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# Migraine prevalence, clinical characteristics, and health care-seeking practice in a sample of medical students in Egypt

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## Abstract

**Introduction:** Migraine is a common disabling primary headache disorder with significant personal and socio-economic impacts. Medical students usually have multiple triggers for migraine, particularly stress and irregular sleep.

**Objective:** To assess the prevalence, characteristics, and degree of disability of migraine in a sample of Egyptian medical students and to study their health care-seeking practice when having migraine

**Patients and methods:** A descriptive cross-sectional, questionnaire-based study included 631 undergraduate medical students enrolled in the Faculty of Medicine. Participants' sociodemographic data, migraine prevalence, characteristic, migraine disability, and health care-seeking practice were evaluated. By using the MIDAS test in the questionnaire, we assessed the impact of migraine headache on the daily activities of the students. The severity of headache was assessed using the visual analog scale (VAS) scores.

**Results:** Prevalence of migraine in medical students was found to be 17.9% causing moderate disability. Migraine was significantly more prevalent and caused more disability among female students compared to males ( $p$  value 0.001 and 0.001). Only 35.4% of the migraineurs had already seen doctors for their migraine, and self-prescription of medications for migraine was practiced by 58.4%. Statistically significant positive correlation was found between migraine frequency, migraine severity, and low academic performance ( $p$  value 0.001 and 0.003 respectively).

**Conclusion:** Migraine is highly prevalent among medical students with predominant female prevalence and has a negative impact on their academic performance and other activities.

**Keywords:** Migraine, Medical students, Incidence, Academic performance, Disability

## Introduction

Headache and different types of facial pain are common complaints in the outpatient clinic. The lifetime prevalence of headache is greater than 90% [1]. Most of the patients suffering from that headache have one of the three main primary headache syndromes: tension-type headache, migraine, or trigeminal autonomic cephalgia [2].

Migraine was ranked as the third most prevalent disorder and seventh highest specific cause of disability worldwide in the Global Burden of Disease Survey, 2010 [3].

The prevalence of migraine is generally highest in the most productive years of life. The prevalence peaks in the late 30s to early 40s and declines during the 50s [4]. In the adult population, females have higher prevalence of migraine compared to males [5].

Medical students are an important and distinctive population who need more care about their health and quality of life which will be reflected on their academic performance, achievements, engagement in different

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social activities, and their future role in various aspects of life [6].

The life of medical students usually has multiple triggers for migraine, particularly stress and irregular sleep. They are routinely exposed to stresses regarding the deducible responsibility towards their courses, the need for higher level of performance, their frequent exams, and several years of education [7]. Nutrition and food status are also important triggers of migraine especially in children and adolescents. Fasting, chocolate, cheese, and alcohol are the main claimed triggers. The effects of food triggers may be exerted by mediating the release of serotonin and norepinephrine, causing vasoconstriction or by directly stimulating brain stem and cortical nervous pathways [8].

The aim of this work was to assess the prevalence, characteristics, and degree of disability of migraine among medical students in the Faculty of Medicine, and to study the health care-seeking practice of medical students when having migraine.

## Methods

This study is a descriptive cross-sectional study among undergraduate medical students enrolled in the Faculty of Medicine, from first to sixth grade during the 2017/2018 academic year.

Using OpenEpi, Version 3, open source calculator, minimum calculated sample size of 569 students was required. Based on migraine prevalence of 15% from previous studies [9], with significance level of 0.05 at 90% power and adding 20% to the sample for expected non-response rate, a total sample of 712 students was required.

Stratified random sampling technique was used to recruit the students according to their academic grade. The university provided the list of classes and students' IDs. Equal number of each grade was targeted (nearly 119 student). In each grade, several classes were randomly selected, and all students in those classes were considered potential participants.

Medical students were interviewed by the researchers using an interview questionnaire. The questionnaire was designed after careful review of the international classification of headache disorders 3 beta version (ICHD3) [3] as well as the Migraine Disability Assessment Test (MIDAS) [10].

The questionnaire was revised by two consultant neurologists and one public health consultant for content and face validity.

The questionnaire was designed in English and contained four main sections: section one, demographic characteristics of the students (age, sex, residence, grade, marital status, and family history); section two, candidates were asked about the following: frequency

of headache attacks during the last 3 months, duration of the single attack in hours. Also they were asked about headache characteristics (site, quality, and severity of headache). Medical students with headache were asked about the following associated symptoms that preceded or accompanied the headache episode, e.g., mood changes, visual symptoms, sensory or motor symptoms, nausea, vomiting, phonophobia, and photophobia. A list of common triggers is provided in the questionnaire, e.g., menstruation, contraceptive pills, fasting, and stress during studying and exams. Section three, the items of MIDAS that assessed migraine disability. Section four, health care-seeking practice of the students when having migraine headache.

Before study implementation, a pilot test for the questionnaire form was done among ten potential participants from each grade. This was performed to check the validity and clarity of the structured questionnaire as well as to estimate the time needed to complete the questionnaire. The pilot study's results were excluded from data analysis.

After data collection, each questionnaire was duly studied, and the diagnosis of different types of headache, especially migraine and its subtypes, was made according to the International Classification of Headache Disorders, 3rd Edition (beta version) as follows: migraine without aura, migraine with aura, chronic migraine, probable migraine [3].

Participants of the study were treated according to the Helsinki Declaration of Biomedical Ethics. The study was approved by the Ethical Committee of the Faculty of Medicine (FWA00015574 in July, 2018). Before data collection, all participants had signed a written informed consent after explaining the aim and impact of the study. The students were individually interviewed to protect each participant's privacy.

## Statistical analysis

The data were coded and entered using Microsoft Office Excel 2010. Statistical analysis was done using IBM SPSS Version 24 (IBM Corporation, USA, Armonk, NY, 2016). Frequencies (number) and relative frequencies (percent) were used to summarize qualitative variables while mean and standard deviations were used for quantitative variables. Comparison between groups was performed using Chi-square test. Pearson correlation was used to estimate the possible correlation between migraine severity, disability, and academic performance. Binary logistic regression was carried out in order to detect possible predictors of migraine headache among the students. *P* value less than or equal to 0.05 was considered significant.

## Results

The overall response rate was 88.6% (631 students responded to 712 targeted students).

A total of 631 medical students have participated in this study. Their mean age was 20.8 years with standard deviation of 2.06 years. A nearly equal percentage of males and females have participated in the study (49.3% and 50.7%, respectively). Regarding the residency of the medical students, nearly two thirds of the students were from urban areas (62.6%). Most of the students under study were single (98.1%). About one third of the students (39.3%) were having positive family history of headache. They were nearly equally distributed among different educational grades from first to the sixth year (Table 1).

According to ICHD 3, the medical students who had migraine in the last 3 months were 113 (17.9%), mostly of episodic type (88.5%). Migraine headache was described by medical students by being of moderate intensity in nearly three fourths (76.0%) of migrainous students, occurring with frequency of 5–9 episodes every 3 months in more than one third of them (41.9%). Students who had migraine described their migraine headache as being unilateral in nearly half (44.2%) of them, throbbing in character and increases with daily activity in three fourths of them (77% and 75.2% respectively). Forty six (40.8%) of the migrainous students under study experienced aura before their migraine episode, and the

**Table 1** Sociodemographic characteristics of medical students under study

Variable	n (total 631)	Percentages
Sex		
Male	311	49.3
Female	320	50.7
Residency		
Urban	395	62.6
Rural	236	37.4
Marital status		
Single	619	98.1
Married	12	1.9
Family history		
Yes	248	39.3
No	383	60.7
Academic grade		
First	114	18.1
Second	101	16.0
Third	106	16.8
Fourth	102	16.2
Fifth	108	17.1
Sixth	100	15.8

n numbers

most frequent aura was visual followed by sensory and motor symptoms (Table 2).

The most frequent migraine triggers were irregular sleep, stress during studying and exams, sun exposure and high sounds, psychological stress, and fasting (92.9%, 91.2%, 87.6%, 86.7, and 77%, respectively). Migraine attacks were associated with mood changes, photophobia, and phonophobia in most of migraineurs. Most frequent relieving factors reported by migraineurs were rest and analgesics. According to MIDAS scoring, about one third (37.2%) of migraineurs had moderate disability (Table 2).

Regarding health care-seeking practice of the students when having migraine, only one third (35.4%) had visited doctors for their migraines. The visited doctors were neurologists and ophthalmologists. Only 17.7% of migraineurs conducted investigations for their migraine. Self-prescription of medications for migraine was practiced by nearly two thirds (58.4%) of the migraineurs (Table 3).

A statistically significant higher percentage of females was having migraine headache compared to males ( $p$  value  $< 0.001$ ). Also, on comparing between males and females regarding migraine disability measured by MIDAS scoring, we found that migraine caused moderate to severe disability in females more than in males ( $p$  value is 0.001).

Married medical students reported higher prevalence of migraine than single students ( $p$  value 0.030). Medical students who had family history of headache were having statistically significant higher prevalence of migraine than their classmates with negative family history ( $p$  value  $< 0.001$ ). No differences in migraine distribution among the medical students under study were found regarding residence or academic grade (Table 4).

Logistic regression analysis for migraine predictors revealed that female sex and positive family history of headache were significant predictors of having migraine ( $p$  value 0.001 and  $< 0.001$  respectively) (Tables 5 and 6).

## Discussion

The present study was conducted in the medical students enrolled in the Faculty of Medicine, in the 2017–2018 academic year.

The curricula in the Faculty of Medicine require continuous effort, hard work, and concentration, and, thus, evaluation and management of headaches among medical students are of great importance [7].

Migraine frequency in our questionnaire-based study according to the international classification of headache disorders [3] was 17.9% (12.5% in males versus 23.1% in females).

The prevalence of migraine among medical students was variable worldwide. We found that the prevalence of

**Table 2** Frequency and characteristics of migraine among the students under study

Variable	Number	Percent
Migraine		
Yes	113	17.9
No	518	82.1
Migraine type (n 113)		
Chronic	13	11.5
Episodic	100	88.5
Frequency (n 113)		
5–9 episodes/3 months	47	41.5
10–19 episodes/3 months	31	27.4
> 19 episodes/3 months	35	31.1
Severity (n 113)		
Mild	5	4.4
Moderate	87	76.0
Severe	21	18.6
Site (n 113)		
Unilateral	50	44.2
Bilateral	24	21.2
Generalized	16	14.2
Periorbital	11	9.7
Occipital	5	4.4
Frontal	7	6.2
Quality of headache (n 113)		
Throbbing	87	77.0
Compressing	17	15.0
Stabbing	9	8.0
Increase with daily activities (n 113)		
Yes	85	75.2
No	28	24.8
Presence of aura (n 113)		
Yes	46	40.8
No	67	59.2
Aura type (n 46)		
Visual	31	67.4
Sensory	11	23.9
Motor	4	8.6
Migraine triggers <sup>a</sup> (n 113)		
Psychological stress	98	86.7
Irregular sleep	105	92.9
Smoking	9	8.0
Menstruation	31	27.4
Contraceptive pills	4	3.5
Fasting	87	77.0
Coffee, chocolate, aged cheese	24	21.2

**Table 2** Frequency and characteristics of migraine among the students under study (*Continued*)

Variable	Number	Percent
Drugs	8	7.1
Sun exposure, bright light, and high sounds	99	87.6
During studying and exams	103	91.2
Associated symptoms <sup>a</sup> (n 113)		
Mood changes	102	90.3
Flashes of light and scotoma	56	49.6
Unilateral numbness	19	16.8
Hemiparesis	5	4.4
Nausea	60	53.1
Vomiting	17	15.0
Phonophobia	97	85.8
Photophobia	97	85.8
Lacrimation	28	24.8
Nasal congestion	17	15.0
Eyelid edema	15	13.3
Facial sweating	13	11.5
Relieving factors <sup>a</sup> (n 113)		
Rest	89	78.8
Analgesics	87	77.0
Sitting in a dark place	81	71.7
Sleeping	80	71.0
Disability (n 113)		
No or minimal	22	19.5
Mild	24	21.2
Moderate	42	37.2
Severe	25	22.1

<sup>a</sup>More than one answer allowed  
n numbers  
m:month

migraine in our study was higher compared to some other studies. The prevalence was reported to be 14.2% in Isfahan, Iran [11]; 13.4% in the USA [12]; 13.1% in Nigeria [13]; and only 7.9% in Southeast China [14].

In contrast, other studies have revealed higher migraine prevalence than our study; the prevalence was 40.2% in Sao Paulo, Brazil [15]; 38.3% in Peshawar, Pakistan [16]; 28% in India [17]; 27.9% in Kuwait [7]; and 26.3% in Saudi Arabia, at King Abdulaziz University, Jeddah [18].

Many factors can explain the difference between the results of our study and the abovementioned studies regarding migraine prevalence: first, the number of subjects included from each gender. For example, in the study conducted by Ojini and colleagues, the ratio of female to male participants was lower than the ratio in our study. Moreover, the prevalence of migraine in

**Table 3** Health care seeking practice of students when having migraine

Variable	Number	Percent
Visiting a doctor due to migraine		
Yes	40	35.4
No	73	64.6
Specialists visited by migraineurs (n 40)		
Neurologist	13	32.5
General practitioner	5	12.5
Internist	9	22.5
Ophthalmologist	10	25.0
ENT	3	7.5
Did investigations for their migraine (n 113)		
Yes	20	17.7
No	93	82.3
Medications for migraine (n 113)		
No medications	18	15.9
Self-medications	66	58.4
Prescribed medications	29	25.7

n numbers

ENT ear, nose, and throat specialist

females in their study was 10.9% while 3.2% in males. These factors made their total migraine prevalence 6.4% compared to 17.9% in our study [19].

Second, the difference in methodology, self-reporting questionnaires used, and the duration of the study differed between various studies. In the studies by Menon and Kinnera [17], for example, they assessed one year prevalence of migraine while in our study we assessed the last 3 months prevalence of migraine. Also, the studies conducted during stressful periods such as midterms, end of clinical rounds, or final exams were expected to find higher migraine prevalence.

Third, the difference in prevalence can also be explained by racial differences. Stewart and colleagues [20] studied the prevalence of migraine in Asian Americans, African-Americans, and Caucasians in the USA and found a significant difference in migraine prevalence between distinct racial groups. Nutritional habits and variation in weather and climate are also contributing factors.

Migraine prevalence among medical students in this study was higher compared to migraine prevalence in the Egyptian general population which was 10.5% in Kandil and colleagues, a study conducted in Assiut Governorate, Egypt [21].

Many studies have agreed that migraine is highly prevalent among university students compared to

**Table 4** Socio-demographic characteristics of medical students with migraine headache

	Migraine headache n (%)	Students without migraine n (%)	p value
Sex			
Male	39 (12.5)	272 (87.5)	< 0.001*
Female	74 (23.1)	246 (76.9)	
Residence			
Urban	70 (17.7)	325 (82.3)	0.852
Rural	43 (18.2)	193 (81.8)	
Marital status			
Single	108 (17.4)	511 (82.6)	0.030*
Married	5 (41.6)	7 (58.4)	
Family history			
Yes	76 (30.6)	172 (69.4)	< 0.001*
No	37 (9.6)	346 (90.4)	
Academic grade			
First	23 (20.2)	91 (79.8)	0.814
Second	22 (21.8)	79 (78.2)	
Third	17 (16)	89 (84)	
Fourth	17 (16.7)	85 (83.3)	
Fifth	20 (18.5)	88 (81.5)	
Sixth	14 (14)	86 (86)	

\*p value ≤ 0.05 (significant)

**Table 5** Predictors of migraine headache among the medical students under study

Predictors	p value	Estimate relative risk (95 % CI)
Sex (female vs. male)	0.001*	2.276 (1.418–3.652)
Residence (urban vs. rural)	0.322	1.272 (0.790–2.050)
Marital status (married vs. single)	0.238	2.282 (0.580–8.985)
Family history of headache	< 0.001*	3.278 (2.044–5.256)

\*p value ≤ 0.05 (significant)  
vs versus

general populations [9]. The higher prevalence in our population study is expected due to their young ages and stressful academic life.

In this study, migraine prevalence was 1.9 times more common in females than males which is almost in agreement with the literature and previous studies [7, 11, 18].

This difference may be explained in part by the effects of estrogen hormone. Estrogen stimulates the synthesis and release of NO and calcitonin gene-related peptide, which in turn activate and transmit pain signals to the trigeminal nerve and trigger migraine. Also, estrogen may increase neuronal excitation and induce migraine by creating an imbalance in the levels of Mg<sup>2+</sup> and Ca<sup>2+</sup> [22].

Migraine has a well-known genetic component. Most of migraine patients have a first-degree relative with a history of migraine. Moreover, the risk of migraine has increased 4-folds in relatives of people who have migraine with aura [23].

In the present study, positive family history of headache for students with migraine was 67.4% which is almost in accordance to other studies where Balaban and colleagues [24] found that 72% of medical students with migraine had positive family history of headache respectively. Other studies have revealed less positive family history of headache prevalence among medical students with migraine, whereas the prevalence was 20.6% in the study conducted by Ghorbani and colleagues [11].

In this study, the prevalence of migraine without aura was higher than migraine with aura (59.2% and 40.8%, respectively). The most prevalent aura was visually followed by sensory (67.4% and 23.9%, respectively).

The findings of our study are in line with the results of many studies which found that the prevalence of migraine without aura was more than migraine with aura [11, 25,

26]. However, the prevalence of migraine with aura is relatively higher, and the prevalence of visual aura is relatively lower in our study compared such studies. These findings may have genetic or racial basis. Also, high proportions of subjects with both migraine with and without aura may be expected in headache-prone populations as medical students reported in several previous clinical studies [27–29]. In addition, inaccuracy in the diagnosis of aura symptoms may be a serious problem in both clinical and population-based studies. The aura symptoms may be extremely difficult to describe. The retrospective character of the present study may induce bias due to problems of recall of aura symptoms [30].

Our medical students with migraine had experienced mean frequency of attacks 5.96 per month which is higher than previous studies. The mean attack frequency per month was 4.2 among medical students of Kuwait University [7] and 4.6 among medical students at King Abdulaziz University [18].

Regarding headache characteristics, 94.6% of our medical students with migraine had moderate to severe intensity of their attacks which is higher than that found in other studies [18, 31].

Some students have more than one trigger factor. Menstruation was a trigger factor among 41.9% of our female cohorts. This finding is in accordance with many other studies [14, 31].

As a result of biochemical changes related to the physiological stress response, stress has a negative impact on individuals predisposed to migraine attacks by enhancing the release of corticotrophin-releasing hormone or by the changes induced by psychological response to stressors [32].

In the present study, stress during studying and exams, psychological stress, irregular sleep, and fasting were the most common triggers of migraines. The findings of our present study are in agreement with the results of previous studies [33, 34]. Our results are also consistent with Timothy and colleagues, who concluded that migraine can be triggered by exams, diet, hunger, sleep deprivation, and physical and emotional stress [35].

These findings raise the importance of teaching stress management in the medical curricula so that medical students can learn how to deal with and alleviate stresses [14].

The impact of migraine on the lives of medical students could be measured by the Migraine Disability Assessment (MIDAS) questionnaire which includes five questions regarding days of activity limitations in work or scholastic performance, household work, and social, family, and leisure activities [10].

In this study, 37.2% and 23% of medical students with migraine had moderate and severe disability, respectively, according to The MIDAS scoring. In the study by

**Table 6** Correlation between migraine frequency, migraine severity, and academic performance

	Low academic performance	
	(r) coefficient	p value
Migraine frequency	0.569	0.001*
Migraine severity	0.255	0.003*

\*p value < 0.05 (significant)

Balaban and colleagues, MIDAS scoring was 19.3% for moderate disability and 22% for severe disability [24]. Hence, it is clear that our medical students had more disability because of their migraines.

Despite medical students were expected to be more aware regarding the importance of consultation for health problems, yet they reported low consultation rates. In this study, only 35.4% of medical students with migraine sought medical advice for their headache; 32.5% of them visited a neurologist, 25% visited an ophthalmologist, and 22.5% visited an internist.

In the USA, Johnson and colleagues [12] reported that half of medical students with migraine had consulted a physician for their headaches. This rate of consultation is higher than that of our study despite the fact that the Faculty of Medicine is affiliated with a teaching hospital that runs a neurologic outpatient clinic at least twice a week.

In Brazil, Da Costa and colleagues [36] revealed that 33.6% of the patients had consulted physicians which comes in agreement with our study. Other study has shown very low consultation rates [14, 31]. These findings could be explained by a relatively light severity of headache. Also, over-the-counter analgesics are easily available.

Fifty eight percent of our medical students with migraine administered medications without prescriptions, which was significantly higher than those who took medications with prescriptions (25.7%) ( $p$  value is  $< 0.00001$ ). It is important to shed light on this malpractice because of its effect on migraine transformation from episodic to chronic due to analgesics overuse [37].

Not only was there a significant difference between females and males regarding migraine prevalence with higher females predominance ( $p$  value is 0.0006), but also there were differences regarding migraine-related disability. Female students with migraine had moderate to severe disability more than males with significant difference ( $p$  value is 0.0013). This is consistent with the findings of other studies [38, 39].

Differences between males and females in migraine are likely due to combination of biologic and psychosocial factors. Biologic explanations include genetic factors, fluctuations in sex hormones, and receptor binding [40].

In a study by Maleki and colleagues, high-field magnetic resonance imaging was performed in subjects with and without migraine (interictally for migraineurs). Females with migraine were found to have thicker posterior insula and precuneus cortices compared with males with migraine and healthy controls of both sexes [41].

Furthermore, psychosocial factors such as social role expectations, coping strategies, and affective variables may play a role in the observed gender-related differences in migraine headache [42].

By using logistic regression, female students and those with positive family history of headache had higher risk for migraine. These findings are in line with the findings of previous studies [23].

We have found a significant positive correlation between migraine severity and frequency with low academic performance ( $p$  values were 0.003 and  $< 0.001$  respectively) in medical students. This was also observed in other studies [43]. It is possible that proper management of headaches improves the academic achievement of students [44].

## Conclusions

Migraine is highly prevalent among medical students with predominant female prevalence. It poses a real problem regarding its impact on their life style and academic performance. The Faculty of Medicine should conduct campaigns among students to raise their awareness about the high prevalence of migraine, diagnosis, and its impact on their academic performance. Moreover, the importance of consulting a neurologist if a person suffers from a headache should be focused. Stress management programs should be developed so that students can learn the correct methods of stress alleviation which in turn will lessen the impact of migraine on their academic performance and other activities.

## Limitations of the study

The main limitation of the study is that it is a single center study. Although the study included a large number of students, but still it is not representative of medical students in Egypt.

## Abbreviations

ICHD3: International Classification of Headache Disorders 3 beta version; MIDAS: Migraine Disability Assessment Test; That: Calcium; Mg: Magnesium; NO: Nitric oxide

## Acknowledgements

Not applicable

## Authors' contributions

MO participated in study design, sequence alignment, and analysis of data, and helped to draft the manuscript. RS participated in study design, sequence alignment, and analysis of data and helped to draft manuscript. MM participated in study design, collection, and analysis of data and helped to draft the manuscript. EE participated in study design and analysis of data and helped to draft the manuscript. NA participated in study design and analysis of data, and helped to draft the manuscript. All authors read and approved the final manuscript.

## Funding

Authors did not receive any funding for this work.

## Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request with permission of Faculty of Medicine, Beni-Suef University, Egypt.

**Ethics approval and consent to participate**

A written informed consent was obtained from each participant in this study, and the study was approved by the authorized ethical committee in Faculty of Medicine, Beni-Suef University (FWA00015574 in July, 2018).

**Consent for publication**

Not applicable

**Competing interests**

The authors declare that they have no competing interests

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Received: 27 August 2020 Accepted: 27 January 2021

Published online: 15 February 2021

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