



Frequency of migraine and its associated triggers and relievers among medical students of Lahore: a cross-sectional study

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Introduction: Headache is a widely prevalent illness that negatively impacts people's lives, leaving them functionally incapable of performing regular everyday tasks. The global burden of headache is 40%, of which migraine accounts for 47%.

Objective: This study aims to determine the frequency of migraine among medical students of Lahore and its characteristics, associated triggers, and relievers among medical students.

Methodology: A cross-sectional study was conducted in medical colleges after obtaining ethical approval. Migraine was diagnosed using the criteria provided in the International Classification of Headache Disorders, Third Edition (ICHD-3), and data on triggers, relief, and demographics were collected. The information is analyzed using SPSS 22.

Result: The data were collected from 522 medical students. The average age of the students was 21.3 ± 2.0 SD (in years). About 146 (28.0%) of the medical students have migraine according to ICHD-3 criteria and were diagnosed initially. Gender was insignificantly associated with migraine (P -value = 0.32). Students with psoriasis, hypertension, and polycystic ovarian syndrome were statistically significantly related to migraines with a P -value = 0.002. Dehydration is the most frequent aggravator, and adequate sleep is the most frequent reliever of migraine.

Conclusion: The findings show a high frequency of migraine. They are similar in both genders, depicting that stressful lifestyles, inadequate sleep patterns, and bizarre dietary habits make them more prone to migraine episodes. So, further, detailed studies should be done on evaluating triggers and relievers of migraine and their interrelations with migraine so we can focus on preventive strategies, diagnosis, and treatment of migraine.

Keywords: headache, ICHD-3, migraine, relievers, triggers

Introduction

Headache, or the medical term 'cephalgia', is a widely prevalent illness that negatively impacts people's lives, leaving them functionally incapable of performing regular everyday tasks^[1]. There are many different types of headaches, such as migraine, tension headache, cluster headache, and frequent headache. The global burden of headache is 40%, of which migraine accounts for 47%^[2].

Headache problems are well-studied and relatively frequent, affecting over 50% of the entire population.

HIGHLIGHTS

- This study comprehends that the frequency of migraine is similar in both genders.
- It depicts the stressful lifestyle, inadequate sleep patterns, and bizarre dietary habits, which make them more prone to have episodes of migraine attack.

Migraine affects 30% of the world's population, making it a significant health problem^[3]. Studies have shown that women are more likely to experience migraines (20.7%) than men (9%). The prevalence of migraine is lower in Asia (10.1%) than in the USA (15.3%). Researchers in Iran reported that 6.9% of medical students suffer from migraines. According to research done in Pakistan, migraine accounts for 22.5% of all headaches, making it the second most common type after tension headaches. Migraine affected 52.3% of Pakistani medical students, more commonly affecting females (85.7%) than males (14.3%)^[4].

Migraine is one of the most frequent types of headache among medical students in Pakistan, contributing 22.5% of the total^[1]. Migraine can present differently, such as with the presence of aura or without aura. Various causes of migraine include an imbalanced diet, neuro-endocrine function disorders, hormonal dysfunction, genetic predisposition, and environmental stress^[5,6].

Many studies have been conducted to discover the aggravating factors for migraine without any conclusive evidence^[7]. Stress,

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lack of sleep, exhaustion, and exposure to bright sunlight have been cited as the most common triggering factors for migraine; menstruation is an additional triggering factor for females^[8,9]. Inadequate nutritional intake, fasting, and dehydration, not noticed by migraine sufferers, are other causes for initiating migraine^[10]. Weather is another aggravating factor for migraine; the bright summer sunlight triggers migraine more than the winter sunlight^[11,12]. Migraine patients can relieve their attacks by sleeping through them, taking hot showers, drinking lots of water or eating fatty foods, or using over-the-counter and prescribed painkillers^[13].

Medical students are more prone to migraines, particularly those ranging from 18 to 25 years old. This is considered a significant health problem among students due to its negative influence on their academic performance, daily activities, and quality of life. The student lifestyle, including long working hours, studying, and sleep deprivation, has been linked to fatigue, stress, and anxiety, common triggers for migraine attacks. Medical students are considered part of a particular group due to the heavy study load and long years of education. However, in surveys conducted in Pakistan, the most frequent age group suffering from migraine is 40–49 years^[1,2,14]. This study aims to determine the frequency of migraine among medical students of Lahore and assess their characteristics, associated triggers, and relievers among medical students. The identification of causes would also aid in determining whether or not there is a correlation between the frequency of attacks of migraines and the identified triggers. Since there are so few previous studies on migraine in Pakistan, this one has the potential to both increase the understanding of the condition and open the door to future studies^[15].

Materials and methodology

Subject and study design

The cross-sectional study was conducted among undergraduate students collaborating with medical colleges from May 2022 to July 2022. A total of 522 questionnaires were distributed at random; all participants were given verbal information about the study's goal prior to their participation, which was entirely voluntary. According to the International Classification of Headache Disorders, Third Edition (ICHD-3) criteria, 146 (28.0%) of the 522 medical students completed and returned the questionnaire. There was a 100% response rate. Participants were eligible provided they were registered medical students enrolled in a 5-year medical school program.

The research included college students who had suffered from migraines for at least a year prior to enrollment. Using diagnostic criteria established by the International Headache Society, these individuals were classified as suffering from migraines, tension-type headaches, or migraine-like headaches. The symptoms of migraine include pounding head pain that lasts for 4–72 h, vomiting and nausea, sensitivity to light and sound, and phonophobia.

Students with comorbid conditions such as dental disease, history of fever or sinusitis with headache, and pre-diagnosed with epilepsy or other mental diseases were excluded.

Prior written informed consent was obtained from all the volunteers, and confidentiality was strictly assured. The

institutional review board obtained ethical approval (CPMC/IRB-No/1335). Our work has been reported per the STROCCS criteria^[16].

Diagnostic tools and criteria

The ICHD-3 describes migraine as 'recurring attacks of unilateral, throbbing headache that lasts from 4 to 72 hours, moderate to severe intensity, aggravated by regular physical activities and associated with nausea, vomiting, photophobia, or phonophobia'^[17].

For the screening of migraines according to ICHD-3 criteria in students, a brief history questionnaire was formed and approved by faculty members of the Neurology Department. The final diagnosis of migraine was made based on the visual analogue scale (VAS) score and the medical professional's diagnosis. The standard horizontal VAS of 100 mm was compared to a vertical VAS of 33.3 mm. The anchoring points on the VAS were 'no pain' on the left side/bottom and 'worst imagined agony' on the right side/top. Patients completed the VAS four times in the following order: vertically, horizontally vertical, and horizontal. Patients were not permitted to see previously completed VAS assessments. The vertical VAS was integrated into a headache diary (Fig. 1). Between tests on the same scale, a time gap of around 2 min was employed.

Data collection

The questionnaires were employed in English as all the participants were well versed in English, and the questionnaires were filled in the presence of a medical researcher to avoid ambiguity.

Additional data were obtained from migraineurs to identify the frequency of migraine, their triggers, and the severity of their impact on everyday life. Students were approached using an already constructed, structured questionnaire that covered sociodemographic information, migraine symptoms, and possible triggers. The effect of migraine on migraineurs' daily lives was evaluated using the validated Migraine Disability Assessment Scale (MIDAS), which consists of three questions about days of lost productivity in the previous 3 months. The total number of days matched one of four categories: no disability, moderate disability, mild disability, and severe disability. In addition, the VAS for pain was also used to measure the severity of pain in migraines. A first research structure was created based on critical stages identified by patient researchers in the migraine knowledge. Through a mutual learning process, this was subsequently changed into a concentrated dialog, with two clinical researchers collaborating to interview each participant for 10–15 min. The interviews were conducted at a health center, with the GP researcher on hand to provide assistance as required. The interviews were recorded but not transcribed. Following each interview, there was a debrief, which was followed by a procedure involving consensus qualitative data analysis at a later date.

The questionnaire consisted of three sections: section 1 had demographic and basic information such as age, gender, family history of any comorbidities, drugs use or abuse, and fitness status, while section 2 comprised history questions for migraine screening. In section 3, questions regarding their knowledge of their headache, aggravating factors, and relieving factors were asked.

Participations number:

Patient initials:

200	Date:	/	/	/	/	/	/	/
When did the headache begin?	Indicate time:							
Prior to the headache, did you experience disturbance of?	vision: other senses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache location?	Unilateral (right or left sided): Bilateral:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache quality?	Pulsating: Pressing/tightening:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache intensity?	Worst possible pain →							
	No pain →							
Did the headache aggravate by or causing avoidance of routine physical activity (eg walking or climbing stairs)	Yes: No:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you suffer from nausea?	Yes: No:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you suffer from photophobia?	Yes: No:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Did you suffer from phonophobia?	Yes: No:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When did the headache disappear?	Indicate time:							
Supply information on time, dose and medication taken including non-prescribed medication (OTC)	name: dose: time: name: dose: time:							

Figure 1. The diagnostic diary of migraine.

Statistical analysis

Statistical analysis was performed by using the Statistical Package for Social Science (SPSS) version 22.0. Continuous data were displayed as the mean ± standard deviation, while the categorical and nominal data were presented as frequencies and percentages. Statistical approaches for both descriptive and analytical purposes were used. For the reporting of demographic data and the prevalence of migraine headache, descriptive statistics such as percentage mean and standard deviation were used. Tables were also utilized to present data. To discover variables linked with migraine headaches, binary logistic regression was utilized. Variables having a P-value less than 0.25 were chosen for multivariate analysis. Multiple logistic regression models were constructed to account for any confounder effects, and lastly, the factors with an independent connection to migraine headache were selected based on the adjusted odds ratio (aOR) [95% confidence interval (CI)], and Chi-square was employed as the significance test at a 95% CI, and associations were shown using P-values less than 0.05, which were considered significant.

Results

A total of 522 volunteers participated in this research work, male (n=190) and female (n=332), whose ages were between 18 years and 25 years, with an average age of 21 (SD 2.041) years. The data were collected from 522 medical students. The students had an average age of 21.3 ± 2.0 SD (in years). The maximum age was 25 years, while the lowest age was 18 years. The participants' average age was 21 years. The percentage of male participants was 190 (36.4%), with the remainder 332 (63.6%) being female. The response rate was 100%.

The ICHD-3 criteria were used to observe the incidence of migraine among medical students. About 146 (28.0%) medical students have migraines, according to ICHD-3 standards. The remaining 376 (72.0%) were found to have no migraine.

Participants' demographics, including school, student year, and medical and medication information, are shown in Table 1.

Other factors of migraine include drinks, stress, sensory stimuli, sleep changes, physical characteristics, weather changes, and medications.

The Chi-square association test was used to test the independence of migraine with other factors. Gender was insignificantly associated

Table 1
Information on participants' demographics

School	Study year	Medical and medication information	Frequency <i>n</i> (%)
Neurology Department	Final year	Tension-type headaches	277 (70.5)
Neurology Department	Second year	Loud noise	231 (58.8)
Neurology Department	Third year	Vomiting and nausea	253 (64.4)
Neurology Department	First year	Sensitivity to light	154 (39.2)
Neurology Department	Final year	Dehydration	196 (49.9)

with migraine (P -value = 0.32). Migraine, diabetes, psoriasis, hypertension, and polycystic ovarian syndrome (PCOS) were all linked to a family history of migraines, with a P -value equal to 0.006. Students with psoriasis, hypertension, and PCOS were statistically significantly associated with migraine with a P -value = 0.002 (Table 2).

The correlation between migraine and other disorders was analyzed using a Chi-squared association test. Vision alterations were significantly associated with migraine (P -value = 0.000). Students with pricking, itching, and numbness on one side were statistically significantly related to migraines with P -value = 0.005 and P -value = 0.000. Weak sensation on one side was insignificantly associated with migraine (P -value = 0.128). Vision alteration was the most common issue among students with migraines. Pricking or itching was the least common issue with migraine and was not affected by demographics (Table 3).

When confounding variables are taken into account, it is found that the presence of family history of migraine (aOR = 3.06; 95% CI: 2.03–4.63), functional gastrointestinal disorders (aOR = 3.30; 95% CI: 1.07–10.11), female gender (aOR = 2.74; 95% CI: 1.73–4.33), and enrollment in the third year of university studies are the top predictors of migraine headaches (Table 4).

The most common aggravating factor for migraine was dehydration, followed by lack of sleep, stress, not eating on time, and fatigue (Fig. 2).

The most commonly adopted mechanism for relieving migraine was adequate sleep followed by medication, dim light, massage, and drinking hot/cold beverages (Fig. 3).

Discussion

Migraine pain accounts for 1.4% of all neurological and behavioral diseases. It was stated that the predicted lifetime prevalence of migraine ranged from 12% to 18%^[21].

Table 2
Frequency of various factors with migraine

Factor	Categories	Migraine <i>n</i> (%)		<i>P</i>
		Yes	No	
Gender	Male	46 (24.2)	144 (75.78)	0.32
	Female	100 (30.12)	232 (69.87)	
Family history of comorbidities	Migraine	6 (42.85)	8 (57.14)	0.006
	Hypertension	12 (14.63)	70 (85.36)	
	Diabetes	16 (20)	64 (80)	
	Psoriasis	4 (66.6)	2 (33.33)	
Personal history of comorbidities	Hypertension	12 (66.6)	6 (33.33)	0.002
	Psoriasis	4 (66.6)	2 (33.3)	
	PCOS	14 (70)	6 (30)	

PCOS, polycystic ovarian syndrome.

The ICHD-3 has established a standard criterion for the accurate diagnosis of migraine. The current study focused on the frequency of migraine in the population of medical students and the sociodemographic, aggravating, and relieving factors associated with it. The study revealed several findings; some were coherent with other studies, while others were not.

Of the total 522 medical students, the average age was 21.93, and the median was 21 (in years). The maximum age is 25 and the minimum is 18 years. The incidence of migraine among the students was 28%. However, headache and migraine are age-related in previous research and more common in the age group of 40–49 years^[2]. Out of the total students of migraine, majority were females. The results revealed insignificant differences between males and females in migraine. However, prior studies revealed significant migraine differences between males and females^[18]. The higher frequency of migraine in women is associated with genetics, according to the work of Reinal Shyti *et al.*^[19]. There is evidence that female sex hormones are a significant factor that promotes the risk of migraine in females^[20].

Our participants had a 28% prevalence of migraine headaches, consistent with recent studies from Kuwait, the United States, and India that are comparable in design^[21]. However, other studies conducted in Iran, Turkey, and Nigeria found significantly lower percentages. Conversely, Peshawar, Pakistan, recorded a greater frequency^[22]. The causes of these inequalities may include cultural differences between nations, variations in the timing of their academic pursuits, levels of academic stress, and migraine detection tools. According to the findings from Kuwait and Pakistan, the average number of attacks of migraines in the current study was 4.6 per month.

As far as the factor of family history is concerned, there is a low prevalence of migraine among people who have migraine. It is not consistent with genetic studies that showed a strong correlation

Table 3
Frequency of various issues with migraine

Various issues with migraine	Categories	Migraine <i>n</i> (%)	<i>P</i>
Vision alterations	No	82 (56.16)	0.000
	1–4 times	38 (26.02)	
	5 or more	26 (17.80)	
Pricking or itching	No	106 (72.6)	0.005
	1–4 times	30 (20.54)	
	5 or more	10 (6.84)	
Numbness on one side	No	102 (69.86)	0.000
	1–4 times	26 (17.80)	
	5 or more	18 (12.32)	
Weak sensation on one side	No	106 (72.60)	0.128
	1–4 times	28 (19.17)	
	5 or more	12 (8.21)	

Table 4
Logistic regression investigation of the determinants of migraine headache between medical students of Lahore, Pakistan

Variable	P	aOR	95% CI
Family history of migraine	0.000	3.06	2.03–4.63
Functional gastrointestinal disorders	0.03	3.30	1.07–10.11
Female gender	0.000	2.74	1.73–4.33
Third-year medical students	0.001	2.51	1.49–4.22

aOR, adjusted odds ratio; CI, confidence interval.

between family history and migraine^[23]. This low prevalence can be associated with undiagnosed migraine cases and participants’ unawareness about their corresponding family history in Pakistan. The literature on migraine shows several comorbidities associated with it, including cardiovascular disorders and psoriasis^[24]. Similarly, the current study showed a significant association between migraine and past family history of comorbidity, such as hypertension, psoriasis, and migraine.

Our research has various issues associated with migraines, such as vision alteration, pricking, itching, numbness, and weak sensation on one side of the body. The visual disturbance in migraine patients is due to reduced blood flow to central retinal and posterior ciliary arteries, which causes decreased ocular perfusion^[25]. Moreover, numbness of one side of the body, that is hemiplegia in migraine, has a genetic association^[26].

Multiple aggravating migraine factors include dehydration, stress, lack of sleep, inappropriate diet, and fatigue. Dehydration is the most common in our study (Fig. 2), which is consistent with many other studies^[26,27]. Stress is the second most triggering factor of migraine. However, besides being an aggravating factor, the stress level increases due to the pain phase of migraine^[28]. A study by Kelman^[27] shows that lack of sleep contributes to the aggravation of migraine attacks.

Moreover, many psychiatric comorbidities, including stress, are associated with migraine^[29]. The least common factors were inappropriate diet and fatigue, which may vary in different individuals. These factors do not necessarily remain consistent throughout life and may vary from person to person.

According to our findings, stress and sleep disruption were the most frequently reported triggers in results from Kuwait and India^[30]. Smoking was also identified as a migraine trigger by around 16% of migraineurs, which aligns with findings from Spain^[31].

Aggravating Factors of Migraine

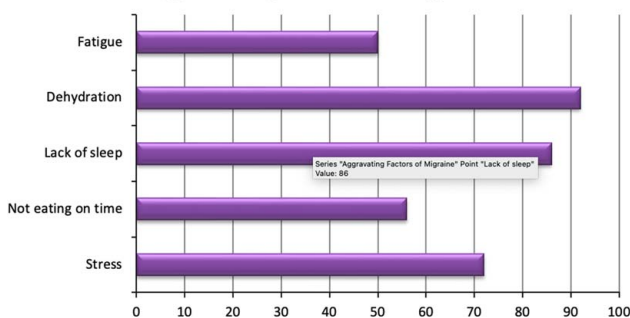


Figure 2. Frequency of aggravating factors of migraine.

Relieving Factors of Migraine

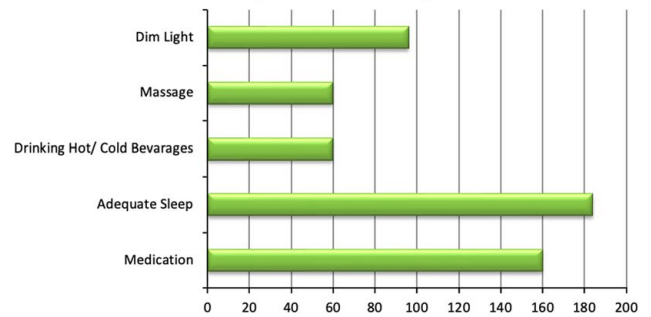


Figure 3. Frequency of relieving factors of migraine.

To cope with migraine, adequate sleep and medication were the most common strategies adopted by most of the respondents. Drinking hot or cold beverages was the least common way of relieving migraine headaches.

Limitations of the study

This is the first research to assess the prevalence, awareness, and effect of migraine among Lahore University students. There are, however, significant limitations to this study. A memory bias might be introduced by using a self-administered questionnaire. Furthermore, analgesic medication’s role in relieving migraines must be better investigated. Again, since this is not a population-based study, there needs to be more clarity on how far our results may be applied.

The convenient sampling method was used; most of the respondents were female. In this study, we did not distinguish between migraine with aura and without auras. These factors may limit the validity of our results to the whole population. Recall bias may be present in our study that participants could not recall the triggers and relievers at the time of response.

Conclusion

The study comprehends the general estimate of information about patients and their frequency, aggravating factors, and relieving factors of migraine among medical students of Lahore. Our study shows that the frequency of migraine is higher in females. It also depicts that stressful lifestyles, inadequate sleep patterns, and bizarre dietary habits make them more prone to migraine attacks. Further detailed studies should be done on evaluating triggers and relievers of migraine and their interrelations with migraine in a particular context to students’ lives. Therefore, we can focus on preventive strategies, diagnosis, and treatment of migraine.

For patients to appreciate the need for good migraine therapy, a global education effort may be required. Informing patients about the condition through educational programs is not only an important step in the treatment of migraine episodes, but it also lowers migraine disability.

Ethical approval

Ethical approval (CPMC/IRB-No/1335) was obtained from the institutional review board of Central Park Medical College.

Consent

Consent was obtained from all participants using Helsinki's declaration.

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Author contribution

All authors significantly contributed to conceptualization, methodology, data curation, formal analysis, investigation, writing – original draft, writing – review and editing, and visualization. H.M. also performed the role of supervision. All authors read the final version of the manuscript and approved it for submission and publication.

Conflicts of interest disclosure

No conflicts of interest to be declared.

Research registration unique identifying number (UIN)

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Guarantor

Hassan Mumtaz.

Data availability statement

Available on request to corresponding author.

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References

- [1] Noor T, Sajjad A, Asma A. Frequency, character and predisposing factor of headache among students of medical college of Karachi. *J Pak Med Assoc* 2016;66:159–64.
- [2] Herekar AA, Ahmad A, Uqaili UL, *et al.* Primary headache disorders in the general adult population of Pakistan – a cross-sectional nationwide prevalence survey. *J Headache Pain* 2017;18:1–9.
- [3] Stovner LJ, Hagen K, Jensen R, *et al.* The global burden of headache: a documentation of headache prevalence and disability worldwide. *Cephalalgia* 2007;27:193–210.
- [4] Shah DR, Dilwali S, Friedman DI. Current aura without headache. *Curr Pain Headache Rep* 2018;22:77.
- [5] Charles A. The pathophysiology of migraine: implications for clinical management. *Lancet Neurol* 2018;17:174–82.
- [6] Buse DC, Greisman JD, Baigi K, *et al.* Migraine progression: a systematic review. *Headache* 2019;59:306–38.
- [7] Marmura MJ. Triggers, protectors, and predictors in episodic migraine. *Curr Pain Headache Rep* 2018;22:81.
- [8] Spierings ELH, Donoghue S, Mian A, *et al.* Sufficiency and necessity in migraine: how do we figure out if triggers are absolute or partial and, if partial, additive or potentiating? *Curr Pain Headache Rep* 2014;18:455.
- [9] Bigal ME, Hargreaves RJ. Why does sleep stop migraine? *Curr Pain Headache Rep* 2013;17:369.
- [10] Abu-Salameh I, Plakht Y, Ifergane G. Migraine exacerbation during Ramadan fasting. *J Headache Pain* 2010;11:513–7.
- [11] Ivar Bekkelund S, Hindberg K, Bashari H, *et al.* Sun-induced migraine attacks in an Arctic population. *Cephalalgia* 2011;31:992–8.
- [12] Tekatas A, Mungen B. Migraine headache triggered specifically by sunlight: report of 16 cases. *Eur Neurol* 2013;70(5–6):263–6.
- [13] Gu X, Xie YJ. Migraine attacks among medical students in Soochow University, southeast China: a cross-sectional study. *J Pain Res* 2018;11:771–81.
- [14] Ghorbani A, Abtahi SM, Fereidan-Esfahani M, *et al.* Prevalence and clinical characteristics of headache among medical students, Isfahan, Iran. *J Res Med Sci* 2013;18(suppl. 1):24–7.
- [15] Steiner TJ, Stovner LJ. Global epidemiology of migraine and its implications for public health and health policy. *Nat Rev Neurol* 2023;19:109–7.
- [16] Mathew G, Agha R. for the STROCSS Group. STROCSS 2021: Strengthening the Reporting of Cohort, cross-sectional and case-control studies in Surgery. *Int J Surg* 2021;96:106165.
- [17] Olesen J. Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia* 2018;38:1–211.
- [18] Athar F, Zahid A, Farooq M, *et al.* Frequency of migraine according to the ICHD-3 criteria and its association with sociodemographic and triggering factors in Pakistan: a cross-sectional study. *Ann Med Surg (Lond)* 2022;82:104589.
- [19] Shyti R, de Vries B, van den Maagdenberg A. Migraine genes and the relation to gender. *Headache*. 2011;51:880–90.
- [20] Vervik KG, MacGregor EA. Sex differences in the epidemiology, clinical features, and pathophysiology of migraine. *Lancet Neurol* 2017;16:76.
- [21] Al-Hashel JY, Ahmed SF, Alroughani R, *et al.* Migraine among medical students at Kuwait University. *J Headache Pain* 2014;15:26.
- [22] Khan A, Khattak H, Jamali R, *et al.* Prevalence of migraine, its common triggering factors and coping strategies in medical students of Peshawar. *Khyber Med Univ J* 2012;4:187–92.
- [23] Paz-Tamayo A, Perez-Carpena P, Lopez-Escamez JA. Systematic review of prevalence studies and familial aggregation in vestibular migraine. *Front Genet* 2020;11(August):1–9.
- [24] Buse DC, Reed ML, Fanning KM, *et al.* Comorbid and co-occurring conditions in migraine and associated risk of increasing headache pain intensity and frequency: results of the migraine in America symptoms and treatment (MAST) study. *J Headache Pain* 2020;21:23.
- [25] Demircan S, Ataş M, Arik Yüksel S, *et al.* The impact of migraine on posterior ocular structures. *J Ophthalmol* 2015;2015:868967.
- [26] Di Stefano V, Rispoli MG, Pellegrino N, *et al.* Diagnostic and therapeutic aspects of hemiplegic migraine. *J Neurol Neurosurg Psychiatry* 2020;91:764–71.
- [27] Kelman L. The triggers or precipitants of the acute migraine attack. *Cephalalgia* 2007;27:394–402.
- [28] Montagni I, Guichard E, Carpenet C, *et al.* Screen time exposure and reporting of headaches in young adults: a cross-sectional study. *Cephalalgia* 2016;36:1020–7.
- [29] Al-Quliti K. Stress and its correlates in migraine-headache patients with a family history of migraine. *Behav Sci (Basel)* 2022;12:65.
- [30] Minen MT, De Dhaem OB, Van Diest AK, *et al.* Migraine and its psychiatric comorbidities. *J Neurol Neurosurg Psychiatry* 2016;87:741–9.
- [31] Menon B, Kinnera N. Prevalence and characteristics of migraine in medical students and its impact on their daily activities. *Ann Indian Acad Neurol* 2013;16:221–5.