

Migraine Disorders - Prevalence and Disability Evaluation along with its Association with Sleep Quality among Undergraduate Medical Students

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ABSTRACT

Introduction

Headache is a prevalent issue among medical students, stemming from academic pressures, clinical responsibilities, and emotional stressors, with implications for reduced academic performance and co-morbid psychiatric illnesses. Of particular concern is migraine, which may disrupt the acquisition of patient care skills. This study aimed to assess the prevalence of migraine, its associated disability, and contributing factors

Materials and Methods

This was a cross sectional study on prevalence of migraine, its disability, and contributing factors among 403 MBBS students through a cross-sectional analytical approach. Data encompassed sociodemographic details, perceived academic stress, headache characteristics via the Migraine Screening Questionnaire and Migraine Disability Assessment Questionnaire (MIDAS), and sleep quality evaluated using the Pittsburgh Sleep Quality Index (PSQI), analyzed with SPSS-24.

Results

Findings revealed a mean student age of 20.41 years, with females constituting 66%. Migraine prevalence stood at 12.2%, with 24.4% experiencing severe disability. Factors linked to migraine included gender, academic stress, comorbidities, and psychiatric conditions, with the latter emerging as an independent predictor. Notably, lack of sleep emerged as the primary trigger, followed by eye strain or excessive screen time.

Conclusion

This study underscores the significance of addressing migraine and poor sleep quality among medical students, highlighting the necessity of promoting good sleep hygiene, effective stress management, and the management of psychiatric comorbidities to bolster student well-being.

Keywords

Migraine Disorders; Prevalence; Disability Evaluation; Sleep Quality; Students, Medical; Undergraduate Medical Education

Headache disorders, characterised by recurrent headache, are among the most common disorders of the nervous system. According to the WHO,

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it is one of the ten most common causes of functional disability. Tension-type headache (TTH) is the most common primary headache disorder, with two types: episodic and chronic. Episodic TTH, affecting over 70% of some populations, occurs on fewer than 15 days per month, lasting hours to days. Chronic TTH, occurring more than 15 days per month, affects 1-3% of adults and is more disabling. TTH often begins in adolescence and is more common in women (3:2 ratio).¹ Other primary

headache disorders include migraines and trigeminal autonomic cephalgias (TCAs).²

Migraine Disorder is recurrent, often life-long, and characterized by recurring attacks which include one-sided headaches of pulsating quality, moderate or severe intensity, aggravated by routine physical activity with duration of hours to 2-3 days. The most characteristic associated feature is nausea. Attack frequency is anywhere between once a year and once a week and in children, attacks tend to be of shorter duration and abdominal symptoms more prominent. Migraine most often begins at puberty and is more common in women, usually by a factor of about 2:1, because of hormonal influences.¹

The pathophysiology of primary headaches is not fully understood. Migraine is believed to result from neurological dysfunction, subsequently involving cranial vessels and the trigeminal nerve. In tension-type headaches, overactivity in cervical or pericranial muscles may be due to trauma, poor posture, or anxiety.³ In migraines, trigeminal afferents are activated by pannexin-1 channel opening, leading to caspase-1 activation and release of proinflammatory mediators. This triggers a cascade involving NF-kB (nuclear factor kappa-B) activation and its spread to trigeminal nerve fibres around vessels of the pia mater. This causes a series of cortical, meningeal, and brainstem events, provoking inflammation in the pain-sensitive meninges and resulting in headaches through central and peripheral mechanisms. This explains the cortical depression (causing aura), and prolonged trigeminal nociception, resulting in headaches.⁴

Headache is one of the most common complaints among medical students due to excessive exposure to physical, psychological and social stressors more than the general population.⁵ Medical students are expected to navigate their career through a higher level of stress, performance pressure, longer duration of education and a strong responsibility towards their career.⁶ The severity of headache is directly proportional to the negative impact caused by the headache which includes reduced academic performance, quality of life, impaired functioning, and comorbid psychiatric diagnosis.³

The relationship between sleep and headaches is bidirectional. Stress is a common trigger for headaches,

while sleep is the most frequently reported relief. Poor sleep quality has been shown to increase headache impact, frequency, and severity, particularly in migraine and TTH patients. Changes in sleep patterns can trigger migraines, and sleep disorders are linked to increased migraine frequency.⁷ Sleep is often reported as an effective relief for established migraines.⁸ Headaches can impair medical students' academic performance, reasoning, and quality of life,⁶ leading many to self-medicate and overlook the issue.

Although some studies have been done across the world, this topic has been under studied in South India, despite its high prevalence. This study is aimed to establish the prevalence of migraine in medical students, disability caused, factors determining its occurrence along with the impact of sleep quality.

Materials and Methods

A cross-sectional study was conducted in an undergraduate medical teaching institute in Telangana over a period of 6 months starting from April 2023. Study population included all the students of 1st to 4th year of MBBS and Interns of the teaching institute. Anyone who was unwilling to participate during data collection were excluded from the study.

Sample size: In a study conducted by Raju S and S G (2018)⁹ among medical students in a tertiary care medical college and hospital in South India, the prevalence of migraine was noted to be 30%. Applying the formula for sample size calculation for cross sectional studies at 95% CI, with an absolute precision of 5%, the sample size was calculated as 323. A non-response rate of 10% was added and the final sample size was **355**

Sampling procedure : A list of all the students was prepared from each batch of MBBS students and interns. Random selection was done using computer generated random numbers.

Data collection method : After explaining to the students regarding the aim of the study and taking a written informed consent, the data collection was done through Google Forms. Google form contain the participant

information sheet, written informed consent, A pretested semi structured questionnaire, Migraine Screening-Questionnaire, Migraine Disability Assessment Questionnaire and Pittsburgh Sleep quality Index. After collecting the data the identified students having migraine or any form of primary head ache was guided for medical support from General Medicine department of AIMSR, Hyderabad.

Study tools:

1. A pretested semi-structured questionnaire including the identification details, sociodemographic details, perceived academic stress, self assessment on academic performance, details of head ache perceived by the student and health seeking behaviour
2. Migraine Screening-Questionnaire: MSQ is a Migraine screening tool with a favourable diagnostic validity, test-retest reliability, and internal consistency- as determined by the Cronbach's alpha.¹⁰ The MS-Q is based on the International Headache Society (IHS) criteria for the diagnosis of migraine and can be easily administered. There are 5 questions. A score of zero was assigned to all negative responses and 1 for the positive response. A cut off of 4 and above was used as indicative of possible migraine
3. Migraine Disability Assessment Questionnaire (MIDAS): 5 question expressed as number of days in last 3 months affected by headache leading to loss of productivity, avoidance of leisure activities etc. This questionnaire quantifies the disability caused due to migraine
4. Pittsburgh Sleep quality Index (PSQI): 11 questions which assess the time of quality sleep frequency of troubled sleep, requirement of medicines to induce sleep etc over last 1 month. This questionnaire rates the quality of sleep

Ethical clearance: Written informed consent was from every student. Participant information sheet containing the objectives and outcome of the study was provided to study participants. Clearance has been taken from Institutional ethics committee for biomedical research. (EC/NEW/INST/1527/2023/04/052)

Statistical analysis: The data was entered to MS excel and the analysis done using SPSS version 24. Descriptive analysis was done to find the proportion of students having migraine, extent of disability and sleep quality. The quantitative variables were expressed as mean \pm Standard Deviation. Bivariate analysis was done using chi square for categorical variables and student t test in case of comparison of means. P value <0.05 was taken as statistically significant. Multivariate logistic regression was done to find the predictors for migraine, to adjust for confounding factors. Strength of association was expressed as adjusted OR (95% CI).

Results

Sociodemographic details: The total number of responses received from medical students across all academic years was 403. Mean age of study participants was 20.41 years (SD = 2.08). Majority of the students 266 (66%) were females and the rest 137(34%) were males. Among the responses received, majority were 177 (43.9%) first year students, 86 (21.3%) were interns and the rest from other academic years were 140 (34.7%). Out of the 403 students, 13 (3.2%) had known psychiatric conditions like anxiety, depression. 17 (4.2%) had known comorbidities like Hypothyroidism, Asthma and PCOS. Long term use of medications like beta agonists, corticosteroids, OCPs, SSRIs, Triptans and Thyroxine sodium supplements were present among 6.9% of medical students. Majority 329 (81.63%) were day scholars residing at their own homes.

Headaches and its characteristics: Of the 403 respondents, 45 (11.1%) experienced headaches more than once a day, while the majority, 144 (35.7%), had headaches more than once a week. Only 9 students (2.2%) had no headaches in the past year. Most students (179, 44.4%) reported headaches lasting 2-3 hours, with moderate intensity in 235 (58.3%). The most common pain location was around the head (band-like) in 172 (42.7%), followed by one side of the head (20.1%). Associated symptoms such as aura, tearing, nausea, and vomiting were present in 49.1% of students. Among the

403 students, 10 (2.4%) had autoimmune conditions, 7 (1.6%) had previous head injuries, and 3 (0.6%) had seizures. Most respondents (65%) did not use medication for headache relief, while 35% self-medicated, primarily with Paracetamol (26.8%) and Ibuprofen-Paracetamol combinations (2.5%).

Prevalence of migraine, migraine disability and trigger factors : Out of 403 responses received, 49 (12.2%) screened positive for migraine according to MS-Q in accordance with the diagnostic criteria according to IHS (International Headache society) Mean MS-Q score is 1.30 (SD = 1.056).

Table I: Migraine Screening Questionnaire responses among medical students

MS-Q MIGRAINE SCREENING-QUESTIONNAIRE			
S. NO.	QUESTIONS	RESPONSES	
		YES	NO
1	Do you have frequent or intense headaches?	310(76.9%)	93(23.1%)
2	Do your headaches last more than 4 hours?	41(10.2%)	362(89.8%)
3	Do you usually suffer from nausea when you have a headache?	60(14.9%)	342(85.1%)
4	Does light or noise bother you when you have a headache?	43(10.7%)	360(89.3%)
5	Does headache limit any of your physical or intellectual activities?	70(17.4%)	333(82.6%)

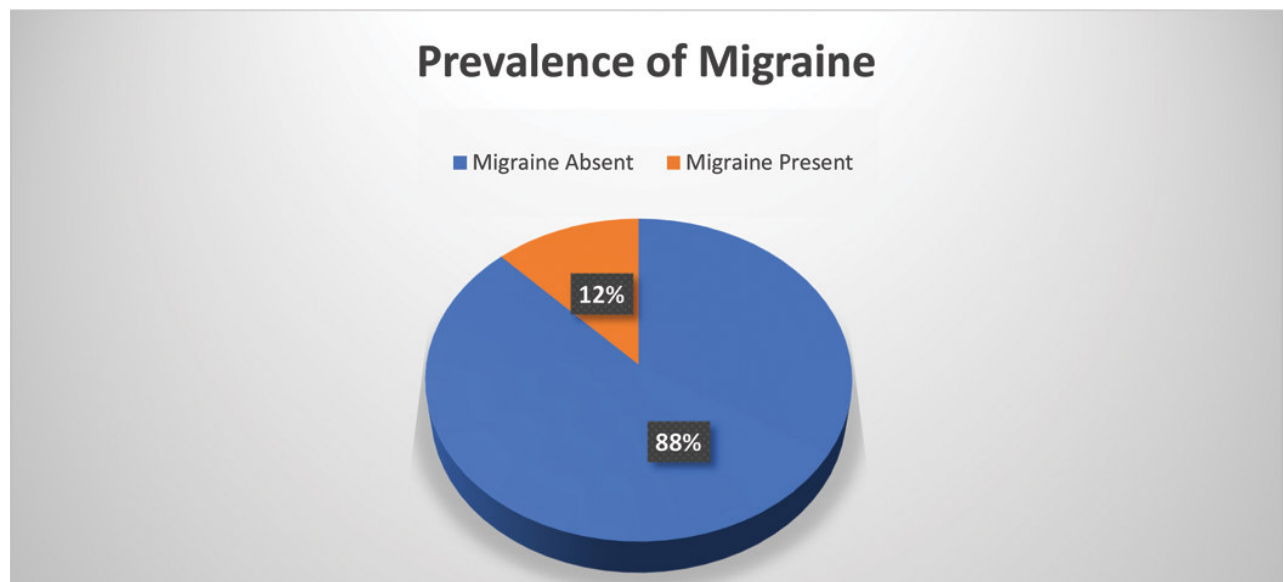


Fig. 1. Prevalence of possible migraine (MSQ score: ≥ 4)

Out of 49 students with migraine, 12 (24.4%) had MIDAS Grade IV or severe disability, 10 (20.4%) had MIDAS Grade III or moderate disability, 4 (8.1%) had MIDAS Grade II or mild disability and remaining 23 (46.9%) had MIDAS Grade I or had little or no disability. The average

MIDAS score is 12.9 graded as moderate disability. Out of the 49 migraineurs, lack of sleep 40 (83.3%) was the most frequent trigger, followed by eye strain or excessive screen time 35 (71.4%), not drinking enough water 33 (67.3%) and stress 30 (61.2%).

Table II : Triggers of Migraine among Medical students

TRIGGERS	PRESENT	ABSENT
Lack of sleep	40 (83.3%)	9 (16.7%)
Eye strain/Excessive screen time	35 (71.4%)	14 (28.6%)
Not drinking enough water	33 (67.3%)	16 (32.6%)
Stress	30 (61.2%)	19 (38.8%)
Skipping meals/Fasting	27 (55.1%)	22 (44.8%)
Loud sounds/ Noisy environment	27 (55.1%)	22 (54.9%)
Too much sleep	25 (51%)	24 (49%)
Exposure to sun or bright light	25 (51%)	24 (49%)
Travelling	24 (48.9%)	25 (49.1%)
Hot/Humid weather	23 (46.9%)	26 (53.1%)
Neck Pain/ Fatigue	23 (46.9%)	26 (53.1%)
Skipping workout/Excess workout	17 (34.6%)	32 (64.6%)
Cold/Windy weather	17 (34.6%)	32 (65.4%)
Mood Changes	16 (32.6%)	33 (67.3%)
Onset before menstruation	13 (26.5%)	36 (73.5%)
Strong odour/Perfumes	13 (26.5%)	36 (73.5%)
Skipping medication	12 (24.5%)	37 (75.5%)
Chocolate & sugary foods	12 (24.5%)	37 (75.5%)
MSG/Salty food	4 (8.1%)	35 (91.9%)
Smoking/ Alcohol	3 (6.1%)	46 (93.9%)
Citrus fruits	1 (2%)	48 (98%)
Coffee	1 (2%)	48 (98%)
Cold items	1 (2%)	48 (98%)
Sexual activity	0 (0%)	49 (100%)

Factors associated with migraine in undergraduate medical students

Factors associated with migraine incidence was assessed with sociodemographic factors, perceived academic stress, self-satisfaction with academic performance, result of last exam given, any known comorbidities, any known psychiatric illness, long term medication use, poor sleep quality and, night time screen use using Chi Square

test. Among these, gender, perceived academic stress, known comorbidities and long-term medication use were statistically significant. ($p < 0.05$). In our study, 70% of the students were found to have poor sleep quality. Among those with poor sleep quality, 14.2% had migraine and 7.4% did not have migraine. Sleep quality was not found to be a significant factor.

Table III: Factors associated with migraine among medical students

VARIABLES	CATEGORY	MIGRAINE		CHI SQUARE	DF	P VALUE	OR (CI)
		PRESENT	ABSENT				
Age	>20 years	26 (15.1%)	26 (15.1%)	2.457	1	0.117	1.610 (0.884-2.933)
	<20 years	23(10%)	208 (90%)				
Gender	Female	39 (14.7%)	227 (85.3%)	4.589	1	0.032	0.458 (0.221-0.949)
	Male	10 (7.3%)	127 (92.7%)				
Perceived academic stress	Stressed/Very	3 (4.6%)	62 (95.4%)	4.129	1	0.042	3.256 (0.981-10.805)
	Less	46 (13.6%)	292 (86.4%)				
Self-satisfaction with exam performance	Yes	17 (16.2%)	88 (83.8%)	0.623	1	0.142	1.195 (0.405 to 3.527)
	No	32 (10.7%)	266 (89.3%)				
Result in the last exam	Pass	42 (12.7%)	290 (87.3%)	0.427	1	0.514	1.324 (0.569-3.082)
	Fail	7 (9.9%)	64 (90.1%)				
Known psychiatric condition	Yes	3 (23.1%)	10 (76.9%)	1.499	1	0.221	2.243 (0.595-8.452)
	No	46 (11.8%)	344 (88.2%)				
Known comorbidities	Yes	6 (35.3%)	11 (64.7%)	8.895	1	0.003	4.351 (1.532-12.360)
	No	43 (11.1%)	343 (88.9%)				
Long term medication use	Yes	10 (35.7%)	18 (64.3%)	15.632	1	<0.001	4.786 (2.064-11.099)
	No	39 (10.4%)	336 (89.6%)				
Night time screen use	Yes	45 (12.3%)	320 (87.7%)	0.105	1	0.746	1.195 (0.405 to 3.527)
	No	4 (10.5%)	34 (89.5%)				
Poor Sleep quality	Yes	40 (14.2%)	242 (85.8%)	3.608	1	0.57	2.057 (0.965-4.385)
	No	9 (7.4%)	112 (92.6%)				

Predictors of Migraine among Medical students

To find the predictors of migraine prevalence among undergraduate medical students considering the confounding factors bivariate logistic regression was done. All the variables which gave a p value <0.25 were included in model. Enter method was used to run the logistic regression command. Out of 7 variables included i.e., age, gender, perceived academic stress, self-satisfaction with

performance in the last written exam, known psychiatric condition, known co-morbidities, long term medication use, one variables i.e., known psychiatric conditions ($p < 0.05$) came to be significant predictors of migraine prevalence. It was found that medical students who had known psychiatric conditions were having 3.765 (1.355-8.858) times higher odds of having migraine compared to those students who had no known psychiatric conditions.

Table IV: Predictors of Migraine among Medical students

VARIABLES	REFERENCE CATEGORY	OR (CI)	PVALUE
Age	>20years (1)	1.1519 (0.80402.871)	0.198
	<20years (0)		
Self-satisfaction with performance in the last written exam	Yes (1)	0.656 (0.333-1.291)	0.223
	No (0)		
Gender	Female (1)	2.072 (0.982-4.370)	0.056
	Male (0)		
Known co morbidities	Yes (1)	0.480 (0.146-1.580)	0.227
	No (0)		
Known psychiatric conditions	Yes (1)	3.765 (1.355-8.858)	0.009
	No (0)		
PSQI	> 5 (1)	1.083 (0.975-1.203)	0.132
	< 5 (0)		

Discussion

In our study population consisting of 403 students, 97.8% of the participants have experienced a headache atleast once in their lifetime. Nearly ~43% had band-like headaches, characteristic of episodic tension-type headaches. This finding is similar to that of Bhattarai A M et al⁶ study where the most common type of headache among medical students in Nepal was also TTH. Associated symptoms like aura, redness and tearing of eyes, nausea and vomiting were found in a small proportion of participants. 35% were found to self-medicate when headaches occur which was less than

that described by Raju S and S G⁹ and Menon B et al¹¹ and most common among them, 26.8% used Paracetamol to relieve headaches which was lesser than described by Oraby et al¹² and Bhattarai AM et al⁶ but, consistent with the pattern of self-medication among students. According to our study, 12.2% of the students were found to have migraine which is less than the global prevalence of 14-15%. Our findings were most consistent with prevalence rates found in Lebanon¹³ and was similar that found in Kathmandu Valley.¹⁴ Lower prevalences were seen in studies conducted in China,^{15,16,17} Saudi Arabia,¹⁸ and Sudan.¹⁹ Higher prevalence was seen in Kuwait,²⁰

Egypt,¹² Pakistan,²¹ and Palestine.²² Higher prevalence was also seen in a study conducted in a similar geographical location by Menon B et al¹¹ in 2013 using similar tools and sample size, probably due to decreasing trend of headache prevalence over the last decade which can be associated with increase in health-seeking behaviours. Out of 12.2%, 79.5% had already been diagnosed by a physician which is significantly higher than those described in Oraby et al¹² study and Choudry H et al⁽²¹⁾ study which might be due to moderate health care services in Egypt and Pakistan, compared to India. Twice as many females (14.7%) compared to males (7.3%) had migraine (p value=0.032). This is consistent with global values of higher prevalence in females compared to males.²³ This was also consistent with findings from similar studies by Bhattarai AM et al⁶ Bindu Menon et al,¹¹ Oraby et al,¹² Shrestha O et al,¹⁴ Osman Ali MM et al,¹⁹ Choudry H et al,²¹ and Anaya F et al²² which showed female preponderance. Significant association was found between perceived academic stress and migraines in our study (p value = 0.042) and 61.2% of migraineurs described stress as a trigger. This is consistent with a global large-scale study on triggers conducted by L Kelman in 2007²⁴ where stress was found to be the most common trigger. Similarly, stress was identified as a common cause of headaches or trigger for migraines by Raju S and S G,⁹ Bindu Menon et al,¹¹ Yang H et al,¹⁵ Gu X et al¹⁶ and Al-Hashel et al.²⁰ Bhattarai AM et al,⁶ Aljaafari D et al,¹⁸ and Anaya F et al²² also described high proportion of exam related stress as a trigger in their studies. Other significant factors included known comorbidities (p value = 0.003) and long-term medication use (p value<0.001). A history of known psychiatric conditions like depression and anxiety was found to be a significant predictor of migraine incidence. This finding was similar to the Lebanese study¹³ where anxiety and depression were found significantly associated with migraine. This is also consistent with an Italian review done by Antonaci F et al²⁵ which described that psychiatric comorbidity affects migraine evolution and may change treatment strategies, eventually modifying the outcome. Although poor sleep quality was not significant, lack of sleep was the most frequent trigger (83.3%) among

migraineurs. This was also seen in studies by Bindu Menon et al,¹¹ Yang H et al,¹⁵ Gu X et al,¹⁶ Al-Hashel et al.²⁰ Other common triggers included eye strain or excessive screen time (71.4%) and not drinking enough water (67.3%). Using MIDAS severity scale, we found a relatively small proportion of students (24.4%) had Grade IV or severe disability which was less than that in Chahine et al¹³ study probably due to different geographical and environmental conditions in Lebanon compared to those in our study despite similar sample sizes.

Our study aimed to establish the prevalence and disability caused by migraine in medical students which is valuable information to medical education systems and colleges to introduce necessary interventions to set more reasonable course schedules and create awareness among students regarding the importance of sleep hygiene, seeking help for mental health issues, adequately de-stressing with regular exercise and indulging in extracurricular activities.

Some limitations of the study include the inability to assess temporality due to its cross-sectional design, as well as the timing of data collection during exam season, which affected response rates and year-wise variation analysis; while known confounding factors such as stress, gender, coffee consumption, sleep disturbances, irregular meal patterns, smartphone use, long-term medications, and mental health conditions were considered, the potential for unknown confounders remains. Data collection was conducted via Google Forms instead of face-to-face interviews since most students were busy with exam preparations.

In conclusion, we found a 12.2% prevalence of migraine and a history of known psychiatric conditions was found to be a significant predictor. A female preponderance was also seen. Other significant factors included academic stress, history of co-morbidities and use of long-term medication. Among the migraineurs, lack of sleep, eye strain or excessive screen time, not drinking enough water, and stress were the significant triggers in this population. Headache is a very common disability and migraine attacks affect a significant portion of the population. Migraines are known to be quite disabling for

a person experiencing it, hindering their tasks/goals at hand. Our study, therefore, provokes at creating awareness among the general population regarding triggers that can help the affected population towards preventing an attack which could be by taking simple measures such as maintaining good sleep hygiene, monitoring their screen time, hydrating adequately, and participating in activities to manage stress and maintain holistic well-being; this becomes of increasing importance, especially in high-stress courses and jobs. Further research exploring various lifestyle measures to prevent the same can be explored and help optimize the prevention of headaches and migraines in a sustainable way.

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