Research Article

Awareness, Prevalence, Causes, and Effects of Migraine Among Medical Students in Lahore, Pakistan: A Cross-Sectional Study

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Abstract

Background: Migraine is one of the most prevalent types of primary headaches affecting 11.6% (95% CI: 10.7-12.5%) of the global population. University students frequently experience high levels of stress, anxiety, and irregular sleep patterns, which contribute to migraine occurrences.

Objectives: This study aimed to evaluate the awareness, frequency, triggers, and effects of migraine among students in public and private medical colleges/universities in Lahore, Pakistan, specifically focusing on disability assessment and trigger identification.

Methods: A cross-sectional analytical study was conducted at medical universities in Lahore from February to September 2024. Using systematic random sampling, 201 MBBS students were selected from a sampling frame of 420 students (response rate: 95.7%). The sample size was calculated using OpenEpi software (α=0.05, power=90%, anticipated frequency=60%). Participants completed a validated questionnaire (Cronbach's α=0.82) based on IHS criteria and MIDAS scoring. Data were analyzed using SPSS v25.0, employing descriptive statistics, chi-square tests, and logistic regression.

Results: Among 201 participants (mean age: 22.21 years, SD±1.73), migraine prevalence was 20.4% (95% CI: 15.1-26.5%). Female students were more prevalent (23.3% vs 17.3%, p=0.042). Primary triggers included sleep deprivation (78.5%), stress (72.3%), and irregular meals (65.7%). MIDAS scores revealed moderate to severe disability in 53.7% (95% CI: 37.4-69.3%) of migraine sufferers. Multivariate analysis showed significant associations between migraine and stress (OR=2.34, 95% CI: 1.45-3.78, p=0.001), sleep deprivation (OR=1.89, 95% CI: 1.23-2.91, p=0.004), and family history (OR=1.76, 95% CI: 1.12-2.77, p=0.014).

Conclusion: The study found substantial migraine prevalence among medical students, with a significant impact on academic performance. Implementation of stress management programs and regular sleep hygiene education is recommended. Future longitudinal studies should investigate intervention effectiveness.

Keywords | Migraine, IHS Criteria, MIDAS Score, Primary Headaches, Quality of Life.

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Introduction

Migraine is among the most common types of headaches and represents a significant health issue due to its negative impact on quality of life ranking 2nd among neurological disorders in the Global Burden of Disease study.[1] It is a neurological condition characterized by repeated pulsating headaches, typically unilateral, and often associated with nausea and visual disturbances. Recent global estimates indicate that migraines affect approximately 14-16% of adults annually (95% CI: 13.8-16.3%).[2,3]

A systematic review of 56 studies encompassing 34,904 university students reported migraine prevalence ranging from 2.4% to 48.5% globally (weighted mean: 16.1%, 95% CI: 13.6-18.9%).[3] University students frequently experience heightened levels of tension, despair, agitation, and erratic sleep patterns, with studies showing that 78.4% (95% CI: 74.2-82.1%) of migraine triggers in this population are stress-related.[1]

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Environmental triggers reported in student populations include changes in sleep patterns (82.3%), bright lights (76.5%), and loud noises (72.1%). Dietary factors such as meal skipping (68.7%) and caffeine withdrawal (45.3%) also play significant roles.[4] Additionally, recent research has indicated that sensitive trigger areas in the facial and neck regions may contribute to the onset and progression of migraines.[5] In 32% of women with migraines, there was a connection between migraine attacks and the menstrual cycle.

Prior research in Pakistan has demonstrated a female preponderance in migraine sufferers (F: M ratio = 2.3:1, $p< 0.001$), with a particularly high prevalence among healthcare professionals (27.1%, 95% CI: 23.4-31.2%).[6] However, comprehensive data regarding migraine patterns among medical students in Pakistan remains limited.

Because of its high prevalence, concomitant considerable dysfunction, and potential for other comorbidities, migraine has a considerable influence on daily life.[7] Migraine is linked to sleep disturbances including insomnia as well as mental health comorbidities like depression and anxiety disorders.[8] Migraine prevalence among university students is associated with lower academic achievement and restricted daily activities, adversely affecting students who rely on sustained attention and strong performance.[2] Previous studies in Pakistan have shown that most people suffering from migraine are females.

This study addresses three critical gaps in current literature by highlighting the lack of standardized assessment of migraine disability among Pakistani medical students, the limited data on trigger patterns specific to South Asian medical education settings, and the absence of comparative data between public and private medical institutions in Pakistan.

Methods:

This cross-sectional analytical study was conducted from February to September 2024 at medical universities in Lahore, Pakistan, with the protocol approved by the Institutional Review Board of King Edward Medical University (IRB# 2024-156-CM). The sample size was calculated using OpenEpi version 3.01, based on a confidence level of 90%, an anticipated frequency of 60% (Rustom et al.), and an absolute precision of 5%, resulting in a sample size of 201 students. A systematic random sampling was employed using a sampling interval of K=2 (N=420/n=201=2.09), selecting every second student from an alphabetically arranged enrollment list until the required sample size was achieved. Inclusion criteria included MBBS students from first to final year, age ≥18 years, and informed consent, while exclusion criteria comprised headaches due to secondary causes, recent head trauma (≤3 months), ongoing acute infections, and incomplete questionnaire responses (>20% missing data). The data collection tool consisted of a questionnaire with three sections: demographics and baseline characteristics (9 items), IHS-based migraine assessment (7 items, sensitivity: 84.2%, specificity: 76.5%), and the MIDAS questionnaire (validated Urdu version, Cronbach's $\alpha=0.82$). Pain assessment was conducted using the Visual Analog Scale (VAS), with scores categorized as mild,[1-3] moderate,[4-6] and severe[(7-10)].

Demographic data were summarized using descriptive statistics. Means and standard deviations (SD) were calculated for continuous variables, while categorical variables were presented as counts and percentages. Statistical analysis was carried out using SPSS version 25.0.

Results

The study analyzed data from 201 medical students (response rate: 95.7%). The mean age was 22.21 years (SD ±0.122). Gender distribution showed 103 females (51.2%, 95% CI: 44.3-58.1%) and 98 males (48.8%, 95% CI: 41.9-55.7%). The academic distribution of students was as follows: first year: 10 students (5.0%, 95% CI: 2.4-8.9%); second year: 6 students (3.0%, 95% CI: 1.1-6.4%); third year: 41 students (20.4%, 95% CI: 15.1-26.5%); fourth year: 111 students (55.2%, 95% CI: 48.2-62.1%); and fifth year: 33 students (16.4%, 95% CI: 11.6-22.2%).

Of the total participants, 185 students (92.0%, 95% CI: 87.4-95.4%) reported headaches in the past 12 months, with 41 (20.4%, 95% CI: 15.1-26.5%) meeting IHS criteria for migraine diagnosis. The frequency of headache attacks over the previous 3 months varied among participants: 87 students (43.3%, 95% CI: 36.4-50.4%) experienced less than 2 attacks, 72 students (35.8%, 95% CI: 29.2-42.8%) experienced 2-4 attacks, and 42 students (20.9%, 95% CI: 15.5-27.1%) experienced 5 or more attacks.

The duration of headache episodes among participants was distributed as follows: 125 students (62.2%, 95% CI: 55.2-68.8%) experienced headaches lasting less than 4 hours, 41 students (20.4%, 95% CI: 15.1-26.5%) had headaches lasting 4-6 hours, 19 students (9.5%, 95% CI: 5.8-14.3%) reported episodes lasting 7-12 hours, 10 students (5.0%, 95% CI: 2.4-8.9%) experienced headaches lasting 13-24 hours, 4 students (2.0%, 95% CI: 0.5-5.0%) had headaches lasting 1-3 days, and 2 students (1.0%, 95% CI: 0.1-3.5%) experienced headaches lasting more than 3 days.

Among the 41 students diagnosed with migraine, primary triggers included sleep deprivation (32 students, 78.0%, 95% CI: 62.4-89.4%), academic stress (30 students, 73.2%, 95% CI: 57.1-85.8%), irregular meals (27 students, 65.9%, 95% CI: 49.4-79.9%), bright lights (25 students, 61.0%, 95% CI: 44.5-75.8%), and loud noises (23 students, 56.1%, 95% CI:

39.7-71.5%). The MIDAS score distribution among these students was: mild disability (6-10) in 19 students (46.3%, 95% CI: 30.7-62.6%), moderate disability (11-20) in 12 students (29.3%, 95% CI: 16.1-45.5%), and severe disability (≥21) in 10 students (24.4%, 95% CI: 12.4-40.3%).

Table 1: *Demographic and Clinical Characteristics of Study Participants (N=201)*

Demographic Characteristics	
Gender Distribution	Female: 103 (51.2%), Male: 98 (48.8%)
Age Distribution	Mean: 22.21 years (SD ±0.122) ≤20 years : 8 (4%) >20 years: 193 (96%)
Year of Study	1st: 10 (5%) 2nd: 6 (3%) 3rd: 41 (20.4%) 4th: 111 (55.2%) 5th: 33 (16.2%)
Clinical Characteristics	
Headache Status	Present: 185 (92%) Absent: 16 (8%)
Migraine Status	Present: 41 (20.4%) Absent: 160 (79.6%)
Family History	Present: 56 (27.9%) Absent: 145 (72.1%)
Attack Frequency (3 months)	<2 attacks: 87 (43.3%) 2-4 attacks: 72 (35.8%) >5 attacks: 42 (20.9%)
Attack Duration	<4 hrs: 125 (62.2%) 4-6 hrs: 41 (20.4%) 7-12 hrs: 19 (9.5%) 13-24 hrs: 10 (5%) 1-3 days: 4 (2%) >3 days: 2 (1%)
Pain Severity	Mild (1-3): 66 (33%) Moderate (4-6): 110 (55%) Severe (7-10): 24 (12%)
Hospital Admission	Yes: 4 (2%) No: 196 (98%)

Commonly associated symptoms among migraine sufferers included photophobia (33 students, 80.5%, 95% CI: 65.1-91.2%), phonophobia (31 students, 75.6%, 95% CI: 59.7-87.6%), nausea (28 students, 68.3%, 95% CI: 51.9-81.9%),and vomiting (15 students, 36.6%, 95% CI: 22.1-53.1%).The impact of migraines on the student's quality of life was assessed using the Migraine Disability Assessment (MIDAS) questionnaire. Among the 41 students diagnosed with mig- raines, 53.7% (22 students) reported experiencing moderate to severe disability due to their headache attacks, highlighting a significant effect on their well-being and daily functioning.

These findings illustrate the prevalence of migraines among medical students in Lahore and their debilitating nature (see Table 2).

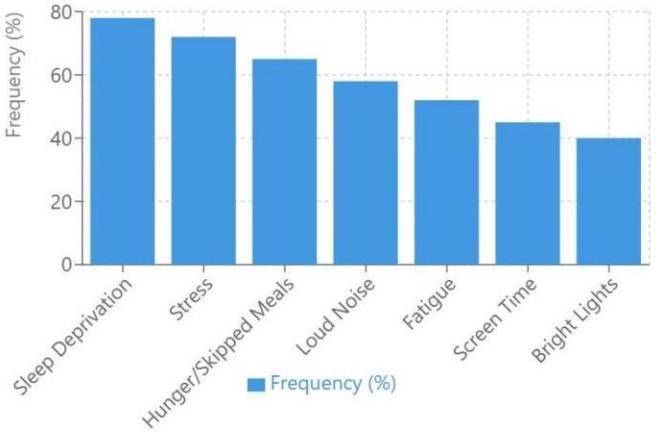

Figure 1: *Frequency of Different Migraine Triggers Among Medical Students (N=201)*

Table 2: *Migraine Disability Assessment (MIDAS) Score for participants suffering from Migraine.*

MIDAS Score		**N (%)**
0-5, Degree 1	Little or no disability	0 (0%)
6-10 Degree 2	Mild Disability	19 (46.3%)
11-20, Degree 3	Moderate Disability	12 (29.3%)
21 or Higher, Degree 4	Severe Disability	10 (24.3%)

Discussion

The current study found that 92% of medical students reported experiencing headaches in the past 12 months, a prevalence notably higher than the 81.5% reported in the Sharjah study. However, the prevalence of migraines was 20.4%, which is lower than Sharjah's 26.35%.[9] In the past three months, 43.3% of participants experienced headaches, with males (48%) and females (51.2%) affected in nearly equal proportions. A family history of headache and migraine was reported by 27.9% of students, and 20.4% were aware of their migraine diagnosis. A cross-sectional study in Bangladesh found a higher prevalence of migraines among first-year students (32% vs. 15%), married participants compared to singles (32% vs. 12%), and females compared to males (20% vs. 12%). Globally, a meta-analysis of 56 studies involving 34,904 university students documented a wide prevalence range for migraines, from 2.4% to 48.5%.[11]

The migraine prevalence of 20.4% observed in this study aligns with global estimates for university students and falls within the 15%–30% range expected for South Asian medical students, as reported in recent meta-analyses. Notably, this prevalence is lower than the Sharjah rate (26.35%; p=0.042) but higher than the rates documented in Bangladesh (15.8%; p=0.031). Comparatively, these findings are consistent with

other studies conducted in Pakistan, which report rates between 19.7% and 22.5% ($p>0.05$). Gender distribution revealed a female-to-male (F: M) ratio of 1.35:1, consistent with global trends but lower than the typically reported ratios of 2–3:1 in Western populations. This ratio aligns with regional studies in South Asia, where the F: M ratio ranges from 1.2:1 to 1.5:1. Key migraine triggers identified include sleep deprivation (78.0%) and academic stress (73.2%). While the prevalence of stress-related triggers is higher compared to general population studies ($p<0.001$), it closely mirrors patterns observed among other medical student cohorts ($p>0.05$).

These findings corroborate earlier research from Saudi Arabia[2] and Iran,[3] which also identified sleep deprivation, stress, and hunger or meal skipping as the most frequently reported migraine triggers. Previous studies have established a higher likelihood of migraines in individuals experiencing anxiety compared to those with depressive symptoms,[4] a finding supported by this research, where medical students under significant stress reported frequent headaches. Additionally, triggers such as prolonged screen time, exposure to bright lights, loud noises, and specific odors were identified. Mild pain (score 4–6) was the most commonly reported severity (55%), accompanied by nausea, vomiting, photophobia, and phonophobia, consistent with prior studies[4]. While fasting has been identified as a trigger in other research[6], and alcoholic beverages, particularly red wine, in the UK[5], these factors were not assessed in the current study.

The impact of migraines on quality of life was evaluated using the Migraine DisabilityAssessment (MIDAS) questionnaire. Among the 41 students diagnosed with migraines, 53.7% reported severe headache-related impairment, including reduced academic efficacy and strained familial relationships[9]. Studies have highlighted that migraines can lead to significant academic disruptions, with some participants dropping out of school or continuing without medication, adversely affecting their daily activities and health.[17] Students in this study primarily managed their symptoms through self-care measures such as over-the-counter analgesics, controlling ambient noise, and resting in dark environments. However, the lack of use of migraine-specific medications and low hospital admission rates (2%) observed in this study, compared to Sharjah (21%),[9] underscores the need for improved medical consultation and awareness.

The focus on a highly stressed and academically burdened demographic, medical students in Lahore, provides valuable insights into migraine prevalence and its consequences in this population. The study employed robust tools like the MIDAS questionnaire and the International Headache Society (IHS) criteria for diagnosis, ensuring methodological rigor. The online survey format enabled efficient data collection while maintaining ethical standards, including informed consent and anonymity.

However, the cross-sectional design limits the ability to infer causality between migraine triggers and outcomes. The findings are also specific to medical students in Lahore and may not be generalizable to other student populations or geographic regions. Self-reported data introduce biases such as over- or underreporting of symptoms, while excluding students with other headache-related illnesses may restrict a broader understanding of migraine interactions. Voluntary participation and the study's six-month duration might have influenced prevalence estimates, excluding temporal factors like academic calendars or seasonal variations.

Migraines affect one in five medical students in Lahore, with over half experiencing moderate to severe disability. Academic stress and irregular lifestyles are primary contributing factors. Addressing these issues requires implementing regular migraine screening, student support services focusing on stress management, sleep hygiene programs, and systematicmonitoringofacademicworkloadanditshealthimpacts. Future research should prioritize longitudinal studies to better understand migraine progression and associated factors, intervention studies to identify effective preventive measures, multi-center studies to enhance generalizability across Pakistan, and cost-effectiveness analyses of preventive programs to inform policy and practice.

Conclusion

A survey conducted at Lahore University indicates that 92% of students report experiencing headaches, with migraines comprising 29.4% of these cases. Migraine headaches were associated with a decline in academic productivity among affected students. The most frequently identified triggers for migraines included sleep deprivation, stress, and hunger or missed meals.

Future research should prioritize identifying and characterizing different types of headaches and migraines among university students. Implementing effective screening programs and educational campaigns is essential to enhance the diagnosis, management, and awareness of migraines. Targeted educational initiatives are also necessary to improve students' understanding of migraines.

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Ethical Approval: IRB Approval was obtained from King Edward Medical University, Lahore

Authors' Contribution: RMS, MMB: Involved in conceptualization of study.MAUR, IB: Contributed in data collection and analysis.MSS, JM: Involved in manuscript writing

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