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Prevalence and characteristics of headache among medical students in Egypt: a multicentric cross-sectional study

Rashad G Mohamed ,[1] Khalid Sarhan,[2,3] Basma Kamel,[2,3] Rahma M Almetwaly,[2,3] Eslam E Fouda,[2,3] Mostafa Meshref,[4] Sara Bioumy,[3,5] Doaa Alemam,[6] Hebatalla A Ahmed[7]

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For numbered affiliations see end of article.

Correspondence to
Dr Rashad G Mohamed; rashadgamal11@std.mans.edu.eg

ABSTRACT

Background Headaches are one of the most common neurological disorders, ranging in severity from mild discomfort to a severe, debilitating condition. Headaches are particularly prevalent among medical students, which can be attributed to various factors such as psychological stressors, extensive studying, long hours of clinical rotations and high-pressure examination. This study aims to ascertain the prevalence of different types of headaches, along with analysing their associated clinical characteristics among medical students in Egypt.

Methods A multicentric, descriptive questionnaire-based cross-sectional study was conducted across five governmental faculties of medicine in Egypt from November 2022 to March 2023. Using a multistage random sampling method, 600 undergraduate students were selected to participate. Headache was diagnosed based on the International Classification of Headache Disorders.

Results A total of 493 responses were included in the analysis; the prevalence of headache disorder was 264 (53.5%), with tension-type headaches (TTH) frequent episodic being the highest 89 (33.7%), while TTH chronic and migraine with aura were the least prevalent, accounting for 10 (3.8%) and 31 (11.7%), respectively. Women exhibited a higher overall headache prevalence (69.4%) compared with men (44.4%). A positive family history was found in 120 (45.5%) of students with headache. Lack of sleep and stress were the most frequently reported potential triggers for headaches. Out of 264 medical students, 171 (65%) took analgesics. Only 42 (24.6%) had a medical consultation, while most students 129 (75.4%) took over-the-counter medications.

Conclusion Notably, headaches were prevalent in 264 (53.5%) of the respondents. TTH frequent and infrequent emerged as the most common headaches among medical students, followed by migraine without aura then migraine with aura. Participants were statistically different according to sex, faculty, academic year and living conditions. Alarmingly, despite the substantial prevalence, only 42 (24.6%) students sought medical consultation.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Headaches are considered one of the major problems that university students, particularly medical students, face. Many studies have examined the prevalence of headaches among medical students in various countries. However, no studies have been conducted on a multicentric scale in Egypt to provide comprehensive data on the prevalence and characteristics of headaches among medical students.

WHAT THIS STUDY ADDS

⇒ This study provides new insights into the existing literature by providing an in-depth analysis of the prevalence and characteristics of headaches among medical students in Egypt, identifying a significantly higher occurrence in third-year students compared with first-year and fifth-year students.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Our results confirm the need for greater attention to different types of headaches experienced by medical students through applying prevention and management programmes. This study offers a guide for future research to explore the specific causes of headache in this population and pave the way for new approaches and interventions. It encourages educational and healthcare practices to shed light on students' well-being as well as their academic performance.

INTRODUCTION

Headaches are among the most frequently encountered neurological reports, manifesting with varying degrees of intensity, from mild discomfort to severe, incapacitating conditions. In addition to burdening the sufferer and the community, headaches greatly affect daily functioning, especially if they are accompanied by other symptoms.[1] Headaches are the reason for 1 in 10 consultations with general practitioners, one in three

referrals to neurologists, and one in five acute medical hospitalisations.[2]

Headaches are categorised into two types: primary and secondary. Tension-type headaches (TTH) are the leading cause of primary headaches, followed by migraines.[3] Secondary headaches, on the other hand, are caused by underlying medical conditions that have been scientifically proven to trigger headaches, according to International Headache Society in 2018.[4]

In relation to the Global Burden of Disease Study in 2019, headache disorders were the 14th highest cause of disability-adjusted life years (DALYs) worldwide across all ages and genders. However, among adolescents aged 10–24 years, headaches ranked as the second highest cause of DALYs, just behind road injuries.[3] Globally, headaches result in 46.6 million years of disability, ranking as the third most common cause of years lived with disability (YLDs). For young adults aged 15–49, regardless of sex, headaches are the leading cause of YLDs, accounting for 8%. According to the 2016 Global Burden of Disease Study Collaborators, migraine is the third most common cause of disability among young people aged 15–49.[5] The socioeconomic impact of headaches is profound, encompassing direct healthcare costs, lost productivity and decreased quality of life. Migraines alone are estimated to result in billions of dollars in economic burden annually worldwide, attributed to healthcare expenditures, decreased work productivity and absenteeism.[6]

Medical students are a distinctive population that requires special attention to their health and quality of life, as this directly affects their academic performance, achievements, social engagement and future roles in various aspects of life.[7] The demanding and rigorous nature of medical education, combined with high stress levels and intense workloads, makes them particularly susceptible to headaches. This can exacerbate headache symptoms, potentially hindering their academic and professional success.[8–10]

In 2018, Oraby *et al*[11] conducted a cross-sectional study to evaluate the prevalence of migraines among Egyptian medical students. However, since it was a single-centre study that assessed only one type of headache, its findings cannot be generalised to the entire population of medical students in Egypt.

So, our study aims to investigate the prevalence of different types of headaches among medical students across various faculties in Egypt. We will compare the incidence of headaches among students on entering the faculty, during their studies and in their final year to explore the relationship between studying medicine and the occurrence of headaches. Furthermore, it seeks to identify the factors that influence the frequency of these headaches, providing insights into early detection, counselling and appropriate treatment. Additionally, we aim to examine the healthcare-seeking behaviours of medical students experiencing headaches.

METHODS

Study design and setting

A multicentric, descriptive questionnaire-based cross-sectional study was conducted among undergraduate students in governmental faculties of medicine in Egypt from November 2022 to March 2023.

Study sampling and sample size

We implemented a multistage stratified random sampling methodology to select our target population. Initially, we divided the 28 governmental faculties of medicine in Egypt into five groups based on their location (Delta, Capital, East, West and Upper Egypt). From each group, we randomly selected a faculty. Subsequently, we obtained lists of enrolled students from the administrative offices of the involved faculties (Mansoura, Kafr Elsheikh, Port Said, Al-Azhar Cairo Boys, and Assiut) and assigned unique identification numbers to each student. Using a random number generator, we selected students from the lists of the first, middle, and final years proportionately across the faculties and different years. The Egyptian medical education system previously consisted of 6 years of university education followed by 1 year of internship, but in 2019, this was changed to 5 years followed by 2 years of internships.

Using Epi Info's sample size calculator,[12] we calculated the sample size based on a similar study among university students in Syria that found a 50% prevalence of headaches.[13] Given a total population of 30 000, a 95% CI, and a 5% margin of error, the minimum sample size was determined to be 384 students. However, we expanded the sample size to 600 students to account for potential dropouts and incomplete responses. Students with a history of head or neck trauma within the previous 3 months were not eligible, and we also excluded fresh graduates, interns, residents, practitioners and specialists.

Data collection and study questionnaire

Collaborators distributed the online questionnaire to selected students through their contacts, providing a thorough explanation in advance to prevent any misunderstandings. Participation in the study was anonymous and entirely voluntary.

We employed an English-language, self-administered questionnaire previously used by Alkarrash *et al*[13] to assess the prevalence of headaches among university students. The questionnaire consisted of several sections: the first section of the questionnaire focused on gathering sociodemographic information about students, including age, sex, faculty and academic year. The final question assessed headache presence by asking, 'Have you experienced two or more headache attacks in the last 3 months unrelated to illness or trauma?' Participants who answered negatively did not proceed further, while those who answered yes proceeded to further questions aimed at diagnosing the type of headache and detailing its characteristics. The second section categorised headache types based on the International Classification of Headache Disorders

Table 1 Prevalence of headache across different sociodemographics variables

	Total (N=493) Column %	Students with headache (N=264) Column %	Students without headache (N=229) Column %	P value
Age 'median (IQR)'	20 (19, 22)	20 (18, 21)		**< 0.0011***†
Sex				**< 0.001***
Male	313 (63.5%)	139 (52.7%)	174 (76.0%)	
Female	180 (36.5%)	125 (47.3%)	55 (24.0%)	
Faculty				**< 0.001***
Kafr-El-Sheikh	124 (25.2%)	60 (22.7%)	64 (27.9%)	0.183
Mansoura	120 (24.3%)	67 (25.4%)	53 (23.1%)	0.564
Al-Azhar Cairo	94 (19.1%)	25 (9.5%)	69 (30.1%)	0.001*
Assiut	92 (18.7%)	60 (22.7%)	32 (14.0%)	0.013*
Port Said	63 (12.8%)	52 (19.7%)	11 (4.8%)	< 0.001*
Academic year				**< 0.001***
First	183 (37.1%)	77 (29.2%)	106 (46.3%)	< 0.001*
Third	178 (36.1%)	101 (38.3%)	77 (33.6%)	0.285
Fifth	132 (26.8%)	86 (32.5%)	46 (20.1%)	0.002
Nationality				**0.726**
Egyptian	458 (92.9%)	247 (93.6%)	211 (92.1%)	
Non-Egyptian	35 (3.7%)	17 (6.4%)	18 (7.9%)	
Residence				**0.229**
Urban	249 (50.5%)	140 (53.0%)	109 (47.6%)	
Rural	244 (49.5%)	124 (47.0%)	120 (52.4%)	
Marital status				**0.980**
Single	473 (95.9%)	253 (95.8%)	220 (96.1%)	0.894
Engaged	18 (3.7%)	10 (3.8%)	8 (3.5%)	0.862
Married	2 (0.4%)	1 (0.4%)	1 (0.4%)	0.92
Working because of income need				**0.253**
No job/job not for income need	431 (87.4%)	235 (89.0%)	196 (85.6%)	
Yes	62 (12.6%)	29 (11.0%)	33 (14.4%)	
How do you go to university				**0.435**
Public transportation	381 (77.3%)	210 (79.5%)	171 (74.7%)	0.918
On foot	106 (21.5%)	51 (19.3%)	55 (24.0%)	0.205
Bicycle	6 (1.2%)	3.0 (1.1%)	3 (1.3%)	0.861
Forced by parents to join medical school				**0.476**
No	436 (88.4%)	236 (89.4%)	200 (87.3%)	
Yes	57 (11.6%)	28 (10.6%)	29 (12.7%)	
Living condition				**0.074**
With family/relatives	362 (73.4%)	205 (77.7%)	157 (68.6%)	0.023
With friends/housemates	109 (22.1%)	49 (18.6%)	60 (26.2%)	0.041
Alone	22 (4.5%)	10 (3.8%)	12 (5.2%)	0.436
Smoking				**0.403**
No	481 (97.6%)	259 (98.1%)	222 (96.9%)	
Yes	12 (2.4%)	5 (1.9%)	7 (3.1%)	

*Significant.
†Mann-Whitney U test.

(ICHD-III).[14] The third section explored specific headache characteristics, including pain location, duration, age at onset and family history. Sections 4 and 5 focused on identifying headache triggers and documenting participants' experiences in managing headaches, respectively. We included the questionnaire in online supplemental file 1. Prior to distribution, three experts, including one neurologist and two public health professionals, reviewed the questionnaire for content and validity prior.

After data collection, ICHD-III was used to diagnose various headache types as follows: migraine with aura, migraine without aura, TTH chronic, TTH frequent episodic, TTH infrequent episodic and unclassified headache.[14]

Before data collection, we conducted a pilot study involving 20 students to validate the questionnaire's reliability and ensure its clarity. The data from the pilot study were excluded from the final analysis.

Statistical analysis

The collected data were coded, processed and analysed using the Jamovi program (V.2.2.5) for Windows. We performed a Shapiro-Wilk test to assess normality of continuous variables. The χ^2 test was used to compare differences between categorical variables. For comparisons between two independent groups, where the dependent variable was continuous and non-parametric, we applied the Mann-Whitney U test. The Kruskal-Wallis test was used to compare differences among more than two independent groups when the dependent variable was continuous and non-parametric. To study factors associated with headache prevalence a generalised mixed effect logistic regression model was used. A random effects model was applied specifically to factors that were sampled from a distribution of effect sizes, such as academic year and faculty, which were selected using a random sampling method. For the other sociodemographic variables, a fixed effects model was used. P values less than 0.05 were considered statically significant.

RESULTS

A total of 509 medical students, out of the 600, participated in this study, with a response rate of 84.8%. We excluded 16 participants due to incomplete responses. A total of 493 responses were included in the analysis. 313 (63.5%) were men, and 180 (36.5%) were women. 264 of the participants reported they had headache, with a prevalence rate of 53.5%. The prevalence of headache was significantly different based on variables such as sex, faculty and academic year (p<0.05). However, variables such as nationality, residence, transportation, marital status, working due to income need, mode of transportation to university, parental influence on joining medical school, and smoking did not show statistically significant associations (p>0.05) as shown in table 1.

The prevalence of headache showed a notable sex disparity among medical students. A higher headache prevalence was observed among women (69.4%) compared with men (44.4%). Both migraine and TTH were more prevalent in women (p<0.05), as shown in table 2.

Table 3 demonstrates the characteristics and impact of different headache types among participants, TTH was found to be the most common type of headache among medical students, with predominantly frequent episodic and infrequent episodic cases (33.7% and 24.3%, respectively). Migraine, on the other hand, showed lower prevalence rates than TTH. Migraine without aura and migraine with aura accounted for 23.8% and 11.7% of cases, respectively. TTH, both frequent and infrequent, were characterised by being generalised (50.6% and 48.4%, respectively), pain duration typically less than 4 hours (73% and 75%, respectively), not associated with neck pain (76.4% and 92.2%, respectively), but associated with triggers (85.4% and 75%, respectively) and limitations in daily activities (77.5% and 76.6%, respectively). Family history played a role in TTH frequent and infrequent cases (48.3% and 26.6%, respectively). Migraine without aura and migraine with aura were described as unilateral (28.6% and 38.7%, respectively) or generalised

Table 2 Prevalence of different types of headaches based on sex

	Male (N=313)	Female (N=180)	Total (N=493)	P value
Diagnosis				**< 0.001***
No headache	174 (55.6%)	55 (30.6%)	229 (46.5%)	< 0.001*
Migraine without aura	27 (8.6%)	36 (20.0%)	63 (12.8%)	< 0.001*
Migraine with aura	16 (5.1%)	15 (8.3%)	31 (6.3%)	0.156
TTH frequent episodic	49 (15.7%)	40 (22.2%)	89 (18.1%)	0.068
TTH Infrequent episodic	39 (12.5%)	25 (13.9%)	64 (13.0%)	0.65
TTH chronic	4 (1.3%)	6 (3.3%)	10 (2.0%)	0.119
Unclassified	4 (1.3%)	3 (1.7%)	7 (1.4%)	0.725

*Significant.
TTH, tension-type headaches.

Table 3 Characteristics and impact of different headache types among the study participants

	Migraine without aura n (%)	Migraine with aura n (%)	TTH frequent episodic n (%)	TTH infrequent episodic n (%)	TTH chronic n (%)	Unclassified n (%)	Total n (%)	P value
Total	63 (23.8%)	31 (11.7%)	89 (33.7%)	64 (24.3%)	10 (3.8%)	7 (2.7%)	264 (100%)	
Daily activities limitation								**0.051**
Yes	59 (93.7%)	28 (90.3%)	69 (77.5%)	49 (76.6%)	9 (90.0%)	5 (71.4%)	219 (83.0%)	
No	4 (6.3%)	3 (9.7%)	20 (22.5%)	15 (23.4%)	1 (10.0%)	2 (28.6%)	45 (17.0%)	
Family history								**0.003***
Yes	33 (52.4%)	21 (67.7%)	43 (48.3%)	17 (26.6%)	4 (40.0%)	2 (28.6%)	120 (45.5%)	
No	30.0 (47.6%)	10 (32.3%)	46 (51.7%)	47 (73.4%)	6 (60.0%)	5 (71.4%)	144 (54.5%)	
Age of onset								**0.046*†**
Mean (SD)	15.8 (2.8)	15.7 (3.8)	17.3 (2.3)	16.8 (3.1)	17.2 (2.5)	16.1 (2.1)	16.6 (2.9)	
Range	10.0–21.0	6.0–20.0	11.0–22.0	10.0–23.0	12.0–22.0	12.0–18.0	6.0–23.0	
Headache character								**< 0.001***
Throbbing	34 (54.0%)	14 (45.2%)	21 (23.6%)	19 (29.7%)	2 (20.0%)	6 (85.7%)	96 (36.4%)	< 0.001*
Tightening	9 (14.3%)	1 (3.2%)	25 (28.1%)	17 (26.6%)	3 (30.0%)	0 (0.0%)	55 (20.8%)	0.016*
Sharp	9 (14.3%)	9 (29.0%)	30 (33.7%)	23 (35.9%)	3 (30.0%)	1 (14.3%)	75 (28.4%)	0.078
Heaviness feeling	11 (17.5%)	7 (22.6%)	13 (14.6%)	5 (7.8%)	2 (20.0%)	0 (0.0%)	38 (14.4%)	0.321
Location								**0.004***
Generalised	22 (34.9%)	10 (32.3%)	45 (50.6%)	31 (48.4%)	4 (40.0%)	3 (42.9%)	115 (43.6%)	0.309
Unilateral	18 (28.6%)	12 (38.7%)	3 (3.4%)	9 (14.1%)	1 (10.0%)	0 (0.0%)	43 (16.3%)	< 0.001*
Temporal	11 (17.5%)	3 (9.7%)	20 (22.5%)	16 (25.0%)	4 (40.0%)	3 (42.9%)	57 (21.6%)	0.181
Occipital	8 (12.7%)	3 (9.7%)	11 (12.4%)	3 (4.7%)	0 (0.0%)	1 (14.3%)	26 (9.8%)	0.496
Vertex	4 (6.3%)	3 (9.7%)	10 (11.2%)	5 (7.8%)	1 (10.0%)	0 (0.0%)	23 (8.7%)	0.857
Pain duration								**0.002***
less than 4 hours	28 (44.4%)	12 (38.7%)	65 (73.0%)	48 (75.0%)	6 (60.0%)	5 (71.4%)	164 (62.1%)	< 0.001*
4–8 hours	25 (39.7%)	12 (38.7%)	19 (21.3%)	12 (18.8%)	3 (30.0%)	2 (28.6%)	73 (27.7%)	0.056
8–24 hours	9 (14.3%)	4 (12.9%)	4 (4.5%)	4 (6.2%)	1 (10.0%)	0 (0.0%)	22 (8.3%)	0.259
More than 24 hours	1 (1.6%)	3 (9.7%)	1 (1.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	5 (1.9%)	0.035*
Associated neck pain								**0.008***
Yes	20 (31.7%)	12 (38.7%)	21 (23.6%)	5 (7.8%)	2 (20.0%)	1 (14.3%)	61 (23.1%)	
No	43 (68.3%)	19 (61.3%)	68 (76.4%)	59 (92.2%)	8 (80.0%)	6 (85.7%)	203 (76.9%)	
Headache triggers								**0.488**
Yes	54 (85.7%)	25 (80.6%)	76 (85.4%)	48 (75.0%)	9 (90.0%)	5 (71.4%)	217 (82.2%)	
No	9 (14.3%)	6 (19.4%)	13 (14.6%)	16 (25.0%)	1 (10.0%)	2 (28.6%)	47 (17.8%)	

*Significant.
†Kruskal-Wallis test.
TTH, tension-type headaches.

(34.9% and 32.3%, respectively). Pain duration ranged from 4 to 8 hours (39.7% and 38.7%, respectively) or less than 4 hours (44.4% and 38.7%, respectively), not associated with neck pain (68.3% and 61.3%, respectively), but associated with triggers (85.7% and 80.6%, respectively). Family history played a more significant role in these types (52.4% and 67.7%, respectively).

The most frequently reported potential triggers for TTH and migraine among the participants were lack of sleep, stress and exams, as shown in figure 1.

Out of 264 students who had headache, 171 used analgesics (64.8%). Only 42 (24.6%) sought medical advice. However, most of the students 103 (60.2%) self-medicated with analgesics without physician prescription 27 (15.8%). The most common reported analgesic was paracetamol 154 (90.1%). Of those who used analgesics, 77.8% took them for a duration of 1–7 days. Only 17 (9.9%) students used preventive medications, with antidepressants being the most commonly used (57.9%), followed by beta blockers (42.1%) as shown in table 4.

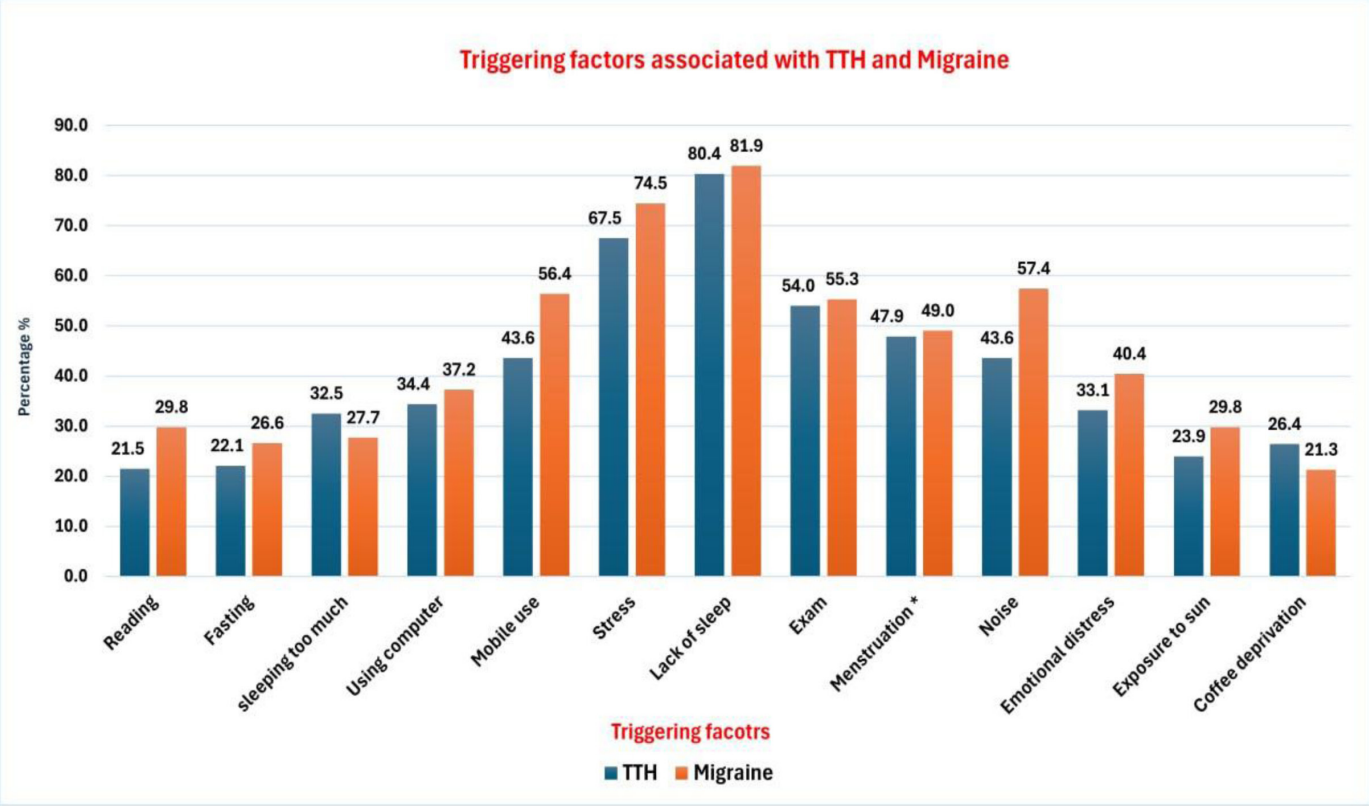

Figure 1 Triggering factors associated with TTH and migraine. *Percentage was calculated from women only. TTH, tension-type headaches.

The results of the mixed-effects logistic regression model, which examined factors associated with headache prevalence, are presented in table 5. The odds of headache prevalence were significantly higher among women compared with men (OR=1.834, 95% CI (1.165 to 2.90), p<0.009). Regarding random effects, the variance in headache prevalence attributable to faculty membership was 0.629 (SE=0.793), while the variance associated with the academic year was 1.3 (SD=0.36).

DISCUSSION

Headaches are prevalent neurological illnesses that exert a substantial impact on both the individual experiencing them and the surrounding community, significantly impeding daily functioning, particularly when concomitant symptoms are present.[15] Multiple triggers may have a potential role in provocation of headache attacks. Those triggers include diet,[16] environmental factors,[17] physiological factors like menstruation[18] or psychological factors like stress and sleep abnormalities.[19]

Stress has been identified as a significant precipitant of headache attacks. It could exacerbate heightened pain sensitivity in individuals with chronic headache conditions, hence further decreasing the threshold for perceiving noxious stimuli originating from structures around the head.[20] Rapid environmental shifts are a major cause of stress in modern life. The student age is sometimes referred to as the 'age of stress' due to the heightened pressures placed on students in today's competitive society. Academic tests, assignments, attendance and other university requirements put students under a lot of stress that they are nt always able to handle.[21]

In this study, we performed a multicentric, descriptive questionnaire-based cross-sectional study among undergraduate medical students. Undergraduate students enrolled in medical colleges are currently encountering a novel phase characterised by transformative educational experiences, heightened psychological strain and cognitive advancements. This phenomenon gives rise to a connection between pain and unpleasant emotions, which can be influenced by neurocognitive mechanisms. An individual's self-efficacy, or their belief in their own capability to execute the steps required to achieve a desired goal within various contexts, has the potential to mitigate both headaches and the adverse impacts of stress on their well-being.[22 23] In our study, the prevalence of headaches among participants was common and estimated about 53.5%. Our results are close to the results of other studies done among undergraduate students in Iran, Oman and India.[8 24 25] In contrast, studies conducted in Nigeria and Nepal[26 27] reported lower prevalence rates. Several factors can account for the disparity between our study's findings and those mentioned studies on headache prevalence. Variations in research methodologies, the use of self-reporting questionnaires, and the study durations differed across studies. For instance, Ojini *et al*[26]

Table 4 Analgesic utilisation patterns across various headache types

Analgesic use	Migraine (N=65/94)	TTH (N=100/163)	Unclassified (N=6/7)	Total (N=171/264)	P value
Medical consultation					**< 0.001***
Yes	27 (41.5%)	13 (13.0%)	2 (33.3%)	42 (24.6%)	
No	38 (58.5%)	87 (87.0%)	4 (66.7%)	129 (75.4%)	
Who advised you to take analgesic					**0.003***
Self- decision	27 (41.5%)	72 (72.0%)	4 (66.7%)	103 (60.2%)	< 0.001*
Your family advice	14 (21.5%)	17 (17.0%)	1 (16.7%)	32 (18.7%)	0.759
Doctor advice	19 (29.2%)	7 (7.0%)	1 (16.7%)	27 (15.8%)	< 0.001*
Pharmacist advice	5 (7.7%)	4 (4.0%)	0 (0.0%)	9 (5.3%)	0.491
Frequency per month					**0.482**
Daily	2 (3.1%)	1 (1.0%)	0 (0.0%)	3 (1.8%)	0.578
1–7 days	47 (72.3%)	81 (81.0%)	5 (83.3%)	133 (77.8%)	0.4
8–14 days	13 (20.0%)	12 (12.0%)	0 (0.0%)	25 (14.6%)	0.214
15–28 days	3 (4.6%)	6.0 (6.0%)	1 (16.7%)	10 (5.8%)	0.482
Increase the dose					**0.013***
Need	16 (24.6%)	9 (9.0%)	2 (33.3%)	27 (15.8%)	
Did not need	49 (75.4%)	91 (91.0%)	4 (66.7%)	144 (84.2%)	
Type of medication					**0.275**
Paracetamol	58 (89.2%)	91 (91.0%)	5 (83.3%)	154 (90.1%)	0.798
Ibuprofen	3 (4.6%)	4 (4.0%)	0 (0.0%)	7 (4.1%)	0.859
Imigran	1 (1.5%)	1 (1.0%)	1 (16.7%)	3 (1.8%)	0.018*
Diclofenac	1 (1.5%)	(3.0%)	0 (0.0%)	4 (2.3%)	0.772
Aspirin	2 (3.1%)	1 (1.0%)	0 (0.0%)	3 (1.8%)	0.578
Preventive mediciations					**0.335**
Yes	9 (13.8%)	8 (8.0%)	0 (0.0%)	17 (9.9%)	
No	56 (86.2%)	92 (92.0%)	6 (100.0%)	154 (90.1%)	

*Significant.
TTH, tension-type headaches.

focused on the 1-year prevalence of headaches, whereas our study assessed prevalence over the past 3 months. Additionally, studies conducted during stressful periods such as midterms, end of clinical rounds or final exams were anticipated to report higher headache prevalence. Furthermore, racial differences, nutritional habits and variations in weather and climate are also likely contribute to the observed differences in prevalence rates.[28]

In our study, we noticed that there was a significant relation between the sex of the participants and headache occurrence with predominant female participants. These results were consistent with other studies, which also had a female predominance.[8 13 24 25] However, this disagrees with other studies that had a male predominance.[10 27] Recent data suggest that women are more affected by headaches than men. This is attributed to the influence of fluctuations in ovarian steroid hormones, particularly oestrogen and progesterone, on headache occurrence.[29 30]

In addition to that, our study showed significant relations between the academic year and headache prevalence. The most prevalent headache group was in the third academic year. This can be attributed to the fact that the third year represents a transitional phase for students moving from preclinical to clinical studies. This shift introduces new learning environments, clinical responsibilities and practical exams, which can be stressful and potentially contribute to a higher incidence of headaches.[31] Those results were opposed by the data of a previous study done by Bhattarai and his colleagues,[27] which showed a lower prevalence of headache in the third-year MBBS students compared with other academic years.

There was no apparent association between smoking and headaches in our study (p value=0.4). The relationship between headaches and smoking is controversial. Some studies do not support that there is a strong causal relationship between smoking intensity and any type of headache.[32 33] Other studies showed that previous smoking was associated with an increased risk of migraines, but not TTH.[34] One meta-analysis reported

Table 5 Mixed-effects logistic regression model of factors associated with headache prevalence

Fixed effects	Effect	OR	SE	95% CI	P value
(Intercept)	(Intercept)	0.649	0.722	(0.149 to 2.81)	0.549
Sex	Female–male	1.834	0.233	(1.165 to 2.90)	**0.009***
Nationality	Non-Egyptian–Egyptian	0.929	0.441	(0.39 to 2.21)	0.868
Marital status	Engaged–single	0.795	0.549	(0.27 to 2.38)	0.676
	Married–single	0.382	1.448	(0.014 to 10.1)	0.506
Working because of income need	Yes–no job/job not for income need	0.781	0.302	(0.43 to 1.41)	0.412
Residence	Rural–urban	0.800	0.209	(0.53 to 1.21)	0.286
Living condition	With friends/housemates–with family/relatives	1.087	0.301	(0.6 to 1.97)	0.781
	Alone–with family/relatives	0.918		(0.34 to 2.46)	0.864
Smoking	Yes–no	0.669	0.644	(0.18 to 2.36)	0.532
Random effects					
Group	Variance	SD			
Faculty	0.629	0.793			
Academic year	0.130	0.360			
Residual	1.000	1.000			

*Significant.

that there was conflicting data supporting the validity of patient-reported environmental tobacco exposure as a headache trigger.[35]

Most of the participants in our study suffered from TTH frequent episodic and TTH infrequent episodic, followed by migraine with or without aura, and then TTH chronic. This can be explained as TTH represents a very common type of headache among adolescents.[36] Approximately 15%–20% of population-based studies identify this type of headache as being the most neglected.[21] Among medical students, this might be due to the long working hours, which lead to fatigue, stress and anxiety. Students with frequent headaches mostly suffer from lost study days, which lead to reduced academic performance, poor concentration, and poor attitudes and behaviour.[37]

Students with different types of headaches reported that headache interfered with their daily life activities. This result was consistent with previous studies which explained that headaches affected daily functions and activities.[11 27] Also, headaches are major problems, which cause absence from work, physical labour, lack of decision-making skills and memory.[38]

Among different types of headaches, we found that family history is the more potent and consistent risk factor for migraines than other types. This could be supported by a study by Hernández Latorre *et al* that revealed relatives of people with migraines are two-to-three-fold greater risk of migraines compared with controls.[39]

Strengths and limitations

Our study is one of the pioneers' studies using the multi-stage random methodology to represent the prevalence of headaches among medical students. It builds on prior research conducted by Oraby *et al*[11] to assess migraine prevalence among the same population, However, it is a single-centre study that cannot be generalised among all medical students in Egypt. In addition to that, the diagnosis of headache in our study is based on the criteria of ICHD-III for the most accurate diagnosis. However, the study also has notable limitations. There was a high risk of recall bias, resulting from using self-reported questionnaires. Additionally, the survey used was not validated, which may affect the reliability and accuracy of the reported data. Although we followed ICHD-III criteria for diagnosing headaches, we did not confirm diagnoses through clinical assessments or objective measures. Furthermore, we did not use strict criteria to diagnose psychological triggers of headache such as anxiety and depression, instead of participants' self-reports. So, we suggest conducting more longitudinal research to study the cause-and-effect relationship among headaches and different variables.

CONCLUSION

In our study, tension-type headaches, both frequent and infrequent, emerged as the most prevalent among medical students, followed by migraine without aura then migraine with aura. Statistically significant differences were observed based on sex, faculty, academic year and living conditions. Notably, a concerning trend of relying on over-the-counter medications was identified, underscoring the urgency of addressing the lack of medical consultations among affected students.

Author affiliations
[1]Mansoura Manchester Program for Medical Education, Faculty of Medicine, Mansoura University, Mansoura, Egypt

[2]Faculty of Medicine, Mansoura University, Mansoura, Egypt
[3]Medical Research Group of Egypt (MRGE), Negida Academy, Arlington, MA, USA
[4]Department of Neurology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt
[5]Neuropsychiatry Specialist, Faculty of Medicine, Alexandria University, Alexandria, Egypt
[6]Public Health and Community Medicine Department, Faculty of Medicine, Mansoura University, Mansoura, Egypt
[7]Public Health and Community Medicine Department, Faculty of Medicine, Kafrelshiekh University, Kafrelshiekh, Egypt

X Rashad G Mohamed @RashadGamal2001@ and Khalid Sarhan @SarhanNeuro

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ORCID iD
Rashad G Mohamed http://orcid.org/0009-0004-2962-0075

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