is a major contributor to disability worldwide. Mental health problems not only affect a person's mental abilities, like cognitive abilities, but they also come with physical disabilities and mental disorders. [1] It has been shown in a study that mental distress can cause physical disabilities like cardiovascular diseases, arthritis, and COPD. [2]

In the Diagnostic and Statistical Manual of Mental Disorders (DSM 4), mental disorders are defined as 'clinically significant behavioral or psychological syndrome that occurs in an individual and is associated with present distress or disability or with a significantly increased risk of suffering from mental pain, disability, and death.' [3]

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The medical community is often seen as invulnerable, yet mental health issues are highly prevalent among medical professionals. However, many hesitate to seek help for their mental health concerns. [4] Medical students face a higher risk of depression, burnout, and other mental illnesses compared to the general population.". [5] Several predisposing factors cause psychological distress in medical students, like adjustment to a medical school environment, exposure to death and human sufferings, ethical conflicts, high-grade assessments, and personal life events, and this distress can lead to serious mental illnesses and can affect the academic progress of medical students. [6] A study on medical students has found that only a small percentage, despite being part of the medical community, seek mental health services. Several barriers contribute to this, including limited time, concerns about confidentiality, and anxiety over having their mental health documented in academic records, failure to recognize or deny that there is some problem, normalization of symptoms, fear of stigmatization, and inability to recognize the symptoms like lack of motivation, low mood, etc. [7-8] a one-time survey of 194 first- and second-year medical students was conducted in the School of Medicine at the University of California, San Francisco. Outcome measures were self-reported use of counseling services, barriers to use,

suicidal ideation, and depressive symptoms as measured by the 13-item Beck Depression Inventory (BDI

Compared to the West, there is a high chance of stigmatization and discrimination against individuals with mental illnesses in Asia, and there are more obstacles to mental healthcare seeking in Asia, as people are more likely to approach supernatural, religious, and magical ways to treat any mental illness rather than medical treatment. Another factor is the lack of financial resources in developing countries in Asia. [9]

Generally, Asian cultural norms harm the attitude of Asians towards seeking professional help and seeing a professional counselor. [10] In a previous study, it was found that South Asians had a less positive attitude towards mental healthcare seeking as compared to Caucasians, and personal stigma was the main mediator for this attitude. [11]

The purpose of our study is that there is more literature about the issue of obstacles faced by the general population around the world, but little is known about the attitude of medical students about this topic, particularly in our part of the region, especially Peshawar, Pakistan.

Therefore, in this study, we want to assess medical students' attitudes toward the use of mental healthcare services and to know the obstacles/barriers faced by them in attaining mental health facilities in Peshawar, KP, Pakistan.

MATERIALS AND METHODS

The study was conducted in 4 medical colleges of Peshawar, including Khyber Medical College, Khyber Girls Medical College, Rehman Medical College, and North West School of Medicine, from 1st May 2021 to 1st July 2021. The sample size comprised 197 MBBS students, and the sampling technique was non-probability convenience sampling.

A questionnaire-based online survey was used to collect data through Google Forms, in which the attitude of medical students of Peshawar towards the use of mental health services and the obstacles they face were measured. Data was collected on a questionnaire, which consisted of 3 parts. The 1st part consisted of basic demographic information, i.e., age, gender, name of institute they belonged to, year of study, and socioeconomic status.

The 2nd part had ten questions regarding attitudes toward obtaining professional assistance taken from the Attitude Towards Seeking Professional Psychological Help scale-short form (ATSPPH-SF) questionnaire measured on a four-point Likert scale.

The 3rd part consisted of 24 questions about obstacles faced in seeking mental health services taken from the Barriers to Access to Care Evaluation (BACE-V3) questionnaire, which was also measured on a Likert scale. A Pilot test was done, and the questionnaire was sent online to the participants, chosen as a sample, through WhatsApp groups of different colleges.

Participation was optional, and participants had the freedom to withdraw from the study at any stage. The data were analyzed by using IBM SPSS version 20, in which we used descriptive statistics to find percentages and frequencies for categorical variables, while for continuous variables, we calculated the means and standard deviation. Microsoft Excel Version 2010 was used to make graphs and figures.

RESULTS

In our study, 197 medical students participated. Participants' ages varied from 18 to 25 years, with an average age of 21.42 years. (Figure 1). Among them, 34% were males and 66% were females

The percentage of respondents from each medical college and their years of study are shown in Figures 2 and 3. (KGMC: Khyber Girls Medical College, KMC:

Table No 1: Characteristics of study participants (n=230)

Obstacles		Percentage (%)
Instruments Obstacles	Being unsure where to go to get professional care	10.7
	Problems with transport or travelling to appointments	7.6
Attitudes Obstacles	Wanting to solve the problem on my own	24.9
	Preferring to get alternative forms of care (e.g., traditional/religious healing or alternative/ complementary therapies)	20.8
	Thinking the problem would get better by itself	16.2
	Preferring to get help from family or friends	15.2
	Concerns about the treatments available (e.g. medication side effects)	14.7
	Dislike of talking about my feelings, emotions or thoughts	13.2
Stigma-related Obstacles	Concern about what my family might think, say, do or feel	17.3
	Not wanting a mental health problem to be on my medical records	8.1
	Concern that people might not take me seriously if they found out I was having professional care	7.6

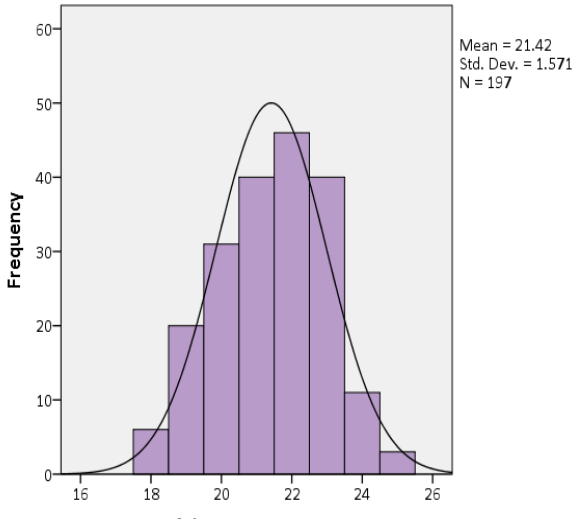

Fig 1: Age distribution of the participants

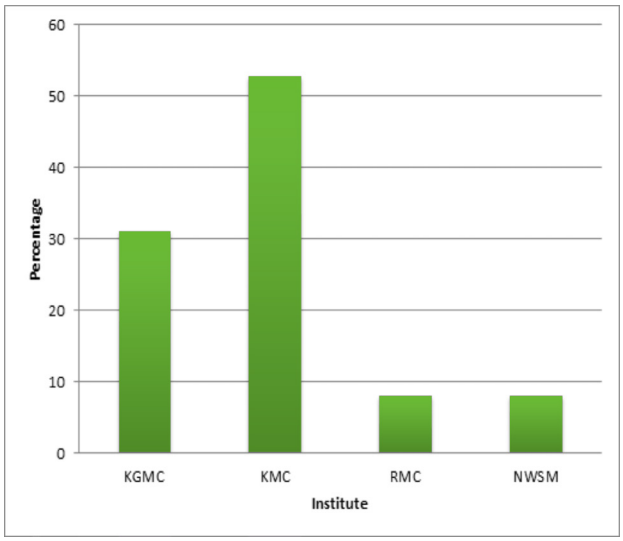

Fig 2: Response of Participants Belonging to Different Institutions

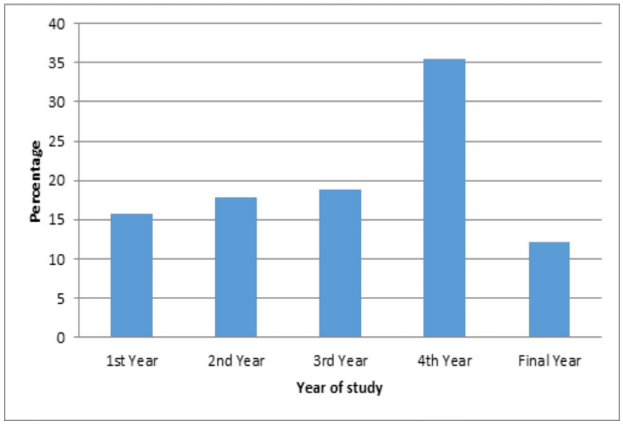

Fig 3: Responses of Participants By Year of Study

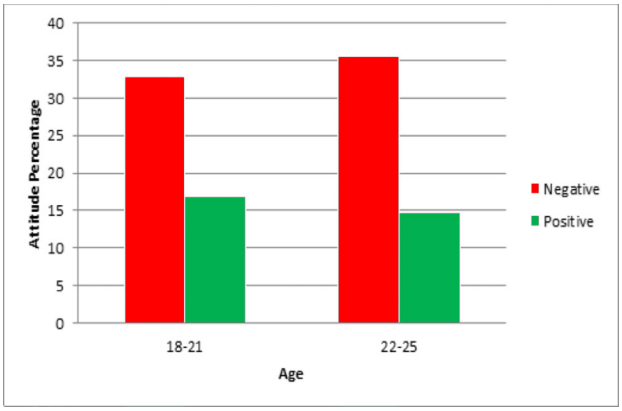

Fig 4: Relation of Attitude with Age

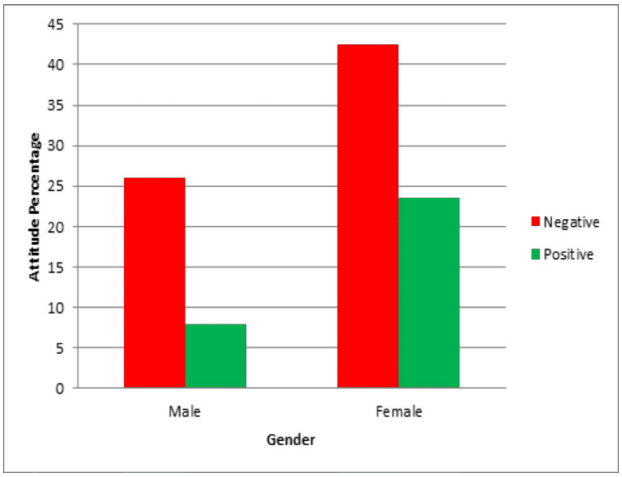

Fig 5: Attitude of Participants According to Gender

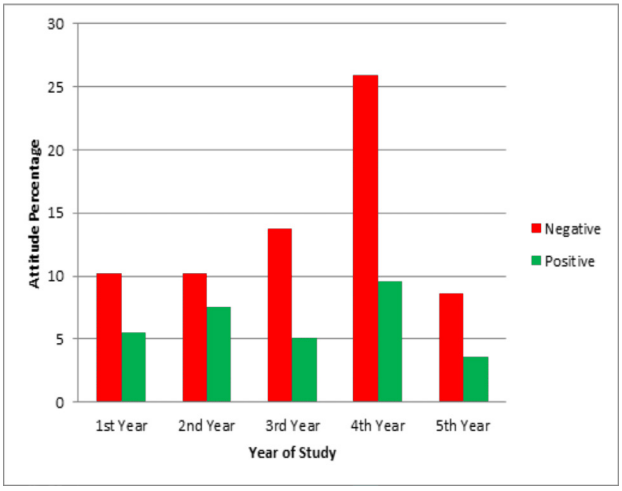

Fig 6: Attitude of Participants by Year of Study

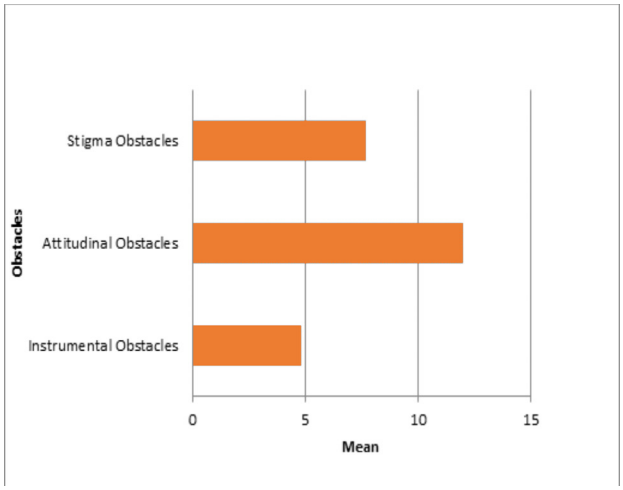

Fig 7: The Responses of Participants Regarding Different Obstacles

Khyber Medical College, RMC: Rehman Medical College, NWSM: North-West School of Medicine)

The attitude of the majority of the medical students (68%) towards the use of mental health services was negative, while the rest (32%) showed a positive attitude. The percentage responses of positive and negative attitudes of participants according to their age are shown in Figure 4. Figure 6 shows the participants' attitude relationship with their study year.

For the obstacles faced by medical students, we decided to focus on three categories of barriers that were: Stigma obstacles, Attitudes obstacles, and Instrument obstacles. Among these, attitude obstacles had the highest mean value of 11.99, followed by instrument obstacles with a value of 7.69, and Stigma obstacles with the lowest mean value of 4.80. See Figure 7 and Table 1 for details.

DISCUSSION

People's perceptions and attitudes toward mental illness influence how they experience and express emotional struggles and psychological distress, as well as their willingness to disclose symptoms and seek help. In many Asian cultures, including Pakistan, discussing mental health is considered taboo, reinforcing the belief that mental illness is shameful and should be kept private. In our country, mental health and its care have not been prioritized, despite growing international attention. As long as medical schools continue to rely on outdated methods of teaching psychiatry, using the most critically ill patients in mental hospitals as case studies, progress in mental health will remain limited. Pakistan requires further research to explore how different risk factors contribute to the widespread occurrence of mental health disorders in the country. To our understanding, this is the inaugural study exploring the viewpoints of students from medical colleges in Peshawar towards the utilization of professional mental health services when dealing with mental health issues, and also to investigate the hurdles regarding pursuing treatment.

The primary result of this study was that most students had negative perceptions about seeking professional mental health services, and the foremost obstacles faced by them were attitudinal. In our study, 68% of the medical students showed a negative attitude toward availing mental health services, which showed that they did not agree with resolving mental health issues clinically. Females showed slightly higher reluctance towards the use of these services.

According to our results, a different study investigated the utilization of psychological support services among women in Pakistan and showed that the usage of professional psychological support services by women in Pakistan is very limited because they may be fearful that their confidentiality may not be maintained. [24] There were no significant findings about the age of participants with their outlook on using professional help for their psychological problems. However, Age group 2 (22-25 years) showed a slightly higher negative attitude (35.6%) as compared to Age group 1 (18-21 years), 32.9%. These findings were similar to a study conducted by Golberstein et al., which showed that older students perceived more stigma, which can be the reason for their reluctance to seek help. [14] Another study conducted in Abbottabad, Pakistan, also confirms that the age group of 20-30 years had a comparatively higher negative attitude, i.e., 84.1%. [12]

Regarding the year of study about the attitude toward seeking professional help, we found that final-year students showed the least negative attitude (8.9%), which may be attributed to their greater clinical exposure to psychiatric patients and a better understanding of mental health issues in different patients. However, a study conducted in Gujrat, India, showed that with the increasing academic year, there was an increase in stigma about disclosing mental illness and fear of discrimination by colleagues. [15] The second portion of the study was based on the obstacles faced by medical students of Peshawar, for which the obstacles were divided into three categories, i.e., attitudinal obstacles, Stigma-related obstacles, and Instrument obstacles.

Our study showed that most of the obstacles faced

by the students in availing of mental health services were attitudinal obstacles, which included their beliefs and restraints about cure and treatment. Many of the respondents believed that they could solve their problems by themselves. These findings are in par with a study conducted in Sudan, showing that 60% of the participants preferred dealing with the problem alone. [13] However, a significant number of our participants also believed in alternative methods, including traditional or religious healing, to overcome mental health issues.

In previous studies conducted in Nigeria, the preference for religious means for treating a mental illness over medical treatment was reported. [16-17] It was also reported that the majority of the respondents view psychological disorders as a sin, and sometimes it is attributed to the influence of evil spirits. Over half of the respondents would turn to spiritual counseling when experiencing active suicidal thoughts, which are considered a psychiatric emergency. Such belief systems often contribute to the high rates of death and illness associated with mental disorders. [18-19] The emphasis on spirituality in mental illness is also reported in another study. [20] A study conducted by the WHO showed that most of the respondents felt that prayer plays a crucial role in managing feelings of depression or anxiety. [18]

Our data showed that the majority of the participants had concerns about the side effects of medication as they had no clear idea about the drugs used for treatment and deemed it unnecessary [21] Our findings also showed students believe that they will solve their issues by getting help from relatives or the problem will get better over time. These findings are also consistent with a study conducted among undergraduate medical students in Sri Lanka. [22]

In our study, Stigma-related obstacles accounted for another major obstacle to obtaining support for mental health concerns. These obstacles included concerns about the reaction of the family, fear of documentation in medical records, and fear of societal judgment or stigma. For those struggling with psychological challenges, the stigma and discrimination they encounter can intensify their problems, making recovery more difficult. The fear of judgment often leads individuals to avoid seeking the treatment they need, as mental health care is still considered a taboo subject in our society. Findings from a UK-based study indicate that medical students are more inclined to manage their mental health on their own or seek unofficial support from family or friends within the medical field, with this behavior being learned early in their academic journey. [23] This tendency of managing personal medical concerns privately may be influenced by a fear of having the issue documented by the institution. A similar fear of academic repercussions has been highlighted in a study involving medical students in the US. [24] Another study also investigated stigma-related barriers to help-seeking. One of the major findings of this study is the concern over documentation, which may influence professional students' readiness to practice. This has been recognized as a significant obstacle to seeking assistance, particularly among medical students. [25-26]

Instrumental obstacles were also observed to be a barrier faced by medical students in our study. The lack of awareness about the availability of services offered by mental health departments in hospitals and private clinics led the students not to seek help in case of need. Students were also concerned about traveling and transport to appointments in case they opt to seek professional help. These findings are similar to a previous cross-sectional survey conducted among young adults in the UK. [27]

Mental health is important, so health sciences students should be reminded of the benefits of regular exercise, a healthy diet, enough sleep, and avoiding harmful habits. Mindfulness also helps reduce stress and can be especially useful for these students.[28] Medical students should receive clear guidance on professional competency requirements from the start of their curriculum. Providing timely information about mental health can help reduce fear and encourage students to seek support without delay.

This research study provides the basis for making approaches to developing interventions aimed at reducing stigma within medical schools. The study highlights the need for educational focus on mental disorders as a physical illness rather than a sign of psychological vulnerability, along with the critical importance of patient confidentiality and its resulting impact on emotional distress levels.

CONCLUSION

High stigma exists among medical students of Peshawar about disclosing mental illnesses, which is holding them back from seeking medical help, leading to the worsening of their conditions. Female students felt these stigmas more strongly. Our study findings showed that the majority of the participants had negative attitudes

towards seeking mental health services; however, due to more clinical exposure to psychiatric patients and a better understanding of mental health issues, final-year students showed the least negative attitude. Apart from a lack of awareness about the availability of mental health services, social pressure, confidentiality concerns, and fear of documentation/ treatment cost, the most important barrier to getting medical assistance is the attitudinal barrier. This gives rise to an alarming situation, needing extensive awareness programs, analyzing the cause of stigma among future healthcare providers, and bringing much-needed grassroots-level changes in medical curricula.

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Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Mumtaz S	✓	×	✓	×	✓	×
Rahman M	✓	✓	×	✓	✓	×
Kazmi W	×	✓	×	×	✓	×
Saleem S	✓	✓	✓	×	✓	✓
Khalil N	✓	×	✓	×	✓	×
Jahan B	✓	✓	×	✓	✓	×
Fatima R	×	✓	×	×	✓	×
Safiyyah	✓	✓	✓	×	✓	✓
Ammara	✓	✓	×	✓	✓	×

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ORIGINAL ARTICLE

SPECTRUM OF CHANGES IN HAEMATOLOGICAL PARAMETERS IN DIFFERENT LEUKEMIAS

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ABSTRACT

Objective: To determine the spectrum of changes in hematological parameters in Leukemia subtypes.

Materials and Methods: This descriptive cross-sectional study was conducted at Khyber Teaching Hospital in Peshawar from January 2024 to July 2024, after obtaining ethical approval from the Institutional Review and Ethical Board, using a non-probability purposive sampling technique. In this study, a total of 69 patients with acute and chronic leukemias were included. A Sysmex hematology analyzer was utilized to perform complete blood counts. The full blood count findings were recorded and analyzed using SPSS-23. The mean and standard deviation were applied to analyze quantitative variables, while qualitative data was examined as frequency and percentages.

Results: The average age of the study participants was 18 ± 13.94 years. The changes in blood counts included low hemoglobin levels in 68.5%, 82.35%, 100%, and 88% of ALL, AML, CLL, and CML cases, respectively, and a high TLC count in 60%, 41%, 62%, and 59% of ALL, AML, CLL, and CML cases, respectively. Thus, chronic leukemias have a higher incidence of low hemoglobin and high TLC counts compared to acute leukemias. There was a decrease in platelet count in 45.7%, 94%, and 62.5% of ALL, AML, and CLL cases, respectively, but an increase in platelet count in 88% of CML cases.

Conclusion: All leukemias are characterized by anemia, elevated white cell count, and thrombocytopenia, except chronic myeloid leukemia, which has elevated platelet counts. Complete blood count parameters provide sufficient information about the underlying leukemia subtype.

Keywords: Acute Lymphocytic leukemia, Acute Myeloid leukemia, Complete blood count, Chronic lymphocytic leukemia, Chronic myeloid leukemia.

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INTRODUCTION

Leukemia is a disorder characterized by the clonal proliferation of hematopoietic stem cells within the bone marrow. Primary care physicians most frequently encounter four main types: acute lymphoblastic, acute myelogenous, chronic lymphocytic, and chronic myelogenous leukemia. Acute lymphoblastic leukemia is seen more often in children, whereas the other forms are typically diagnosed in adults. [1]

In 2020, leukemia accounted for approximately 2.5% of all new cancer cases and 3.1% of all cancer-related deaths worldwide. [2] Acute myeloid leukemia (AML) represents about 1 in 3 leukemias in adults. However, AML is not common, making up about 1% of all cancers overall. [3] Chronic leukemia subtypes mainly affect adults. Upon diagnosis, chronic leukemia patients may not show any symptoms.

Approximately 50% of chronic lymphocytic leukemia (CLL) patients are diagnosed incidentally during routine blood tests that reveal lymphocytosis. [4] Similarly, many chronic myeloid leukemia (CML) patients are asymptomatic at diagnosis, with the disease often detected through abnormalities found on routine blood testing. [5] A complete blood count should be performed when leukemia is suspected. Chronic myelogenous leukemia and chronic lymphocytic leukemia are characterized by extremely high leukocytosis, often exceeding 100,000 white blood cells per μL (100.0 × 10^9 per L). In cases of chronic myelogenous leukemia, nearly 96% of patients have white blood cell counts over 20,000 per μL (20.0 x 10^9 per L), whereas only 34% to 38% of patients with acute myelogenous leukemia and acute lymphoblastic leukemia exhibit such elevated levels. [4,6,7] Acute leukemia may lead to low white blood cell counts along with anemia or low platelet counts. Additional initial laboratory tests for leukemia include bone marrow biopsy, flow cytometry, serum electrolytes, creatinine levels, liver function tests,

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and tests for blood clotting disorders. If the patient exhibits symptoms of illness or fever, the physician should investigate for infection through urinalysis, blood cultures, urine cultures, and chest X-rays. [1]

CBC parameters remain fundamental due to their cost-effectiveness, simplicity, and wide availability. Additionally, investigating the prognostic implications of CBC abnormalities may provide insights into disease progression, treatment response, and overall survival, thus guiding therapeutic decisions. The rationale for conducting this study is to determine the spectrum of hematological changes in different leukemias.

MATERIALS AND METHODS

This cross-sectional study was conducted at Khyber Teaching Hospital in Peshawar from January 2024 to July 2024 after obtaining ethical approval from the Institutional Review and Ethical Board using a non-probability purposive sampling technique. This study included 69 patients by using a proportion of 5.3%, 95% confidence interval, and 5% as the margin of error in Open EPI Software. Sample size estimation using OpenEpi is widely adopted in epidemiological research due to its user-friendly interface and robust statistical calculations. [8] This study included patients who were referred to the Pathology department with a suspicion of leukemia for bone marrow aspiration. The research excluded individuals undergoing chemotherapy for leukemia or those with inadequate aspirates for analysis. A Sysmex hematology analyzer was used to perform complete blood counts. Standard levels for TLC, Hb, and platelet count were 4 to 11 billion per cubic millimeter, 11.5 to 14 grams per deciliter, and 150 to 400 billion per cubic millimeter, respectively. All patients underwent a bone marrow aspiration and biopsy. Hematologists prepared and stained slides with Giemsa before examining them under a microscope. To differentiate between AML and ALL, slides were treated with myeloperoxidase stain for examination. Leukemia diagnoses were established based on this method. Variables analyzed included patient age, gender, leukemia subtype, and fundamental hematological parameters such as hemoglobin level, total leukocyte count, and platelet count. Data for these factors were documented in a standardized form and analyzed, and conclusions were drawn accordingly. The data was processed using SPSS software and primarily presented through tables and charts. Quantitative variables were assessed using the mean and standard deviation, whereas qualitative data was analyzed through frequencies and percentages.

RESULTS

The study included a total of 69 patients with acute and chronic leukemias. The mean age of our study is 18 ±13.94 years. About 32 (46.4%) cases were males and 37 (53.6%) cases were females. Acute lymphocytic leukemia percentage was highest among all other subtypes i.e., 50.7% as shown in Table 1. Absolute counts in leukemia are given in Table 2. Figures 1-3 display changes in hematological parameters observed in leukemia cases. Changes in blood counts were as low hemoglobin levels (in 68.5%, 82.35%, 100%, and 88% of ALL, AML, CLL, and CML cases respectively) and high TLC count (in 60%, 41%, 62% and 59% of ALL, AML, CLL and CML cases respectively). There was a decrease in platelet count (in 45.7%, 94%, and 62.5% of ALL, AML, and CLL cases respectively), but an increase in count in CML (in 88% of cases).

Table No 1: Demographic variables

Age	
	13.94 ± 18 (Mean ±S.D)
Gender	
Male	32 (46.4%)
Female	37 (53.6%)
Leukemia subtypes	
Acute Lymphocytic Leukemia	35 (50.7%)
Acute Myeloid Leukemia	17 (24.6%)
Chronic Lymphocytic Leukemia	8 (11.6%)
Chronic Myeloid Leukemia	9 (13%)

Table No 2: Absolute Count in Leukemias

Absolute Count (3 ^ 10cells/ μL)	Mean ± Standard Deviation	Range
Absolute Neutrophil count	90.71 ± 35.61	0.06-346.91
Absolute Lymphocyte Count	91.38 ± 39.14	0.75-470.66
Absolute Monocyte count	28.51 ± 9.15	0.00-220.62
Absolute Eosinophilic count	1.83 ± 0.84	0.00-7.53

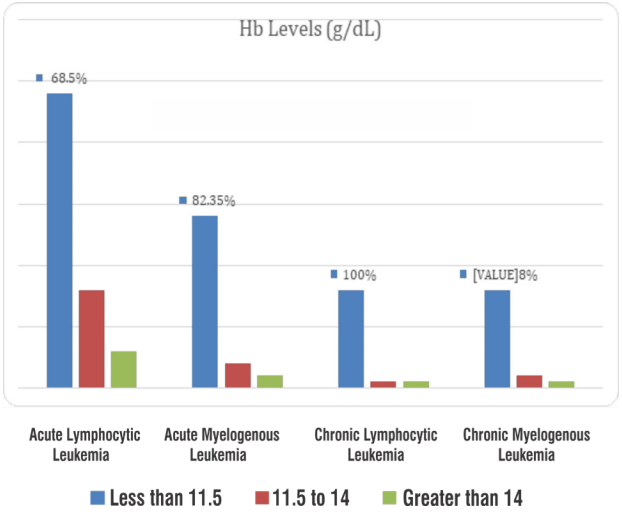

Fig 1: Pattern of Hb levels in different Leukemias

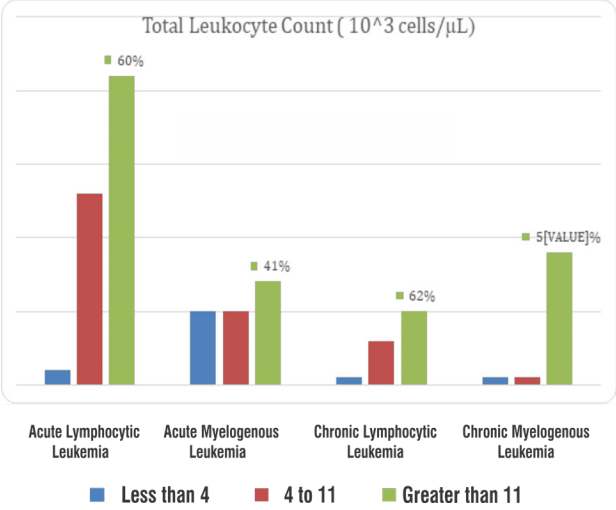

Fig 2: Pattern of Total Leukocyte Count in different Leukemias

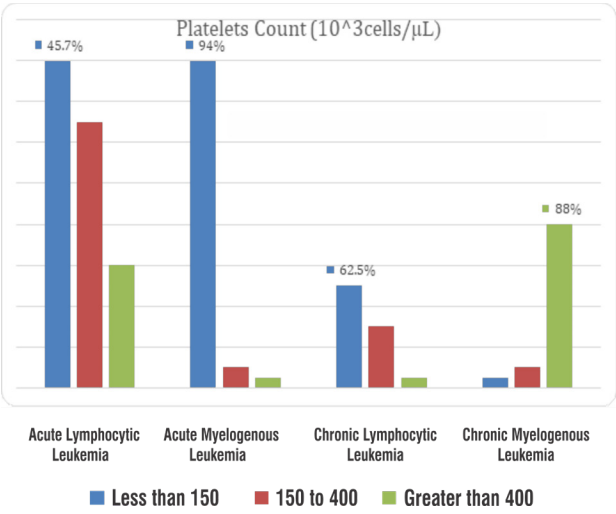

Fig 3: Pattern of Platelets count in different Leukemias

DISCUSSION

The presence of abnormal leukocytes distinguishes leukemia as either a primary or secondary condition. Various genetic and environmental factors contribute to the onset of leukemia. Increased rates of certain types of leukemia have been linked to exposure to ionizing radiation.

Previous chemotherapy treatments, especially those involving alkylating agents and topoisomerase II inhibitors, heighten the likelihood of acute leukemia in later years. [9, 10] The International Agency for Research on Cancer (IARC) classifies benzene as "carcinogenic to humans," based on sufficient evidence that it causes acute myeloid leukemia (AML). [11]

Viral infections like the human T-cell leukemia virus and Epstein-Barr virus have been associated with certain subtypes of ALL. [12] Additionally, genetic conditions (including Down syndrome, Fanconi anemia, Bloom syndrome, and Li-Fraumeni syndrome) are connected to higher susceptibility to AML and ALL. [13]

An initial test for patients suspected of leukemia is a complete blood count (CBC). This test reveals bone marrow changes caused by leukemic cells. The CBC results are distinctive enough that skilled physicians can identify a specific type of leukemia with confidence. [14] Recognizing abnormalities in CBC early allows for further confirmation tests such as bone marrow examination and flow cytometry. [15] Early detection facilitates prompt treatment, thereby lowering the risk of complications and death. In CBC, excessive aberrant leukocytes in the peripheral blood result in elevated TLC. [14, 15]

Malignant cells replacing marrow leads to diminished erythropoiesis, resulting in anemia or low Hb levels on CBC. [16] Anemia is a prominent characteristic in both acute and chronic forms of leukemia and carries prognostic significance. Thrombocytopenia, characterized by a low platelet count, can arise due to bone marrow infiltration by blast cells or splenomegaly, which is commonly observed across various types of leukemia. [17, 18] CBC findings in leukemias reflect the underlying pathogenetic mechanism.

The most frequent type of leukemia is acute lymphoid leukemia (ALL). In this study, ALL instances were characterized by elevated TLC, low Hb, and low platelets (60%, 68.5%, and 45.7%, respectively). This trend matches that reported in the literature. [16]

In a 2015 study involving ALL patients in Lahore, Naeem S reported elevated TLC in 58% of cases, low Hb levels in 74%, and low platelet counts in only 12% of cases; the remainder exhibited normal platelet counts. [19] In 2014, Moussavi F published similar findings from Iran, including anemia and thrombocytopenia in 89.7% of ALL patients. However, only an increased TLC was seen in 39% of cases. [16]

Perez JCJ reported similar findings from Spain in 2018. [15] The combination of elevated TLC, low Hb, and low platelet count should alert physicians to consider acute leukemia as a differential diagnosis. Infections can lead to anemia and increased TLC, but unlike acute leukemias, there is typically no decrease in platelet count. To ensure accurate diagnosis, all three hematological measures (TLC, Hb, and platelet count) should be evaluated.

CML is a myeloproliferative illness that primarily affects adults. The condition comprises three stages: chronic, accelerated, and blast crises. [17] In this study, basic hematological indicators showed increased TLC (59%) and decreased Hb (88%), similar to other types of leukemias. Surprisingly, there was an observed increase in platelet count instead of the anticipated decrease. In a 2017 study by Amer AH, 100% of CML patients had a higher TLC, 92%

had anemia, and 94.6% had a raised platelet count.

CBC abnormalities in CML include anemia, leukocytosis, and thrombocytosis (rather than thrombocytopenia). CML is a myeloproliferative condition, resulting in elevated platelet counts. So, all hematopoietic cells are growing, as are megakaryocytes. [17] CML has a higher platelet count compared to other leukemias, which often have lower counts. [17, 20] A specific CBC picture and clinical signs can help diagnose CML. Healthcare providers should take note of this particular discovery. CLL involves the malignant transformation of B-lymphocytes. Anemia is frequently encountered in CLL and holds prognostic significance due to its association with increased morbidity. Anemia in CLL can be caused by marrow infiltration, chronic illness, dietary deficits, or immune-mediated mechanisms. [20] The current study found a significant prevalence of anemia (100%) compared to Zeeshan's 26.7% and Dhodhi's 15.1%. [19, 20]

Salawuet et al. from Nigeria found a 74.4% incidence of anemia in CLL patients, similar to the current study. [21] Thrombocytopenia is a negative predictor of outcomes in CLL. In this research, 62.5% of CLL cases exhibited thrombocytopenia, a higher proportion compared to Zeeshan's 2015 study, where only 21.7% of CLL cases were reported to have low platelet counts. [20] A recent study conducted in Thailand found that approximately 19% of oral potentially malignant disorders (OPMDs) were positive for high-risk human papillomavirus (HPV) types 16 and 18, with HPV18 DNA predominantly detected in both oral leukoplakia and oral lichen planus patients. [22]

Most patients in our environment exhibit a bleak outlook, characterized by both anemia and thrombocytopenia, which signify advanced disease progression. [20] This suggests that our patients carry a substantial burden of illness, maybe due to late presentation to the clinician. CBC data can provide diagnostic clues when customized to a patient's history, age, and symptoms [14] Anemia and thrombocytopenia in CLL can predict the disease's prognosis. While further tests such as bone marrow biopsy and flow cytometry are employed to verify leukemia diagnoses, CBC results are as important and should not be overlooked.

As this study is conducted in a single tertiary care center, its results may not fully represent the entire population.

CONCLUSION

Knowledge of fundamental hematological parameters in leukemia, such as decreased hemoglobin and platelet counts alongside increased white blood cell counts (except in chronic myelogenous leukemia, where platelet counts are elevated), aids in refining differential diagnosis and identifying the specific leukemia subtype.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Noor B	✓	×	✓	×	✓	×
Idrees M	✓	✓	×	✓	✓	×
Ahmad W	×	✓	×	×	✓	×
Khan A	✓	✓	✓	×	✓	✓
Ahmad H	✓	×	✓	×	✓	×
Khan LA	✓	✓	×	✓	✓	×

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

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ORIGINAL ARTICLE

INTERCONNECTED HIP JOINT PARAMETERS, FUNCTIONAL MOBILITY, AND QUALITY OF LIFE IN PATIENTS WITH DEVELOPMENTAL DYSPLASIA OF THE HIP: A CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: This study aimed to determine the relationships between hip joint parameters, functional mobility, and quality of life in patients with DDH.

Methods: This cross-sectional study involved 35 patients suffering from DDH. Functional mobility was measured with the timed up and go (TUG) test. Hip joint parameters were assessed for range of motion (ROM), abduction, and internal/external rotation. Quality of life was assessed via the Short Form-36 (SF-36) Health Survey. Pearson correlation analysis was conducted to establish variable relationships, considering a statistical significance of $p < 0.05$.

Results: A strong positive correlation, $r = 0.683$, $p < 0.01$, was found between the right and left hip ROMs. Fixed flexion contracture was significantly associated with both fixed abduction ($r = 0.592$, $p < 0.01$) and limb length discrepancy ($r = 0.350$, $p < 0.05$). Avascular necrosis (AVN) showed a strong correlation with limb length discrepancy ($r = 0.655$, $p < 0.01$). There was no significant relationship between sex and hip joint parameters ($p > 0.05$). The average TUG test time was 14.65 seconds (SD = 2.98), indicating a moderate level of functional disability.

Conclusions: This study revealed significant associations between hip joint parameters, mobility, and quality of life in DDH patients, emphasizing the need for early intervention. Key findings include bilateral hip symmetry, contracture-related limb discrepancies, and AVN impacts, highlighting the importance of multidisciplinary care to improve outcomes.

Keywords: Developmental Dysplasia of the Hip, Functional Mobility, Quality of Life, Range of Motion, Avascular Necrosis, Limb Length Discrepancy, Public Health

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INTRODUCTION

Mobility and freedom from pain are luxuries many of us enjoy without much thought. Sadly, people who suffer from developmental dysplasia of the hip (DDH) will tell you that each day can be quite a challenge. DDH refers to a condition where the hip joint fails to develop properly, resulting in instability, misalignment, or even dislocation. [1, 2] Although it typically manifests during infancy or early childhood, its consequences can remain lifelong, especially if one does not receive holistic treatment. For a multitude of individuals suffering from this ailment, it affects not only physical mobility but also overall quality of life, which makes the problem far worse than what the physical symptoms indicate. [2]

Being able to execute a range of movements without assistance is considered functional mobility, and such independence reflects positively on one's health and well-being. Unfortunately, the functional mobility of patients suffering from DDH is greatly restricted. Ordinary tasks such as walking, stair climbing, or even sitting can be painful and challenging. [3] Throughout time, various constraints can culminate in a lack of autonomy, reduced

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engagement in social and leisure activities, and a loss of self-esteem. The emotional and psychological struggles of frustration, anxiety, and depression, often coexisting with the physical challenges of DDH, may further disintegrate the overall well-being of the person afflicted. [4, 5].

Quality of life is not just about having good health and positive feelings; there are social relations and the ability to engage in meaningful activities to consider. One who has DDH faces the interplay of these components quite intricately. One of the most perplexing symptoms of DDH is pain, which is chronic and can make even the simplest activities a struggle. [6] This discomfort is correlated with fatigue, reduced physical activity, and an overall decline in well-being. In addition to physical injury, this ailment may also affect other aspects of mental health. Fragments of disconnection, rage, and hopelessness form some of the most prevalent feelings. These emotions dominate those who are less likely to receive sufficient care or help. [7] This study aimed to understand the relationships between parameters of the hip joint and functional mobility and quality of life in patients with DDH, along with the intricate aspects of the condition with the social and physical world.

METHODS AND MATERIALS

The study used a cross-sectional design and retrieved data from both Orthopedic and rehabilitation clinics that treat patients with musculoskeletal disorders. Subjects aged over two years were enrolled in this study if they were identified as having DDH either through clinical evaluation or imaging studies in the past. Patients suffering from any other serious skeletal or nerve disorders that could confound the results of the study were excluded. This process of participant recruitment was conducted for six months. All the subjects provided informed consent before starting the study.

The data collection was carried out in two phases: the neutral evaluation of functional mobility and the personal assessment of quality of life. 'Functional mobility' was assessed via the TUG test, which is generally used to determine the basic balance and movement functions of a person. The participants were required to stand from a chair, walk a specified distance, and then return to the chair. The time taken to perform the task was measured in seconds. Moreover, to better describe physical functioning, self-reported pain on a visual analogue scale and the range of motion (ROM) of the hip joints were added. The participants' quality of life was assessed through the validated Short Form-36 (SF-36) Health Survey, which measures eight different areas: physical, emotional, and social aspects.

Continuous variables are presented as the means and standard deviations, whereas frequencies and percentages were computed for categorical variables. Correlation analyses were performed for functional mobility measures such as the TUG test, range of motion, and quality-of-life scores of the patients. Statistical analysis was considered significant at a p-value < 0.05.

The ethics review board of the institution provided clearance for the study, and all processes complied with the Declaration of Helsinki guidelines. The participants were promised confidentiality, and all the data were anonymized before any assessments were made.

RESULTS

Table 1 shows that the active ROM values for the right hip were 85° - 130° (\u03bc = 112.05°, SD = 9.6), whereas the corresponding values for the left hip were 90° - 125° (\u03bc = 110.51°, SD = 8.14), and the mean value of left hip flexion was less than that of right hip flexion. The right and left shoulders also revealed comparable differences in the mean values of abduction. 29.05° (SD = 9.69) for the right shoulder and 28.17° (SD = 9.08) for the left shoulder. Compared with the right hip rotation value (mean = 31.20°, standard deviation (SD) = 31.88°, standard deviation (SD) = 11.76), the left internal rotation value (mean = 31.20°, standard deviation (SD) = 8.81) of 15° - 50° was greater. Similarly, the external rotation of the right hip varied from 12° to 90°, with a mean value of 31.08° (SD = 13.62), and the left hip external rotation ranged from 18° to 90°, yielding 31.91° (SD = 12.73).

For patients with DDH, Table 2 presents the results of a Pearson correlation analysis of sex, weight, and some aspects of the hip joint, which include five components: ROM, abduction, and internal rotation. The analysis produced some interesting results. There was a significant correlation between the ROMs of the right and left hips. This correlation is described by a value of 0.683, with a p-value of less than 0.01 indicating significance. Thus, greater ROM in one hip is associated with greater ROM in the other hip. Similarly, there was a fair degree of correlation in abduction between the left and right hips ($r = 0.535$, $p < 0.01$), as shown in Table 2.

In patients with DDH, the relationships among sex, external rotation, fixed flexion contractures, limb length discrepancies, and the presence of AVN were studied via correlation analysis (Pearson) (Table 3). The results revealed a strong positive correlation between the external

rotation of the right and left hips ($r = 0.937$, $p < 0.01$), suggesting that there is a high degree of symmetry for the external rotation of both hips. Moreover, a noteworthy positive correlation was also noted between fixed flexion contracture and fixed abduction ($r = 0.592$, $p < 0.01$), along with fixed flexion contracture and fixed internal rotation ($r = 0.592$, $p < 0.01$). These results show that in one plane of motion, fixed contractures are commonly linked with restrictions in other planes, as shown in Table 3.

DISCUSSION

The purpose of this study was to examine the relationships among functional mobility, quality of life, and hip joint variables among individuals with developmental DDH. The three findings provided in their tables refer to the functional and physical difficulties of individuals with DDH and the complex interactions of hip joint parameters. These findings are not only confirmed by but also far beyond the literature, enhancing the understanding of the condition and its implications for patient care.

The more pronounced correlation between the ROM of the right and left hips ($r = 0.683$, $p < 0.01$) supports other studies that also reported changes in interdependence within DDH and the relationship between the hip joints. Zhang et al. (2015) noted the bilateral nature of hip dysplasia, where limitation in one hip is often associated with restriction in the opposite hip. [8] Similarly, more recent studies by Hu et al. (2023) revealed that bilateral hip involvement tends to be common in patients with DDH, with many functional deficits being bilateral. [9] This emphasizes evaluating and treating both hips in clinical care, regardless of whether one side appears more symptomatic. The associations of some fixed flexion contractures with other joint parameters, as shown in Table 3, confirm the functional integration of the hip joint system. The positive correlation between fixed flexion contracture and fixed abduction ($r = 0.592$, $p < 0.01$) supports the work of Moya-Angeler et al. (2023), who reported that contractures in one movement direction often lead to compensatory restrictions in other directions of movement. [10] This phenomenon appears to result from DDH-related changes in biomechanics and muscle imbalances, which may worsen joint stiffness and reduce overall movement. Additionally, the strong link between fixed flexion contracture and LLD, with a correlation coefficient of 0.350 and a p value below 0.05, confirms the findings of Harris et al. (2022), who noted that LLD is a common issue in patients with poorly treated or unresponsive DDH. [11]

Another important finding of this research is the presence of avascular necrosis (AVN) and its correlation with LLD ($r = 0.655$, $p<0.01$). AVN is a well-known complication of DDH, especially in patients who have had surgical procedures such as closed or open reduction. [12] The data in this study demonstrate a significant relationship between AVN and LLD, highlighting the potential effects of vascular supply abnormalities in the femoral head. This

Table No 1: Descriptive Statistics of Functional and Physical Parameters in Patients with Developmental Dysplasia of the Hip

	Minimum	Maximum	Mean	Std. Deviation
Range of Motion in degrees Right	85.00	130.00	112.05	9.60
Weight in kg	9.00	20.00	14.65	2.98
Range of Motion in degrees Left	90.00	125.00	110.51	8.14
Abduction Right	10.00	45.00	29.05	9.69
Abduction Left	15.00	45.00	28.17	9.08
Internal Rotation	15.00	50.00	31.20	8.81
Internal Rotation Left	15.00	60.00	31.88	11.76
External Rotation Right	12.00	90.00	31.08	13.62
External Rotation Left	18.00	90.00	31.91	12.73
Less than 30° fixed flexion contracture	1.00	2.00	1.37	.49
Less than 10° fixed abduction	1.00	2.00	1.17	.38
Less than 10° fixed internal rotation in	1.00	2.00	1.17	.38
Limb length discrepancy less than 3.2 cm	1.00	2.00	1.1714	.38239
LLD Limb length discrepancy (mm)	1.00	2.00	1.8286	.38239
AVN Present	1.00	2.00	1.7714	.42604
Valid N (list-wise)				

Table No 2: Correlation analysis between sex, weight, and hip joint parameters in patients with developmental dysplasia of the hip

parameters			Gender	Weight in KG	Range of Motion in Degrees Right	Range of Motion in Degrees Left	Abduction Right	Abduction Left	Internal Rotation
Gender	Pearson Correlation	1	.151	-.053	.091	.218	-.006	.030	Internal Rotation Left
Gender Weight in kg	Sig. (2-tailed)		.387	.763	.602	.207	.971	.862	-.038
	N	35	35	35	35	35	35	35	.827
	Pearson Correlation	.151	1	-.118	.021	.310	.250	-.307	35
Weight in kg Range of Motion in degrees Right	Sig. (2-tailed)	.387		.499	.906	.070	.147	.072	-.168
	N	35	35	35	35	35	35	35	.335
	Pearson Correlation	-.053	-.118	1	.683**	.262	.195	.035	35
Range of Motion in degrees Right Range of Motion in degrees Left	Sig. (2-tailed)	.763	.499		.000	.129	.263	.842	.003
	N	35	35	35	35	35	35	35	.987
	Pearson Correlation	.091	.021	.683**	1	.093	.030	-.167	35
Range of Motion in degrees Left Abduction Right	Sig. (2-tailed)	.602	.906	.000		.593	.863	.339	-.113
	N	35	35	35	35	35	35	35	.517
	Pearson Correlation	.218	.310	.262	.093	1	.535**	.315	35
Abduction Right Abduction Left	Sig. (2-tailed)	.207	.070	.129	.593		.001	.065	.264
	N	35	35	35	35	35	35	35	.125
	Pearson Correlation	-.006	.250	.195	.030	.535**	1	.179	35
Abduction Left Internal Rotation	Sig. (2-tailed)	.971	.147	.263	.863	.001		.303	.183
	N	35	35	35	35	35	35	35	.293
	Pearson Correlation	.030	-.307	.035	-.167	.315	.179	1	35
Internal Rotation Internal Rotation Left	Sig. (2-tailed)	.862	.072	.842	.339	.065	.303		.827**
	N	35	35	35	35	35	35	35	.000
	Pearson Correlation	-.038	-.168	.003	-.113	.264	.183	.827**	35
Internal Rotation Left **. Correlation is significant at the 0.01 level (2-tailed).	Sig. (2-tailed)	.827	.335	.987	.517	.125	.293	.000	1
	N	35	35	35	35	35	35	35	35

finding agrees with Mazama et al. (2024), who reported that LLD and abnormal hip movement can increase the risk of AVN due to disruption of the blood supply to the femoral head. [13] As mentioned earlier, these results emphasize the importance of active monitoring and management of leg length discrepancies in patients with developmental dysplasia of the hip to prevent avascular necrosis and its consequences.

In the present study, there were no significant correlations between sex and hip joint parameters, which is remarkable, as it conflicts with some studies that posit that females have greater functional limitations due to developmental dysplasia of the hip. [14] Nonetheless, other studies by Boyer et al. (2008) and Hawellek et al. (2022) reported results that suggest that sex is not an important factor for hip joint function in some populations. These differences could result from the designs of the studies and the characteristics of the population samples, thus highlighting the necessity of further research to address how sex influences DDH outcomes. [15, 16]

The results of this study have serious implications for clinical practice and the public health domain. The association of hip joint measurements with LLD and AVN makes one consider how carefully DDH evaluation and management are handled. There is an overall plan that emphasizes prompt diagnosis and treatment to prevent further deterioration of joint deformities and the negative consequences of LLD and AVN. This corresponds with the

Table No 3: Correlation Analysis of Gender, External Rotation, Fixed Contractures, Limb Length Discrepancy, and Avascular Necrosis in Patients with Developing Dysplasia of the Hip

parameters		Gender	External Rotation Right	External Rotation Left	Less than °30 fixed flexion contracture	Less than °10 fixed abduction	Less than °10 fixed internal rotation in	Limb length discrepancy less than 3.2 cm	LLD Limb length discrepancy (mm)	AVN Present
N	Pearson Correlation	1	.211	.254	.057	.009	.009	.009	-.169	-.106
	Sig. (2-tailed)		.224	.141	.745	.959	.959	.959	.332	.543
	N	35	35	35	35	35	35	35	35	35
External Rotation Right	Pearson Correlation	.211	1	.937**	.246	.008	.008	.008	.054	-.118
	Sig. (2-tailed)	.224		.000	.154	.962	.962	.962	.759	.499
	N	35	35	35	35	35	35	35	35	35
External Rotation Left	Pearson Correlation	.254	.937**	1	.213	-.021	-.021	-.021	-.064	-.226
	Sig. (2-tailed)	.141	.000		.220	.904	.904	.904	.717	.192
	N	35	35	35	35	35	35	35	35	35
Less than 30° fixed flexion contracture	Pearson Correlation	.057	.246	.213	1	.592**	.592**	.592**	.350*	.278
	Sig. (2-tailed)	.745	.154	.220		.000	.000	.000	.039	.106
	N	35	35	35	35	35	35	35	35	35
Less than 10° fixed abduction	Pearson Correlation	.009	.008	-.021	.592**	1	1.000**	1.000**	.207	.248
	Sig. (2-tailed)	.959	.962	.904	.000		.000	.000	.233	.152
	N	35	35	35	35	35	35	35	35	35
Less than 10° fixed internal rotation in	Pearson Correlation	.009	.008	-.021	.592**	1.000**	1	1.000**	.207	.248
	Sig. (2-tailed)	.959	.962	.904	.000	.000		.000	.233	.152
	N	35	35	35	35	35	35	35	35	35
Limb length discrepancy less than 3.2 cm	Pearson Correlation	.009	.008	-.021	.592**	1.000**	1.000**	1	.207	.248
	Sig. (2-tailed)	.959	.962	.904	.000	.000	.000		.233	.152
	N	35	35	35	35	35	35	35	35	35
LLD Limb length discrepancy (mm)	Pearson Correlation	-.169	.054	-.064	.350*	.207	.207	.207	1	.655**
	Sig. (2-tailed)	.332	.759	.717	.039	.233	.233	.233		.000
	N	35	35	35	35	35	35	35	35	35
AVN Present	Pearson Correlation	-.106	-.118	-.226	.278	.248	.248	.248	.655**	1
	Sig. (2-tailed)	.543	.499	.192	.106	.152	.152	.152	.000	
	N	35	35	35	35	35	35	35	35	35

International Hip Dysplasia Institute (IHDI) recommendation, which calls for screening and appropriate response to DDH to maximize the prognosis. [17]

This study proposes, in addition to the clinical findings, the need for public health intervention in terms of awareness and service provision related to DDH. Healthcare access barriers negatively affect the outcomes of many patients with DDH in the more neglected subgroups. [18] These public health problems could be addressed by designing and implementing targeted community health education and outreach programs combined with adequate screening programs to address the burden of DDH at the population and societal levels.

Therefore, the outcomes of this study contribute to the integration of a multidisciplinary approach in the management of DDH. Patients suffering from DDH reported better quality of life and functional mobility as a result of receiving physical therapy, pain relief, and lifestyle activity modification. [19] By adding systematic care and monitoring of the joint angles, it is now possible to increase the quality of life for DDH patients.

CONCLUSION

This research investigated the relationships among hip joint parameters, functional mobility, and quality of life in patients with DDH and revealed complex interactions among joint motion, contractures, and limb length discrepancies. Proactive treatment is crucial for preventing complications such as avascular necrosis, particularly in Paediatric patients. The study also highlights public health challenges, including disparities in screening, treatment, and rehabilitation, underscoring the need for equitable, multidisciplinary care to address the physical, emotional, and social impacts of DDH. Longitudinal research is recommended to assess long-term outcomes and intervention efficacy, guiding strategies to improve patient quality of life and healthcare access.

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Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Ali A	✓	×	✓	×	✓	×
Hayat S	✓	✓	×	✓	✓	×
Khan I	×	✓	×	×	✓	×
Rao EH	✓	✓	✓	×	✓	✓
Khan M	✓	×	✓	×	✓	×
Kamal Y	✓	✓	×	✓	✓	×
Sajjad A	×	✓	×	×	✓	×
Ullah D	✓	✓	✓	×	✓	✓

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

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This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No.196/DME/KMC.

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ORIGINAL ARTICLE

FREQUENCY OF CORRECTION OF REFRACTIVE ERROR THROUGH REFRACTIVE SURGERIES AMONG MEDICAL STUDENTS OF PESHAWAR

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ABSTRACT

Objectives: Visual impairment due to refractive error (RE) affects a global population of approximately 2.2 billion individuals. Contact lenses and refractive surgeries (RS) exist for correction, but the most accessible and non-invasive choice remains glasses. Although the factors for not opting for RS remain a mystery. This study examines the frequency of correction of RE through RS among medical students of Peshawar and the reasoning behind medical students not opting for RS.

Materials & Methods: This cross-sectional study was conducted among undergraduate medical students in Peshawar. A total of 202 students were recruited through purposeful sampling. Students from the first year to the final year who consented to participate were included. Data were collected using a self-validated questionnaire.

Results: The study revealed that 128 students had a refractive error (RE) in 202, of which 25% of students with RE considered refractive surgery (RS) ($p=0.026$, $q=0.319$), with LASIK being the most common procedure at 46.8%. Regarding institutional affiliation, the consideration for RS was significantly higher among private institutions (25.8% vs. 9.3%, $p=0.026$). Barriers to RS included satisfaction with eyeglasses (41.6%).

Conclusion: The high prevalence of RS consideration signifies a strong trust and preference for permanent correction. Advancements in surgical techniques, increased awareness, and a heightened sense of aesthetics may be contributing factors.

Keywords: Refractive error, Refractive Surgery, Eyesight.

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INTRODUCTION

Refractive error is among the most common preventable causes of visual impairment worldwide. The World Health Organization says nearly 2.2 billion people suffer from uncorrected vision impairment around the world, and about half go untreated in lower- and middle-income countries. People with RE experience reduced vision because light rays fail to reach their proper focus point on the retina, producing a cloudy image. [1] The eye develops such distortion when its optical power and axial length do not align properly, resulting in blurred vision. [2] Four types of refractive errors commonly exist: myopia, hyperopia, astigmatism, and presbyopia. [3] Refractive errors affect young adults as their main vision disability, creating notable educational problems for students. Unaddressed RE remains the primary cause of vision deterioration. [4, 5] For correction of RE, the following methods are practiced: Glasses, Contact Lenses, and RS.

Correction of visual impairment with spectacles is the most cost-effective intervention for improving eye care and thus productivity and functionality in children. Spectacles represent several benefits because they provide simple implementation as well as affordability, alongside being non-invasive. [6] Contact lenses deliver a complete visual spectrum with the caution that poor maintenance poses risks for eye infections. [7] Currently, the use of RS stands as a solution to reduce reliance on contact lenses and glasses for eye refraction correction. [8]

RS is defined as the surgical correction of RE. Ophthalmologists now have a multiplicity of surgical methods at their disposal for the individualized correction of RE. Surgical operations for RE help patients reach near-perfect visual acuity through specific corrective procedures.

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Laser RS, PRK, LASIK, LASEK, and SMILE have now been established as fairly safe procedures that produce excellent visual outcomes for patients with low- to moderate amounts of ametropia. One Iranian study showed that 82.5% of participants knew RS could enhance their visual acuity. [10] The proven positive results from RS benefit most patients, although some patients do not qualify as candidates. Ongoing research strives to improve RS efficacy while enhancing long-term results and decreasing complications. A solution to the uncontrolled RE problem calls for a combination of awareness campaigns and increased medical services and caregiver availability.

MATERIALS AND METHODS

This cross-sectional study was conducted to assess the prevalence of consideration of RS (refractory surgeries) among medical students of different government and private medical colleges in Peshawar, including the following,

Khyber medical college 2) Khyber college of dentistry 3) Rehman medical college 4) Rehman college of dentistry 5) Jinnah medical college 6) Northwest medical college 7) Khyber Girls medical college 8) Peshawar medical and dental college 9) Pak international medical college.

The duration of the study was six months, starting from May 2024 till December 2024.

The inclusion criteria consisted of all students from the 1st to the final year who had undergone RS and consented to the questionnaire. The exclusion criteria were based on those students who had undergone other ocular surgeries and incomplete questionnaires.

A self-administered questionnaire was used, which was formulated after careful evaluation of previous literature, and a pilot test was run on 20 responses to cross-check the efficacy of the questionnaire. The questionnaire consisted of 18 questions split into different sections. The first section consisted of demographic details, while the second section had questions regarding the presence of refractive error and the type of refractive error. The third section was based on the type of corrective measure used for visual impairment, and the fourth section assessed the prevalence of consideration of RS among medical students. Finally, the last portion had questions related to the type of RS availed, the reasoning behind not opting for RS, and the attitude toward this surgical technique.

A sample size of 202 subjects was calculated through the OpenEpi sample size calculator using a confidence limit of 5% (as +/- percent of 100), a design effect of 1.0, population size of 6000 participants (this number is a rough estimate of medical students studying in public and private colleges of Peshawar by adding the number of students per class in all the Medical colleges. [11, 12] Lastly, an anticipated frequency of 16.2% was taken out from a study done in the Aseer region of Saudi Arabia. [13]

The questionnaire was distributed among all class groups through Google Forms, and the responses were stored in the form of Google Sheets. Responses were collected anonymously without any personal identifiers. The questionnaire had closed-ended, multiple-choice, and open-ended questions.

The data was analyzed using IBM SPSS V.24. The qualitative data was presented in frequencies, and the quantitative data was presented in mean and standard deviation. A chi-square test of significance was applied to find the association between independent and dependent variables. A p-value of <0.05 was considered statistically significant.

RESULTS

202 medical students from 1st year through 5th year of government and

The association between gender and RE showed that among the male respondents, 33 suffered from myopia,11 had hypermetropia, while 64 female respondents reported having myopia, while reported having hypermetropia. This data revealed that in female participants, myopia was more prevalent relative to men; in contrast, hypermetropia was more prevalent among the male participants. (see Table 2 and Figure 1 for details)

The study findings indicate that a majority of participants (101 out of 116) have used eyeglasses as a corrective measure for vision improvement. The chi-square test demonstrated a statistically significant relationship between the experience of corrective measurement and the type of corrective eyewear used ($p= 0.000$). However, it is worth noting that some expected counts in the chi-square test were lower than recommended (less than 5), which may slightly affect the reliability of the results. Despite this, the findings strongly support the link between corrective eyewear usage and vision correction experiences.

The study revealed a clear connection between the type of RE and the likelihood of considering RS ($p=0.004$). Students with myopia were more inclined towards considering RS in contrast to those with hypermetropia.

33.3% of cells in the chi-square test had expected counts below 5, slightly affecting the reliability of the results. Students with myopia were more likely to consider refractive surgery compared to those with hypermetropia. The consideration of the RS by institutions showed that RS was considered by 9.3% of students from government institutions compared to 23.2% from private institutions. , with a P value of <0.026.

The motivation behind opting for RS by undergraduate medical students was multifactorial and varied

significantly between genders.

Among the students who either chose or were subjected to RS, the most prevalent procedure was LASIK,

Table No 1: Demographic Characteristics of Study Participants

Characteristic	Category	Frequency (n)	Percentage (%)
Total Participants		202	100
Gender	Male	75	37.1
	Female	127	62.8
Age (years)	Range	18–26	-
	Mean (SD)	21.6 (1.67)	-
Institution Type	Government	107	53.0
	Private	95	47.0
Academic Year	1st Year	43	21.3
	2nd Year	38	18.8
	3rd year	45	22.3
	4th Year	36	17.8
	Final year	40	19.8

Table No 2: Prevalence of Refractive Errors among Students

Characteristics	Category	Frequency (n)	Percentage (%)
Refractive Errors (RE)	Present	128	63.4
	Absent	74	36.6
Types of Refractive Errors	Myopia	97	75.7
	Hypermetropia	27	21.0

Table No 3: RS Consideration among Students with RE

Category	Frequency (n)	Percentage (%)
Considered Refractive Surgery	32	25.0
Did Not Consider RS	96	75.0
Breakdown by Refractive Error		
Myopia	23	71.8
Hypermetropia	9	28.1
Breakdown by Gender		
Male	14	43.75
Female	18	56.25

Table No 4: Association between RE Type and Likelihood of Considering RS

Refractive Error	Considered RS (n)	Did Not Consider RS (n)	Total (n / %)
Myopia	23	74	97 (23.7%)
Hypermetropia	9	18	27 (33.3%)
Chi-Square Test			p = 0.004

Table No 5: Motivations for Considering RS by Gender

Motivation	Male (n=14)	Female (n=18)	Total (n=32)	Percentage of Total (%)
Discomfort with current correction	3 (21.4%)	8 (44.4%)	11	34.3%
Avoiding glare and halos	6 (42.8%)	4 (22.2%)	10	31.2%
Aesthetic concerns	4 (28.5%)	2 (11.1%)	6	18.7%
Other reasons	3 (21.4%)	4 (22.2%)	7	21.8%

Table No 6: Student Satisfaction with Refractive Surgery Outcomes

Satisfaction Level	Number of Students (n)	Percentage (%)
Satisfied	27	84.3
Dissatisfied	5	15.6
Total	32	100.0

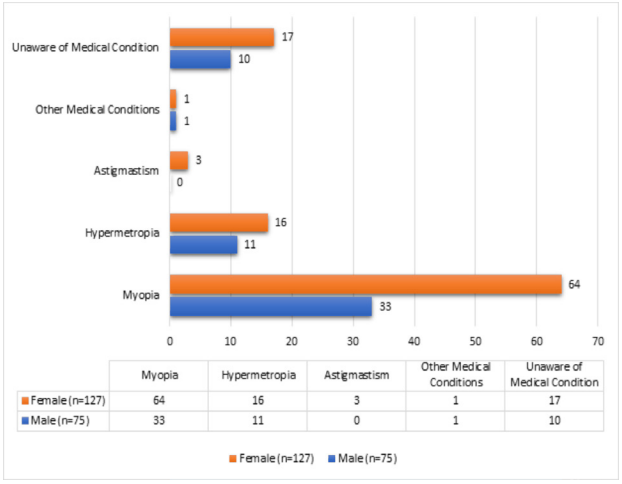

Fig 1: Association between Gender and Refractive Errors

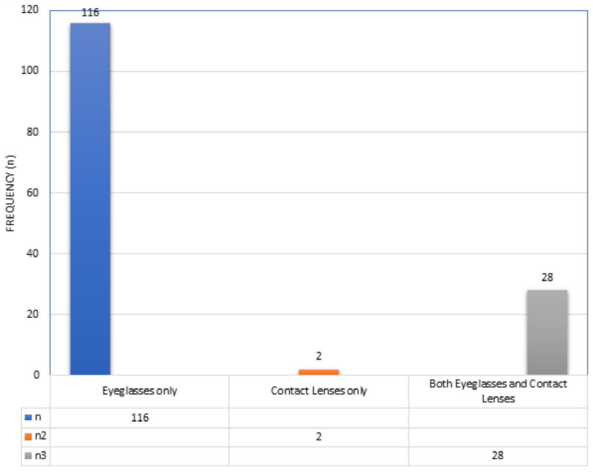

Fig 2: Sight Correction Methods among Students with Refractive Errors

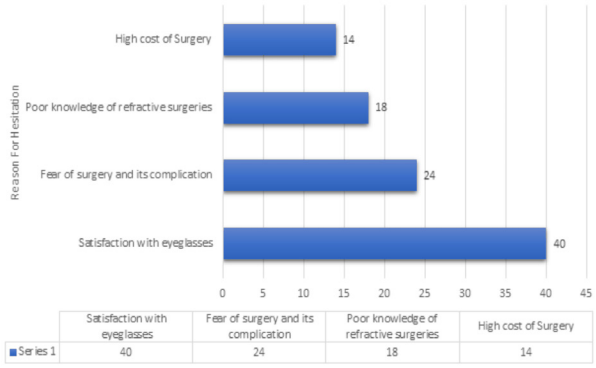

Fig 3: Reasons for Hesitation to Consider Refractive Surgery among Medical Students

considered by 15 students (48.8%) among those who considered or underwent RS, who chose LASIK, making it the most prevalent among the students. Eight students (25%) opted for LASEK, making it the second most common procedure. Five students (15.6%) chose PRK, while 4 students (12.5%) preferred SMILE.

DISCUSSION

Our findings inferred that out of 202 medical students from both private and government medical institutions in Peshawar, 128 students (63.4%) were suffering from Refractive errors. These findings align with the study carried out on undergraduate students of Akhtar Saeed Medical and Dental College, which revealed an estimate of 67.7% of medical students with refractive errors[14]. Comparably, another study conducted in Jordan revealed a refractive error prevalence of 75% among medical students. [15] A study conducted in India projected a similar higher prevalence of refractive errors (70.7%). [16]

The higher prevalence of refractive errors among medical students could be derived from enhanced knowledge, awareness, and vigilant screening. However, it is unfortunate that our country lacks proper screening programs, and consultation is only considered when people face problems with their vision.

The above-mentioned studies deduce a widespread prevalence of refractive errors among medical students. High academic pressure, lack of outdoor exposure, prolonged near work, use of digital devices, and irregular sleep patterns can be some contributing factors to this trend.

Within the various refractive anomalies, myopia was the most common type present in 97 students (75.5%), These findings match with a study conducted in India, which revealed that out of 420 students, 54% had refractive errors, with myopia being the most prevalent (77.7%). [17]

Another study showed comparable results, with myopia being the most frequent type of refractive error, reported by 37% of students. [18]

Our study revealed that eyeglasses are the most extensively utilized form of corrective measure (90.6%) for refractive errors. A cross-sectional study conducted in King Abdul Aziz Hospital, Jeddah, Saudi Arabia, reported comparable results (45.8%). [19]

There is an accelerated rise in worldwide awareness regarding various possible treatment options for visual correction. Our study aimed to evaluate the prevalence of different surgical techniques preferred by medical students of both private and government medical institutions.

This study demonstrated that out of 128 students, 32 students (9.3%), comprising 22 students from private medical institutions and 10 students from government medical institutions, chose to opt for refractive surgeries. A similar study carried out at Qassim University College of Medicine, Saudi Arabia reported that only 10 students (9.6%) out of the total 104 participants had undergone refractive surgery. [20] A corresponding study conducted at Dow revealed that only 1.6% of the total student population considered surgery. [21] Likewise, a similar study conducted in Brazil showed a 6% positive response. [22]

The results of our study highlight a positive trend in students' preference for refractive surgeries in contrast to comparable national and international studies. Our findings suggest an advancement in technology and new modalities in keratin RS with fewer complications, good prognosis, and early rehabilitation.

The trend of greater prevalence of refractive surgery preference in our study could stem from the greater number of private medical students favoring refractive surgery, which can be attributed to these students belonging to high-income groups who are capable of bearing the cost of the surgery.

LASIK was the most popular choice among the RS students (47%) from private and government institutions combined, with LASEK (25%), PRK (16%), and SMILE (13%), following as the next preferred options. In a study conducted in Jalandhar, India[23], LASIK emerged to be the most favored option (44.4%). The study also revealed that fewer than half of students (47.4%) were willing to undergo RS themselves, however, 63.2% of students would suggest it to family and friends. This study, however, only focused on the inclination to RS and did not address the actual prevalence of students electing to undergo RS.

In our study, 96 students (75%) elected not to opt for RS, a figure that may be linked to the limited medical facilities and financial constraints due to Pakistan's classification as a low-income country. A related study in Baghdad showed that 57.8% of medical students refrained from

undergoing refractive surgery. [24] The most frequently cited factors in our study behind the reluctance of the students with RE towards RS included: satisfaction with eyeglasses (41.6%), and fear of surgery (25%) were common. In contrast, a comparable study in Baghdad 24 identified fear of complications (42%). [24]

A separate study conducted in Pakistan[25] outlined the primary deterring factors to be the fear of outcomes (25.6%) and lack of knowledge (15.6%).

All these findings suggest that students in Pakistan are thoroughly knowledgeable about RS as a corrective intervention, however, a considerable number remain reluctant, with fear of surgical risks and affordability being the primary barriers.

Being a novel study in the Peshawar region, it emphasizes the knowledge, awareness, and practical approach of RS. With technological evolution, the acceptance of new options in the form of RS is not limited, and this is evident from the results of our study.

The limitation of our study is that all the participants were from one region with a narrow age range, so the results cannot be generalized. The method of data collection was an online questionnaire, which can lead to response bias, sampling issues, and the chance of survey errors. Our study does not explore the reasoning behind why people opted for LASIK as compared to LASEK, SMILE, and other techniques.

The spectrum of satisfaction from the type of RS could not be covered in the study, as well as the outcome in the context of the improvement in refractive correction from different types of surgery could not be documented. Therefore, there is room for improvement to fill these limitations and gaps in our study.

CONCLUSION

The prevalence of RS is at par with the rest of developed countries, reflecting the trust and preference for permanent correction of vision over traditional methods such as glasses and contact lenses. Advancements in surgical techniques, more awareness, and aesthetic sense are important factors. Further studies with larger sample sizes and long-term follow-ups are recommended to assess the reasons behind opting for RS, satisfaction, and potential complications associated with these procedures among medical students.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Malik MA	✓	×	✓	×	✓	×
Rahil N	✓	✓	×	✓	✓	×
Yousaf S	×	✓	×	×	✓	×
Khan MA,	✓	✓	✓	×	✓	✓
Khan HA,	✓	×	✓	×	✓	×
Arif A	✓	✓	×	✓	✓	×
Shayan A	×	✓	×	×	✓	×
Iftikhar B	✓	✓	✓	×	✓	✓

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

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No.231/DME/KMC.

Dated: 26 03 2024

MASSON HEMANGIOMA- AN UNUSUAL CASE OF RECURRENT MASS INVOLVING MAXILLARY SINUS, NASAL CAVITY, AND NASAL SEPTUM. A CASE REPORT

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ABSTRACT

Masson hemangioma is a rare pathological entity that can involve any part of the body, characterized by intravascular papillary endothelial hyperplasia. The most commonly involved sites of Masson hemangioma are skin, subcutaneous tissue, and lips. Rarely does it involve the spinal cord and the head and neck region. This usually presents multiple benign and malignant lesions, so a differentiation should be made in diagnosis and proper clinical Management.

Key Words: benign tumor, intravascular papillary endothelial hyperplasia, Inverted Papilloma.

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INTRODUCTION

Masson Hemangioma, also known as Masson vegetated intravascular hemangioendothelioma, considered as a papillary hyperplasia of Endothelial vascular cells, is a rare disease that usually develops in veins but rarely also occurs in arteries. [1]

It is considered a vascular proliferation secondary to vascular stasis that can develop in the head and neck region, hands, tendons, digestive tract, intracranial and abdominal areas [2]. Masson tumors can also occur in the eyelid [3], orbit, and conjunctival involvement is also reported [4].

A case of Masson Hemangioma involving the spinal cord, causing compressive myelopathy, has also been reported, which presents with paraplegia as extradural compression at the T4-5 level [5].To the best of our search and literature, 10 cases of Masson hemangioma are reported, but not with multiple time recurrences [6]. We are presenting our case report because of involves multiple recurrences and has been operated on multiple times.

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CASE DESCRIPTION

A 28-year-old male presented with a history of Nasal obstruction and bleeding from the left side of his nose for the last 2 years. On examination, there was a fleshy mass occupying the left nasal cavity. Nasal endoscopy showed the same findings. The right side of the nose was normal on examination.

The nasopharynx and neck show no pathologies. The Patient has been operated on for the same mass 5 times via trans-nasal approach. CT scan of Paranasal Sinuses shows a Heterogeneous mass occupying the Left Nasal cavity and maxillary sinus with involvement of the medial wall of the maxillary sinus and nasal septum. A probable diagnosis of Inverted papilloma was made due to its recurrent nature and fleshy appearance.

Endoscopic Sinus Surgery under General Anesthesia was planned. Medial Maxillectomy and excision of the whole mass were performed. A biopsy of the mass was performed and turned out to be Intravascular endothelial papillary hyperplasia, Masson's Hemangioma.

Histopathological Slides show a large vessel with papillary endothelial proliferation accompanied by inflammation and hemorrhage.

A CT PNS (without contrast) shows soft tissue thickening in the left maxillary sinus. It causes the widening of the osteomeatal complex and thus extends to the nasal cavity and fills it. Mucosal thickening of the right

maxillary sinus was seen.

DISCUSSION

A patient with ulcerated, irreducible hemorrhoids was detected by Masson in 1923, and the lesion was

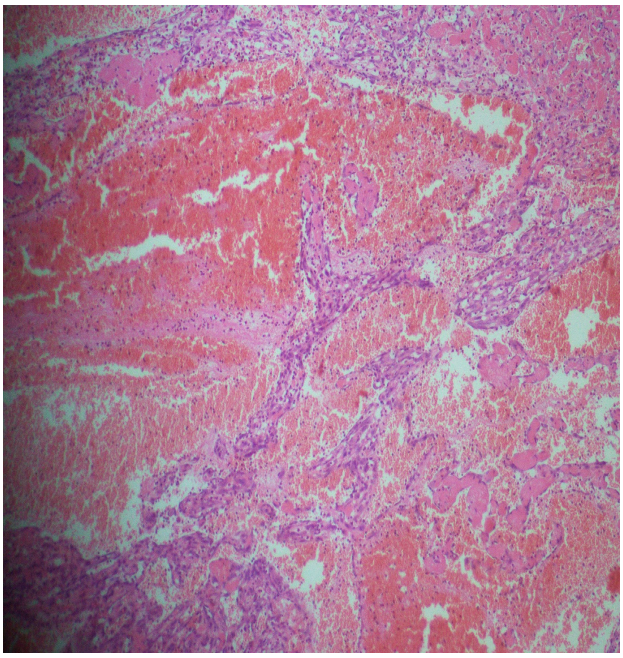

Figure 1: Histopathological outline showing Intravascular Endothelial Papillary Hyperplasia (Masson's Hemangioma).

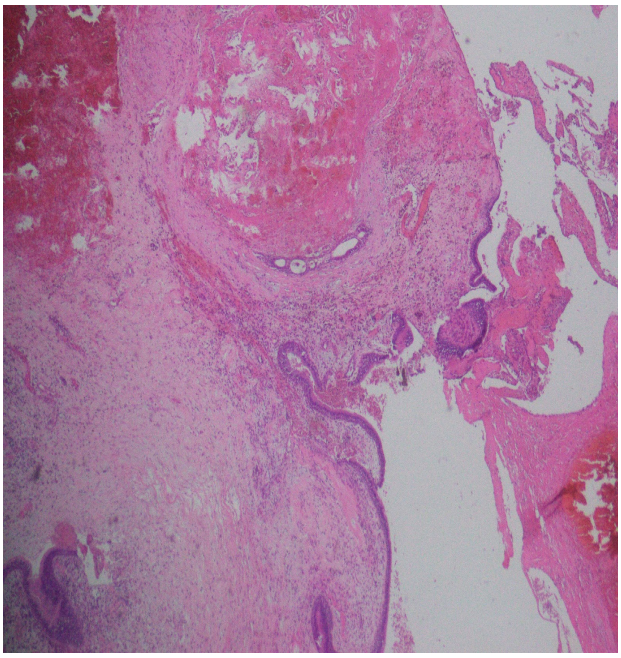

Figure 2: H & E slide showing Intravascular Endothelial Papillary Hyperplasia (Masson's Hemangioma).

Figure 3: Gross Specimen of Masson Hemangioma of Excision.

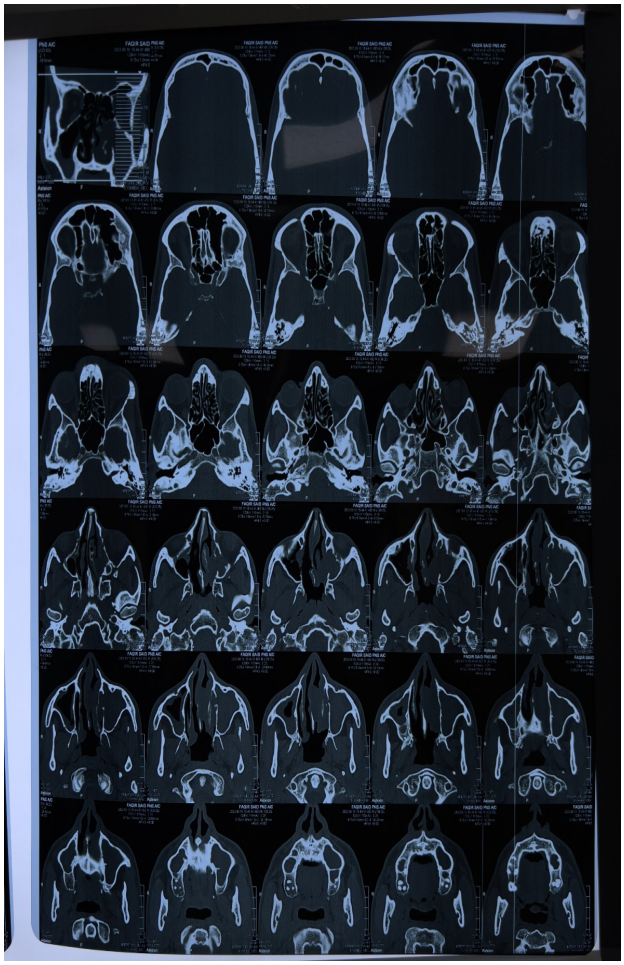

Figure 4: CT Nose and Paranasal Sinuses. showing left Antro -Choanal Polyp

Figure 5: CT Nose and Paranasal Sinuses showing left Antro -Choanal Polyp.

identified as "Vagetant intravascular hemangioendothelioma."[7].

A 22-year-old male with comparable complaints revealed a 10-year history of the synovial hemangioma of the left knee that was identified and treated (arthroscopically). Over the left knee, there was no history of injury or illness. The left knee exhibited normal mobility except for a terminal reduction in range of motion. An intra-synovial low-flow vascular abnormality within the synovium's material was shown by the left knee's MRI. The patient had a synovectomy for the hemangiomatous lesion in toto, and during the eight-month follow-up period, there was no recurrence. The diagnosis of intravascular papillary endothelial hyperplasia/MH was validated by histopathology [8].

An unusual benign vascular lesion called intravascular papillary endothelial hyperplasia is typified by an endothelial cell proliferation that occurs reactively. Due to its rarity, the finger lesion frequently poses diagnostic complications for surgeons. To help identify this rare disease, we present a case of intravascular papillary endothelial hyperplasia [9].

Intravascular papillary endothelial hyperplasia (IPEH), another name for Masson's tumor, is a rare and benign vascular illness characterized by a reactive hyperplasia of intravascular endothelial cells. The head, neck, and upper extremities are the soft tissues where this tumor is most frequently detected. We provide an uncommon instance of IPEH on the vulva. A painful and itchy left vulvar tumor was the presenting symptom for a mid-thirties Hispanic woman. A pedunculated lump was visible on the left labia majora during physical examination. After a pathologic evaluation, the lesion was found to be IPEH and surgically removed. This is an uncommon instance of IPEH on the vulva. In spite of this rarity, IPEH might be managed with a straightforward local excision [10].

In our case the patient was presented with a recurrence of the same mass despite 5 times previous excision, it is important to consider Masson's Hemangioma as a cause of recurrent sinonasal masses (though recurrence is rare with proper resection) for which histopathological diagnosis should be obtained in first instances to avoid aggressive operative measures and a proper surgical excision should be planned to avoid recurrence. CT scan and MRI cannot distinguish between benign and malignant causes; therefore, a histopathological diagnosis should be obtained, and differentiation between Angiosarcoma and hemangioma should be sought out.

CONCLUSION

Recurrent sino-nasal masses may be benign or malignant. Proper surgical resection and histological diagnosis should be made, and the patient should be followed for future recurrence. Proper attention by ENT and head and neck surgeons should be given to identify lesions correctly.

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AUTHOR'S AGREEMENT

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

Journal_____

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I certify that

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B) The article has not been accepted for publication elsewhere

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

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

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

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

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1. Eliminate nonstandard abbreviation in the titles
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9. Letter of ethical review of concerned hospital/study place.
10. A processing and publication fee of Rs. 15,000/-(Pakistani) for local authors and $ 250 (US) for international authors has been approved by the competent authority. The fee should be submitted as bank draft/online payment through the account (IBAN) no: PK56NBPA0388004048685170 (Branch code: 0388 / National Bank of Pakistan, University campus branch, Peshawar, Pakistan). See the fee Submission Process in the editorial Policy on the website.

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

1. PURPOSE

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

A- MISSION OF JMS

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

B- OBJECTIVES OF JMS

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

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

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

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

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

2. PEER REVIEW PROCESS

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

3. AUTHORSHIP

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

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

4. SUBMISSION OF MANUSCRIPT

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

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

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

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

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

5. INSTITUTIONAL RESEARCH AND ETHICS BOARD (IREB) CERTIFICATE

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

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

6. CONFLICT OF INTEREST

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

7. CONFIDENTIALITY

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

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

8. CORRECTION AND RETRACTION OF ARTICLES

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

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

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

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

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

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

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

9. CORRESPONDENCE

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

10. THE FEE SUBMISSION PROCESS

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

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

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

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

11.1: The roles of the Editorial Board are:

11.1.1: To offer expertise in their specialist area

11.1.2: To review submitted manuscripts

11.1.3: To advise on journal policy and scope

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

11.1.5: To identify topics for special issues of

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

11.1.6: To attract new and established authors and articles

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

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

11.2: THE PATRON:

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

11.3: THE CHIEF EDITOR:

11.3.1: THE CRITERIA FOR SELECTION OF CHIEF EDITOR ARE:

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

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

iii. Being a reviewer for an international peer reviewed journal

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

v. Enthusiasm to undertake the Editor role

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

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

11.3.2: THE ROLES OF CHIEF EDITOR ARE:

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

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

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

11.3.3: MANAGING EDITOR:

i. The roles of manging editor are:

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

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

iv. To regularly evaluate the research work

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

11.3.4: EXECUTIVE EDITOR:

i. The roles of executive editor are:

ii. To evaluate the research articles presented for publication

iii. To help the editorial board in policy making

iv. The help the editorial board in smooth publishing

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

11.3.5: SECTION EDITORS:

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

i. Bibliography

ii. Proof-reading

iii. Academic writing reviewing, grammar and spell checking

iv. Dissemination of articles for review

v. Contact with publishers under the supervision of

senior editorial team

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

vii. others

11.3.6: EDITORIAL ADVISORY BOARD:

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

12. POLICY REGARDING RECRUITMENT AND CONTINUATION OF EDITORIAL BOARD

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

13. PLAGIARISM POLICY

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

14. CONTACT INFORMATION

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

KHYBER MEDICAL COLLEGE, PESHAWAR - PAKISTAN