



Original Research Article

Prevalence of Migraine, Contributing Factors, And Its Impact among Medical Students at HITEC-IMS, Taxila: A Cross-Sectional Study

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Abstract: Background: Migraine is a recurrent neurological disorder characterized by severe headache and sensory disturbances, significantly impairing daily functioning and academic performance. This study aimed to assess the prevalence and risk factors of migraine among medical students at HITEC Institute of Medical Sciences (HITEC-IMS), Taxila, Pakistan. **Methods:** A cross-sectional survey was conducted at Institute of Medical Sciences (HITEC-IMS), Taxila, Pakistan, over four months from May 19, 2025, to August 31, 2025 among 480 MBBS students recruited through non-probability convenience sampling using the Migraine Screen Questionnaire (MSQ-5) and the Migraine Disability Assessment (MIDAS). Data on demographics, lifestyle factors, and potential triggers were collected. Statistical analysis was performed using SPSS version 26, with chi-square and t-tests applied; $p \leq 0.05$ was considered significant. **Results:** The prevalence of suspected migraine was 12.9%. Among affected participants, 95.2% reported sensitivity to light and noise, 82.3% experienced headaches lasting more than four hours, and 71% reported nausea. Based on MIDAS scoring, 33.9% had severe disability, while 30.6% had moderate disability. Significant associations were observed between migraine and age ($p=0.03$), academic year ($p=0.00$), screen time ($p=0.005$), and sleep duration ($p=0.03$). **Conclusion:** Migraine is a prevalent and disabling condition among medical students at HITEC-IMS, predominantly linked to stress, prolonged screen exposure, and inadequate sleep. Preventive interventions focusing on stress management, healthy sleep patterns, and migraine awareness are essential to enhance students' academic performance and quality of life.

Keywords: Migraine, Medical students, Prevalence, Risk factors, MIDAS, Stress, Screen time, Pakistan

INTRODUCTION

Migraine is a long-term complex neurological condition characterized by repeated and intense headaches, and may be accompanied by nausea, vomiting, and increased sensitivity to light and noise. Migraine attacks last between 4 and 72 hours, and are usually on one side of the head¹. Migraine are

unique compared to common headaches because they are associated with some systemic symptoms, including nausea, photophobia, and phonophobia. Such episodes may be highly disabling and often require being absent from daily routine activities, which have a significant impact on quality of life. Migraine may affect academic performance,

concentration, and productivity among students. The typical causes are stress, certain foods, hormonal changes, sleep deprivation, and environmental factors, and the condition can impact people of all ages, with far-reaching consequences to personal and professional life^{2,3}.

Migraine is among the most disabling neurological conditions in the world, with a prevalence of about 12% in the population. The prevalence is more significant in females (17%) compared with males (6%), especially in reproductive age^{1,5}. According to the World Health Organization (WHO), migraine is listed as one of the top ten causes of disabilities globally, with a high prevalence among people between the ages of 18 and 50 years. Migraine is a top reason for absenteeism in both school and workplaces, and it has a great impact on productivity and education⁷. The migraine burden on the economy is high, as billions of dollars are lost through medical expenses, lost productivity, and disability.

The prevalence of migraine in Asia is between 8.4% and 12.7% and higher in women (11.3%-14.4%) than in men (3.6%-6.7%)⁹. The economic effect is also significant; Singapore alone presented the overall migraine-related expense of about 1.04 billion SGD in 2018¹⁰. Migraine is very common in Pakistan, with an estimated 25%-30% of the population having the condition at some stage of life, and is the second most frequent form of a headache after tension-type headache^{11, 12}. Among college students, irregular sleep patterns, academic stress, and lifestyle issues are commonly named as major factors contributing to the occurrence of migraine¹³. Nevertheless, the comparative regional variations, low reports, and the lack of population-specific data are barriers to the complete comprehension of the prevalence and factors involved in migraine among Pakistani students.

Migraine is a serious and common condition, yet it has been understudied in medical students in Pakistan. The awareness of its prevalence, related risk factors, and effects on its everyday functioning in this group is essential, considering the scholarly and lifestyle pressures of medical education. This data can be used to inform interventions, preventive approaches, and resource distribution to lessen the disability caused by migraine and enhance the well-being of students. The present study aimed to determine the prevalence of migraine, factors contributing to it, and its effects on the daily functioning of undergraduate medical students.

MATERIAL AND METHOD

This descriptive cross-sectional study was conducted at the HITEC Institute of Medical Sciences (HITEC-

IMS), Taxila, Pakistan, over four months from May 19, 2025, to August 31, 2025. Ethical approval was obtained from the Ethics Review Board of HITEC-IMS (Ref. No. HITEC-IRB-50-2025, dated 19-05-2025), and written informed consent was collected from all participants. Participation was voluntary, and confidentiality and anonymity were strictly maintained.

This study sample was estimated by OpenEpi with an estimated 95% confidence level, a 5% margin of error, and a prevalence of migraine of about 28% among medical students using International Headache Society criteria¹⁴. According to this expected prevalence, the minimum sample size was estimated at around 420 participants. The final sample size of 480 students was decided in order to deal with possible non-response and to have sufficient power to find any associations with demographic and lifestyle variables.

A **non-probability convenience sampling** was used due to accessibility and voluntary participation. The study included students aged 18–25 years, both male and female. Exclusion criteria consisted of students with a prior diagnosis of severe psychiatric illness, cognitive impairment, or any chronic neurological disorder.

Data collection was conducted using a structured, self-administered questionnaire distributed in classroom settings under faculty supervision to ensure accuracy and completeness. The questionnaire consisted of three sections. The first section captured demographic and lifestyle variables, including age, gender, academic year, residence (hostelite or day scholar), marks in the last professional examination, smoking status, dietary habits, physical activity, screen time, and average sleep duration. The second section assessed migraine prevalence using the **Migraine Screen Questionnaire (MSQ-5)**, a five-item self-reported tool developed according to International Headache Society (IHS) criteria with a total score ≥ 4 indicating suspected migraine. The MSQ-5 has demonstrated good internal reliability (Cronbach's $\alpha = 0.81$)¹⁵.

The third section evaluated migraine-related disability using the **Migraine Disability Assessment (MIDAS)** questionnaire, which measures the impact of migraine on daily activities over three months. MIDAS scores range from 0 to 90 and classify disability as little or none (0–5), mild (6–10), moderate (11–20), and severe (>21). The MIDAS questionnaire has demonstrated adequate internal consistency (Cronbach's $\alpha = 0.76$)¹⁶. Participants were also asked to report commonly used medications or management strategies during migraine episodes, with non-steroidal anti-

inflammatory drugs (NSAIDs) being the most frequently used. No interventions or treatments were administered as part of the study.

Data were manually recorded and subsequently entered into **IBM SPSS Version 26.0** for analysis. Continuous variables, such as age, were expressed as

means $\pm$ standard deviations, while categorical variables, including gender, academic year, and screen time, were presented as frequencies and percentages. Associations between categorical variables were assessed using the **Chi-square test**, and a p-value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 480 undergraduate medical students participated in the study. Among them, 252 (52.5%) were male, and 228 (47.5%) were female, with a mean age of 21 ± 2.4 years. The largest proportion of respondents were first-year students (29.7%), followed by fifth-year (20.4%), fourth-year (18.7%), second-year (17%), and third-year students (14%). Regarding residence, 67.5% lived in hostels, while 32.5% were day scholars. Academic performance in the most recent professional examination showed that 36.3% scored between 60–69%, 23.3% scored 80% or above, and 21.5% scored 50–59%. Only 3.3% reported being smokers, whereas the majority were non-smokers (96.7%). (Table 1)

Table 1: Demographic Characteristics of Participants (n = 480)

Variable	Category	Frequency (%)
Age (years)	Mean $\pm$ SD	21 ± 2.4
Gender	Male	252 (52.5%)
	Female	228 (47.5%)
Academic Year	M1	143 (29.7%)
	M2	82 (17%)
	M3	67 (14%)
	M4	90 (18.7%)
	M5	98 (20.4%)
Residence	Hostelites	324 (67.5%)
	Day Scholars	156 (32.5%)
Last Exam Score	<50%	4 (0.8%)
	50–59%	103 (21.5%)
	60–69%	174 (36.3%)
	70–79%	87 (18.1%)
	$\geq 80\%$	112 (23.3%)
Smoking Status	Yes	16 (3.3%)
	No	464 (96.7%)

Out of 480 participants, **62 students (12.9%) were suspected to have migraine** based on MSQ-5 criteria. Among these, 95.2% reported that their headaches worsened upon exposure to light and noise, 82.3% experienced headaches lasting more than four hours, 93.5% reported limitation in physical or intellectual activities, and 71% had associated nausea. (Table 2)

Table 2: Characteristics of Headaches among Suspected Migraine Cases (n = 62)

Headache Feature	Frequency (%)
Triggered by light and noise	59 (95.2%)
Duration >4 hours	51 (82.3%)
Limitation of physical/intellectual activities	58 (93.5%)
Associated nausea	44 (71%)

Lifestyle factors revealed that 82.5% of students had less than six hours of screen time per day, while 17.5% reported more than six hours. Sleep duration varied: 79.7% reported 6–10 hours, 19.5% reported 1–5 hours, and 2.7% exceeded 10 hours per day. Stress was the most commonly reported trigger (30.2%), followed by sleep deprivation (9.3%) and academic pressure (7.7%). NSAIDs were the primary management strategy (71.6%), followed by rest and tea. (Table 3)

Disability assessment using MIDAS showed that 33.9% experienced **severe disability**, 30.6% **moderate**, 19.4% **mild**, and 16.1% **little or no disability**, indicating a significant impact on daily activities and academic performance. (Table 4)

Table 3: Lifestyle Factors, Triggers, and Medication

Factor	Category	Frequency (%)
Screen Time	<2 hours	38 (7.9%)
	2–4 hours	172 (35.8%)
	5–6 hours	186 (38.8%)
	>6 hours	84 (17.5%)
Sleep Duration	1–5 hours	94 (19.5%)
	6–10 hours	383 (79.7%)
	>10 hours	13 (2.7%)
Stress		145 (30.2%)
Sleep Deprivation		45 (9.3%)
Academic Pressure		37 (7.7%)
Medication	NSAIDs	344 (71.6%)

Table 4: Migraine Disability Assessment (MIDAS) Scores (n = 62)

Disability Category	Frequency (%)
Severe (>21)	21 (33.9%)
Moderate (11–20)	19 (30.6%)
Mild (6–10)	12 (19.4%)
Little or None (0–5)	10 (16.1%)

Based on the MIDAS criteria assessing migraine-related disability, 21 students (33.9%) experienced severe disability, 19 (30.6%) had moderate disability, 12 (19.4%) reported mild disability, and 10 (16.1%) experienced little or no disability. (Figure 1)

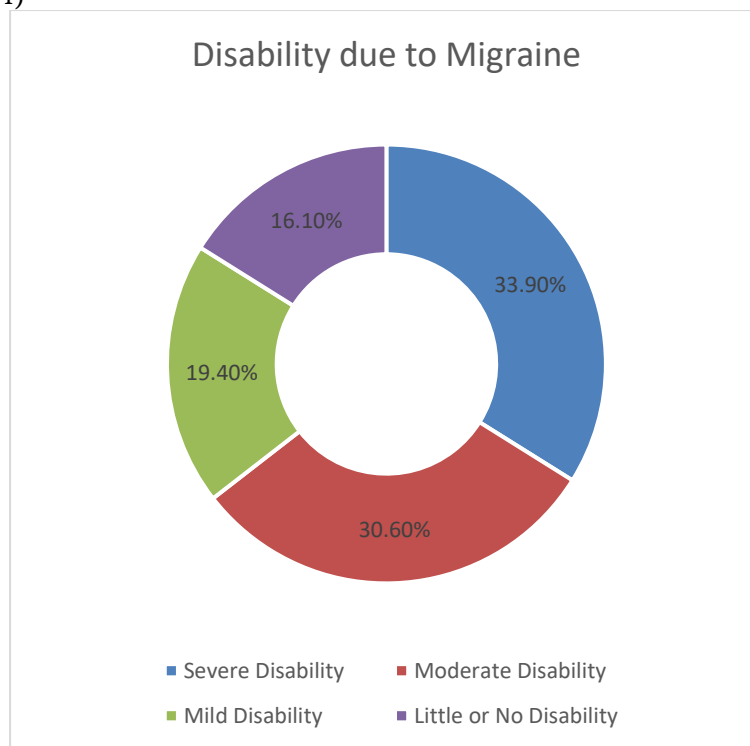


Figure 1: A Pie Chart Showing the Frequency of Disability Due to Migraine

The association of migraine with demographic and lifestyle factors among the medical students showed no significant difference between genders ($p = 0.23$). The academic year was significantly associated with migraine, with students in early years reporting a higher prevalence compared to those in later years ($p < 0.001$). Screen time also demonstrated a significant relationship, with students having more than six hours of daily screen exposure showing a higher prevalence of migraine ($p = 0.005$). Sleep duration was significantly associated with migraine, as students with shorter sleep duration reported more frequent migraine episodes ($p = 0.03$). Age was another significant factor, with younger students experiencing a higher prevalence compared to older students ($p = 0.03$). (Table 5)

Table 5: Association of Migraine with Demographic and Lifestyle Factors n=480

Variable	Migraine Present (n=62)	Migraine Absent (n=418)	P-value
Gender			0.23
Male	32 (12.7%)	220 (87.3%)	
Female	30 (13.2%)	198 (86.8%)	
Academic Year			<0.001
Early Years (M1–M2)	40 (16.5%)	185 (83.5%)	
Later Years (M3–M5)	22 (8.6%)	233 (91.4%)	
Screen Time			0.005
≤6 hours	30 (7.6%)	366 (92.4%)	
>6 hours	32 (38.1%)	52 (61.9%)	
Sleep Duration			0.03
≤5 hours	20 (21.3%)	74 (78.7%)	
>5 hours	42 (11.0%)	344 (89.0%)	
Age Group			0.03
≤21 years	35 (14.9%)	200 (85.1%)	
>21 years	27 (11.0%)	218 (89.0%)	

DISCUSSION

This cross-sectional study evaluated the prevalence, associated factors, and functional impact of migraine among medical students at HITEC Institute of Medical Sciences (HITEC-IMS), Taxila. The overall prevalence of suspected migraine was 12.9%, based on the MSQ-5 and MIDAS criteria. These findings underscore migraine as a frequent neurological disorder in medical students, significantly affecting concentration, academic performance, and quality of life. The prevalence observed in this cohort aligns with both regional and international studies, indicating that migraine remains widespread yet often underrecognized in this population.

The prevalence of 12.9% parallels figures reported among medical students in Saudi Arabia, Kuwait, and India, where rates ranged between 11% and 15%^{1,2,3}. In Saudi Arabia, a prevalence of 14.8% was reported, with females and students experiencing irregular sleep being more susceptible¹. Similarly, a Kuwaiti study documented a 15% prevalence, with stress, inadequate sleep, and prolonged screen time identified as key contributors, while an Indian cohort reported a prevalence of 10.1% using comparable diagnostic criteria^{2,3}.

These trends are supported by recent data on a global scale. A 2025 scoping review by Greek found a rate of migraine in students of up to 20% with stress, sleep disturbance, and academic anxiety being the greatest triggers¹⁷. Among medical students, the prevalence in China was 17.3% and the European cohorts had similar rates^{18,19}. Even more prevalent use of the ID-Migraine questionnaire was observed in a study in Lebanon (35.8%), which makes the method and context different²⁰.

Interestingly, our study prevalence is less than that of the general population of Pakistan at 25-30%, which may indicate underreporting, increased awareness, or

good control among students¹¹. However, it is still elevated when compared to neighboring areas and probably because of academic stress and life-related strains distinct to medical education.

This study did not show any gender difference, unlike the world data, in which there was a female predominance in migraine. Migraine is present in 17% of females in the globe and 6% of males, which has been largely caused by fluctuations in hormones, especially the estrogen levels during the reproductive age^{4,5}. This is supported by a number of international surveys, which point to increased migraine-related disability among young adult women^{6,7}. Nonetheless, our results are consistent with those found in other regions in Pakistan, in which both sexes are influenced by academic stressors, irregular sleep patterns, and lifestyle factors¹². There is evidence of South Asian medical students that gender differences in migraine prevalence decrease in common academic settings and similar workload²¹. The hypothesis that high-stress academic environments anti-select for the biological differences between populations was supported by similar findings in Egyptian and Bangladeshi student populations^{22,23}.

Migraine has been identified as one of the neurovascular conditions where stress and sleep deprivation regulate the levels of serotonin and calcitonin gene-related peptide (CGRP), thereby reducing the threshold of the headache^{5,12}. The most common triggers in this study were stress (30.2%), sleep deprivation (9.3%), and academic pressure (7.7%). These findings correlate with a study conducted in Lahore in which 35% of medical students focused on stress and academic pressure as the leading causes of migraine¹².

Screen time was strongly correlated with migraine ($p = 0.005$), where more than 82% of students indicated greater than six hours of screen exposure every day.

This is in line with that in Pakistan, which cited excessive screen use as a causative factor of the occurrence of headaches among adolescents⁴. Long-term screen time may cause visual fatigue, disruption of the circadian rhythm, and overstimulation of the cortex, which are known to be involved in migraine pathophysiology^{21,24}. The findings of studies in Bangladesh and Peru also confirm that one of the key precipitants among students is extended electronic device use^{22,23}.

The results of MIDAS scores indicated that 21 students (33.9%), 19 students (30.6%), 12 students (19.4%), and 10 students (16.1%) had severe disability, moderate disability, mild disability, and little or no disability, respectively. This highlights the high functional burden of migraines, which is similar to the Indian literature, with more than 50% of medical students stating disrupted focus and absenteeism from classes because of frequent headaches³. Migraine is the second most common cause of years lived with disability in the whole world^{6,7}. The same trends have been noted in Peru and Greece, where there have been cases of absenteeism from classes and low productivity among the affected students^{17,23}.

The majority of students used NSAIDs (71.6%) as the main treatment, then the next most popular therapies were rest and caffeine, which are also the most commonly used methods of self-medication by student populations around the world^{3,12,14}. This, however, creates some concerns about medication-overuse headache (MOH), which may increase the frequency of headaches. There was a significant correlation between migraine and age, academic year, screen exposure, and sleep duration ($p < 0.05$). Students were found to report more prevalence in early years, which may be related to their difficulty in adaptation and greater exposure to academic stressors, as seen in the previous regional research^{11,18}.

Another important factor was sleep deprivation; 19.5% of the students said that they had less than five hours of sleep, which was associated with increased prevalence of migraines ($p = 0.03$). This is consistent with previous research carried out in India and Saudi Arabia, where insufficient or inconsistent sleep is a powerful indicator of migraine^{1,3,25}. There were no significant associations between gender, residence, smoking status, and physical activity ($p > 0.05$), which could be because the sample was relatively homogeneous with little behavioral heterogeneity.

New South Asian data underscores the significance of screening programs and stress-management programs in universities^{17,19,26}. Systematic reviews recommend systematic inclusion of migraine awareness and preventive measures in the institutional health policies to reduce academic and

psychosocial effects²⁶. Together, these observations place migraine in the group of students as a topical issue in terms of influence on productivity, well-being, and educational performance.

Medical students, as future healthcare providers, form a very important group in migraine consciousness and control. Findings of this research indicate the necessity of developing stress-reduction courses, sleep hygiene education, and digital ergonomics information that should be incorporated into the medical curricula. These interventions can be complemented with information about pharmacologic and non-pharmacologic management to make students aware of the first signs and obtain timely help. Such integrated methods, comprising preventive education, counseling, and lifestyle modification, are¹² successful in lowering the disability associated with migraine in student groups around the world^{17,19,26}.

This study's cross-sectional design precludes causal inferences. Reliance on self-reported data may introduce recall bias, and migraine diagnosis was based on screening instruments rather than clinical confirmation. Additionally, the single-institution setting limits generalizability to other regions or universities. Nonetheless, the substantial sample size ($n = 480$) and use of validated tools such as MSQ-5 (Cronbach's $\alpha = 0.81$)¹⁵ and MIDAS (Cronbach's $\alpha = 0.76$)¹⁶ enhance the reliability of the findings.

Conclusion

Migraine is a common and debilitating problem in medical students at HITEC-IMS, and stress, overexposure to screens, and insomnia were found as major causes. The lack of any notable gender differences is an indication that the environment and academic factors are major determinants in this cohort. These results highlight the necessity of specific interventions, such as the promotion of sleep hygiene and stress management and the use of awareness, to decrease the impact of migraine and improve academic results and overall well-being.

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AUTHORS CONTRIBUTIONS:

MSQ-5: Migraine Screening Questionnaire-5

MIDAS: Migraine Disability Assessment Scale

HIS: International Headache Society

NSAIDs: Non-Steroidal Anti-Inflammatory Drugs

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