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# Migraine among Egyptian medical students: prevalence, disability and psychological distress-cross sectional study

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## Abstract

**Background** Migraine is one of the most prevalent and disabling primary headache disorders. Migraine has many triggers factors as stress and irregular sleep pattern. Medical study in Egypt is so stressful with great psychological and physical burden; hence medical students are vulnerable to migraine. This study aims to determine the prevalence, characteristics, degree of disability, and psychological stress associated with migraine among medical students at different Egyptian universities.

**Results** The overall prevalence of migraine was 17.27%, more in female (76.86%) than male. Sleeping disturbance and stress were the most common triggering factors associated with migraine (94.4%, 81.4% respectively). The majority of students with migraine (89.65%) had high psychological distress as measured by Kessler Psychological Distress Scale (K10) with moderate to severe disorder, while 76.8% had moderate to severe disability as assessed by Migraine Disability Assessment Score (MIDAS). Female gender was a potential predictor associated with higher psychological distress. There is negative correlation between degree of disability and academic performance.

**Conclusion** Migraine is prevalent among medical students, with female predominance. It is associated with high level of psychological stress, moderate to severe disability, and negative impact on lifestyle and academic performance of the students.

**Keywords** Migraine, Medical students, Psychological distress, Disability, Academic performance

## Background

According to the International Classification of Headache Disorders 3rd edition (ICHD-3); headache is pain experienced either above the orbitotemporal, the nuchal line, or both [1]. There are primary and secondary types of headaches. The most common primary headaches are migraine, tension-type headache, and trigeminal autonomic cephalalgias [1]. Secondary headache may be attributed to head trauma, cranial or cervical vascular disorder, non-vascular intracranial disorder, substance abuse or its withdrawal, disorders of the cranium or sinuses, or psychiatric disorders [1].

Although migraine is highly prevalent in late adolescence, it is under-estimated among undergraduates [2].

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Medical students have higher reliability for migraine [3]. Among US medical students, migraine prevalence was 35% for females and 14.1% for males in 2014 [4]. In Egypt, Oraby et al. in 2020, stated the prevalence as 17.9% among medical students [5].

The most common headache-triggering factors are stress, fatigue, sleep disturbances, prolonged exposure to excessive sunlight or heat, and hunger [6].

Recent study reported moderate migraine disability among Egyptian medical students; either caused by migraine or the psychological stress associated with it [5]. The prevalence of psychological stress is higher among migraineurs [7]. Rafique et al. in 2020, found that migraineurs female had higher psychological distress than non-migraineurs female [8].

This study aimed to determine the prevalence, characteristics, degree of disability, and psychological stress associated with migraine among medical students at the Faculty of Medicine of different Egyptian universities.

## Methods

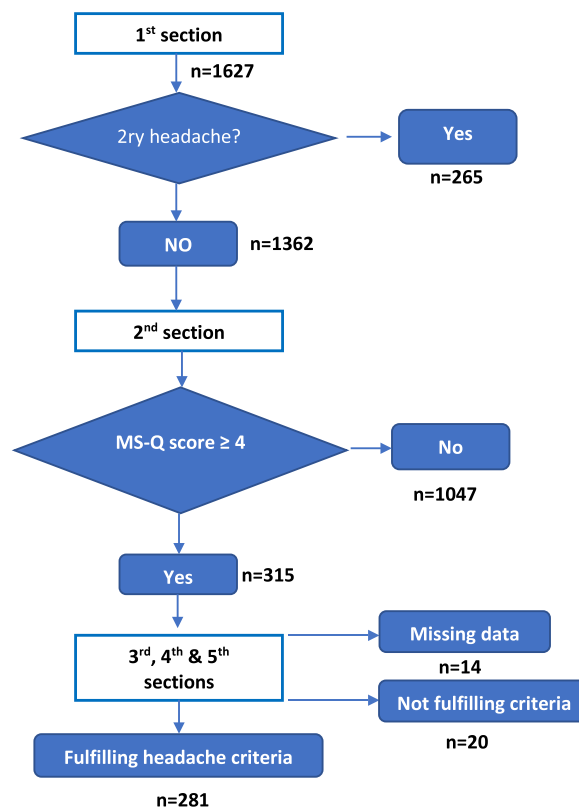
This is a cross sectional multicenter study conducted online via Google form. The study population included medical students and intern doctors from five different Egyptian Universities.

For data collection, we used medical students and intern doctors' groups on Facebook as sample frame, from which we randomly selected 1627 students from all grades with age range from 18 to 24 years. The study was approved by the ethical review board, Approval code: MKSU 46-12-21. Each participants gave a virtual consent before submitting their response.

Our questionnaire was divided into five sections as shown in Fig. 1. In the first section we collected demographic data, family history for migraine, smoking, and other medical causes of headache. Students with secondary cause of headache as history of head trauma, sinusitis, neurological disorders, or systematic disease causing headache were excluded from further analysis.

The second section consisted of Migraine Screen Questionnaire (MS-Q) [9]. This questionnaire consists of five questions about the frequency and characteristics of headaches, as well as the presence or absence of migraine symptoms for this, a score of 0 was obtained for each negative answer (NO), and 1 for each positive answer reply (YES). A cutoff point indicating suspicion of migraine was established at 4 points, while a score less than 4 indicated no suspicion of migraine. Students MS-Q  $\leq$  4 were excluded from further analysis.

The third section consisted of the diagnostic criteria of migraine according to 3rd edition of the International Classification of Headache Disorders (ICHD-III) to confirm diagnosis of migraine [1]. It includes questions



**Fig. 1** Flowchart of survey responses

about the attacks' frequency, duration, intensity, character, site, aura, interference with daily activities and associations of migraine headache. Also, students were asked about triggering factors of headache attacks—including noise, anxiety, sleeping disturbances, physical activity, exposure to sun, heat, annoyance, intense light, studying for exams, emotional upset, eating habits, and menstruation (in female students). Also, they were asked if they had previous diagnosis of migraine by medical staff.

The fourth section assessed psychological distress using Kessler Psychological Distress Scale (K10). K10 scale included 10 questions about emotional states with response scale from one (none of the time) to five (all the time). Scores of the 10 questions are summed and categorized as following: (10–19) is likely to be well, (20–24) is likely to have mild disorder, (25–29) is likely to have moderate disorder, (30–50) is likely to have severe disorder [10].

The fifth section consisted of Migraine Disability Assessment Score (MIDAS) to assess degree of disability. The test consisted of five questions. Total number of days is summed as MIDAS score and categorized as following: grade I (0–5) has little or no disability, grade II (6–10) has mild disability, grade III (11–20) has moderate disability, grade IV (21 or more) has severe disability [11].

The form responses were exported to Google sheets for data organization and cleansing. Then the collected data was analyzed using SPSS software version 20, qualitative data was described as frequency and percentage and expressed as, median and range while quantitative data was expressed as mean and standard deviation. The difference between two qualitative variables was calculated using Chi-square test and Anova was used for more than two groups. P-value less than 0.05 reflecting significant difference.

## Results

A total of 1627 medical students and intern doctors from different universities in Egypt were enrolled in this study through an online structured questionnaire via Google form. Their mean age was 21.3 years with a standard deviation of 3.08 years. Table 1 illustrates the basic characteristics of the studied participants: 65.2% were female, and 34.8% were male. The majority were single (97.5%). Regarding residence, 61.4% and 38.6% lived in urban and rural areas respectively. The majority were non-smokers (96.3%) with no family history of migraine in 72.7%. Two hundred and sixty-five (16.3%) were suspected to have secondary headache.

Among the study participants, 1362 were screened for migraine through (MS-Q) by answering five questions with total mean score ( $X \pm SD = 2.29 \pm 1.4$ ). Of them, 315 (23.1%) had total score  $\geq 4$ ; probably having migraine (Table 2). Out of the 315; fourteen students did not complete the questionnaire and were considered missing data, 281 fit the criteria for migraine headache according to ICHD-3 with a prevalence of 17.27% as shown in Table 3. Among the 281 students diagnosed with migraine, 38.5% had about 1–4 attacks per month, 94.4% reported pulsating headache, the most common location of headache was unilateral 79.35%. In association with headache, 62.8% experienced photophobia or phonophobia while 32.55% experienced nausea or vomiting. The migraine attack was associated with aura in 31.2% of the students, most commonly visual aura (79.7%).

Table 4 shows sociodemographic characteristics of those diagnosed with migraine. It was found to be more in females (76.86%) than males, those living in urban areas (63.35%), academic grades 4th and 6th (23.11% and 23.11%); and regarding academic performance, 45.2% got excellent marks.

Sleeping disturbance and stress were the most common triggering factors associated with migraine attacks among students (94.4%, 81.4% respectively). Menstruation was reported as a triggering factor in 29% of females with migraine as shown in Table 5.

Regarding psychological distress measured by Kessler Psychological Distress Scale (K10), most students

**Table 1** Socio-demographic characteristics of the studied participants (n = 1627)

Characteristics		n	%
Gender	Male	567	34.8
	Female	1060	65.2
	Total	1627	100
Marital status	Single	1587	97.5
	Married	39	2.4
	Widow	1	0.1
	Total	1627	100
Living place	Rural	628	38.6
	Urban	999	61.4
	Total	1627	100
Academic grade	1st grade	157	9.6
	2nd grade	198	12.2
	3rd grade	272	16.7
	4th grade	306	18.8
	5th grade	293	18.0
	6th grade	323	19.9
	Intern doctors	78	4.8
	Total	1627	100
Academic performance	Faire	77	4.7
	Good	325	20.0
	V. good	504	31.0
	Excellent	721	44.3
Total	1627	100	
Smoking	Yes	61	3.7
	No	1566	96.3
	Total	1627	100
Family history of migraine	Yes	444	27.3
	No	1183	72.7
	Total	1627	100

with migraine (252) had high psychological distress with moderate to severe disability (25–50 points) with a percentage of 89.65%. Logistic regression analysis was done for the potential predictors of psychological distress in students with migraine, it showed that the female gender is a potential predictor associated with higher psychological distress with significant relation ( $p$ -value = .047) while other predictors showed no significant relations as shown in Table 6.

In Table 7, by analysis of the degree of disability measured by MIDAS among migraineurs, 216 (76.8%) of students with migraine had moderate to severe disability. On studying different parameters associated with disability in migraine, the academic performance showed statistically significant relation with different grades of migraine with  $P$ -value 0.05. Among students with minimal disability, no cases reported fair academic

**Table 2** Questions of Migraine Screen Questionnaire (MS-Q) (n = 1362)

Items		n	%
Do you have frequent or intense headaches?	Yes	625	45.9
	No	737	54.1
	Total	1362	100.0
Do your headaches usually last more than 4 h?	Yes	485	35.6
	No	877	64.4
	Total	1362	100.0
Do you usually suffer from nausea when you have a headache?	Yes	258	18.9
	No	1104	81.1
	Total	1362	100.0
Does light or noise bother you when you have a headache?	Yes	868	63.7
	No	494	36.3
	Total	1362	100.0
Does headache limit any of your physical or intellectual activities?	Yes	890	65.3
	No	472	34.7
	Total	1362	100.0
Total score	X ± SD = 2.29 ± 1.4		
	< 4	1047	76.9
	> 4	315	23.1
	Total	1362	100.0

performance while more than half of them had an excellent performance but cases with grade IV disability 6.87% had fair achievement and more than half ranging from good and very good. There is a negative correlation between the degree of disability and academic performance; the decrease in the degree of disability is associated with higher academic performance ( $R = -0.118$   $P = .041$ ).

## Discussion

The present study was conducted on medical students and intern doctors from five different universities in Egypt. Google forms was used to structure and distribute the questionnaire. This is the first multicentric study in Egyptian universities to evaluate the prevalence of migraine, associated disability, and psychological distress—based on self-report. The curricula in the Faculty of Medicine demand continuous effort, hard work, and concentration; so evaluating and managing headache among medical students is critical.

In the present study, 281 (17.27%) of 1,627 medical students and intern doctors were established as migraineurs based on ICHD-3. This was similar to a recent Egyptian study conducted in one university—which reported migraine among 17.9% of medical students [5]. Migraine prevalence in this study is close to another study in Brazil with migraine prevalence 22% [12].

The prevalence of migraine was so variable among international studies on university students. Some studies

reported lower prevalence as 14.1% in Nigeria [13], 13.1% in Southeast Nigeria [14], 12.6% in Turkey [15], 12.2% in Oman [16] and 7.14% in the Southeast of Iran [17]. While other studies reported higher prevalence as 40.2% in Sao Paulo, Brazil [18]; 38.3% in Peshawar, Pakistan [19].

Many studies have found that migraine is more common among university students than in the general population, because of their young ages and stressful academic lives [20]. In addition, most of the participants of questionnaire were females with higher prevalence of headache generally and migraine especially. Also, this study was conducted during stressful periods (midterms and the end of clinical rounds) with more students experiencing migraine attacks.

For migraine prevalence, a higher prevalence was reported among females than males (76.86%, 23.13% respectively) which was in agreement with the literature and previous studies [13, 21, 22]. This could be attributed to hormonal differences related to menstrual cycles, a condition referred to as estrogen-withdrawal headache by the International Classification of Headache Disorders (ICHD) [1]. Estrogen stimulates the synthesis and release of NO and calcitonin gene-related peptide, which activates and transmits pain signals to the trigeminal nerve, resulting in migraine. Furthermore, estrogen may cause neuronal excitation and migraine by causing an imbalance in Mg<sup>2+</sup> and Ca<sup>2+</sup> levels [23].

The results of this study showed that 34.87% of migraineur students have positive family history of

**Table 3** Questions related to those diagnosed as migraine (n = 301)

Items		n	%
(1) Did you experience $\geq 5$ attacks of headache in the last year?	Yes	281	93.4
	No	20	6.6
	Total	301	100.0
(2) Number of attacks (per month)	1–4	116	38.5
	5–9	53	17.6
	> 10	52	17.3
	Unknown	80	26.6
	Total	301	100.0
(3) Duration (hours)	Less than 4 h	10	3.3
	4–72 h	167	55.5
	More than 72 h	124	41.2
	Total	301	100.0
(4) Intensity	mild	25	8.3
	moderate to severe	276	91.7
	Total	301	100.0
(5) Character of headache	Pulsating	284	94.4
	Burning	7	2.3
	Unknown	10	3.3
	Total	301	100.0
(6) Site of pain	Unilateral	223	79.35
	Bilateral	78	27.7
	Total	301	100.0
(7) Did your headache interference of daily activity (studying, walking or climbing stairs)	Yes	280	93.02
	No	21	6.97
	Total	301	100.0
(8) Association with headache	No	14	4.65
	Nausea or vomiting	98	32.55
	Photophobia or phonophobia	189	62.8
	Total	301	100.0
(9) Did you experience Aura	Yes	94	31.2
	No	207	68.8
	Total	301	100.0
(10) If you answered yes which type of aura?	Visual	75	79.7
	Aphasic	5	5.3
	Motor	14	14.89
	Total	94	100.0

migraine. Ghorbani et al. reported a lower percentage (20.6%) [24], while another study reported a higher percentage (72%) [15]. This could be justified by the study of Bigal et al. which revealed that personal or family economic status may contribute to migraine attacks due to financial stress in patients without the strong influence of genetic factors [25].

This study revealed that 38.5% of migraineur students experienced 1–4 attacks per month, 55.5% with duration last from 4 to 72 h, most of them (91.7%) with moderate to severe in the intensity, 94.4% was pulsating, 79.35%

was unilateral, 93.2% interfered with daily activity. These results are consistent with the study of Kurt et al. [26].

This study found that most of migraineurs experienced migraine without aura (68.8%) and it is consistent with a previous study which reported that 63.9% had migraine without aura, 17.9% had migraine with aura, and 13.1% had migraine both with and without aura [27]. In consistent with many other studies, 31.2% of migraineurs experienced aura mostly in the form of visual disturbances (79.7%) [24, 28, 29]. However, inaccurate diagnosis of aura symptoms may be a serious issue in both clinical

**Table 4** Socio-demographic characteristics of those diagnosed with migraine (n = 281)

Characteristics		n	%
Gender	Male	65	23.13
	Female	216	76.86
	Total	281	100
Marital status	Single	273	97.15
	Married	8	2.85
	Widow	0	0
	Total	281	100
Living place	Rural	103	36.65
	Urban	178	63.35
	Total	281	100
Academic grade	1st grade	15	5.4
	2nd grade	41	14.6
	3rd grade	43	15.3
	4th grade	65	23.13
	5th grade	40	14.23
	6th grade	65	23.13
	Intern doctors	12	4.3
	Total	281	100
Academic performance	Faire	21	7.5
	Good	56	19.9
	V. good	77	27.4
	Excellent	127	45.2
	Total	281	100
Smoking	Yes	9	3.20
	No	272	96.8
	Total	281	100
Family history of migraine	Yes	98	34.87
	No	183	65.12
	Total	281	100

**Table 5** The frequency distribution of the main triggering factors of migraine

Triggering factor	Percentage
Sleep disturbance	94.4
Anxiety	81.4
Emotional upset	80.1
Studying for exams	79.7
Noise	73.8
Intense light	62.8
Physical activity	50.2
Eating habit	33.2
Menstruation	29.9

and population-based studies as aura symptoms can be difficult to describe. The current study's retrospective nature may introduce bias due to recall issues with aura symptoms [30].

The most triggering factors of migraine were sleeping disturbances (94.4%), anxiety (81.4%), emotional upset (80.1%), and studying for exams (79.7%). Sauro et al. have suggested that stress can not only trigger an acute attack, but also predispose to migraine [31]. Another study examined the relationship between stress and migraine in a longitudinal and bidirectional manner, indicating that stress is a risk factor for migraine [32]. Furthermore, patients with primary chronic headache, including tension type headache and migraine, reported a significant increase in stressful life events in the year preceding the onset of headache [33].

These findings may be explained by the fact that the hypothalamic-pituitary-adrenocortical axis is stimulated in response to stress, resulting in the activation of corticotrophin releasing hormone and, as a result, changes in serotonin receptors. This causes degranulation of mast cells near the trigeminal nerve endings, resulting in the release of vasoactive and inflammatory mediators that cause migraine [34, 35].

In contrast, studies in Africa in particular, reported sun and heat exposure as the most significant triggering factors for migraine [36, 37]. In this study, menstruation was reported as a triggering factor in 29.9 percent of female students, which was slightly higher than other studies that reported proportions ranging from 10 to 19% [16, 26, 38]. Differences in triggering factors may explain some of the disparities in migraine prevalence between developed and developing countries.

An important finding of this study was that migraineurs had higher psychological stress levels (89.65%). This finding is consistent with earlier findings from international research on medical students [17, 21, 39, 40]. Emotional stress, anxiety, poor lifestyle, and other risk factors for headache among medical students were found to be significant. The high degree of psychological distress they endure is a result of exams, high-level performance, and many years of study and training are all risk factors [39]. Lipton et al. found that the stress levels were not generally associated with migraine occurrence. However, stress reduction from one day to the next is linked to migraine onset the next day [41]. Hashizume et al. discovered that increased stress of daily annoyances had no significant impact on the intensity of migraine [42]. These partially contradictory outcomes can be explained by the varying ages of the subjects, the sample size, or the application of different stress scales.

On studying correlation of psychological distress and different characteristics of the migraineurs, female

**Table 6** Logistic regression analysis of potential predictors of psychological distress in patients with migraine (n = 281)

Variables		Psychological distress				OR 95% CI	P-value
		Low (n = 29)		High (n = 252)			
		n	%	n	%		
Gender	Male	11	37.9	54	21.4	1	.047*
	Female	18	62.1	198	78.6	2.37 (1.01–5.57)	
Marital status	Single	29	100	244	96.83	1	.999
	Married	0	0	8	3.17	116,066	
Living place	Rural	13	44.83	90	35.71	1	.998
	Urban	16	55.17	162	64.29	1.14 (0.447–2.65)	
Family history	No	21	72.4	162	64.3	1	.764
	Yes	8	27.6	90	35.7	1.14 (0.489–2.65)	
Smoking	No	29	100	243	96.4	1	.999
	Yes	0	0	9	3.6	2150	
Academic grade	1st grade	0	0	15	5.95	1	.393
	2nd grade	5	17.2	36	14.28	0.00	
	3rd grade	4	13.8	39	15.48	0.00	
	4th grade	9	31.03	56	22.22	0.00	
	5th grade	7	24.13	33	13.1	0.00	
	6th grade	3	10.34	62	24.6	0.00	
	Intern doctors	1	3.45	11	4.36	0.00	
Academic performance	Faire 21	2	6.89	19	11.5	1	.176
	Good 56	2	6.89	54	21.42	2.61	
	V. good 77	7	24.13	70	27.8	1.38	
	Excellent 127	18	62.1	109	43.25	0.813	

p: p value for comparing between the studied groups; \*statistically significant at  $p \leq 0.05$

gender has positive correlation with psychological stress. This could be attributed to the fact the females have a higher prevalence of psychiatric disorders due to hormonal and serotonin effects [43, 44]. Furthermore, the Arab Community places greater limits on girls' actions than on boys' and has lower expectations for females' competences and achievements [45].

The Migraine Disability Assessment questionnaire (MIDAS) could be used to assess the impact of migraine on the lives of medical students; by asking about days of activity limitations in work or scholastic performance, household work, and social, family, and leisure activities [11].

In this study, 19.9% and 56.9% of medical students with migraine had moderate to severe disability respectively. In a previous study on Egyptian medical students, 37.2 percent and 23 percent of medical students with migraine had moderate and severe disability respectively [5]. In the Balaban et al. study, the MIDAS scoring was 19.3 percent for moderate disability and 22 percent for severe disability [15]. As a result, our medical students were more disabled because of their migraines.

Migraine is one of the top diseases causing disability. Since its inclusion in Global Burden of Diseases (GBD), migraine has risen through the ranks of the top causes of Years Lived of Disability (YLDs) worldwide, from 19th in GBD 2000 [46] to sixth in GBD 2013 [47]. Steiner et al. reported that migraine is the third cause of disability under 50 s [48]. This persistent rise does not imply an increase in prevalence, it follows the collection and incorporation of all data into GBD and improved data with new population-based studies [49].

In this study, there was a significant positive correlation between migraine and low academic performance in medical students which was also observed in other studies [25]. It is possible that proper headache management improves students' academic performance [40].

One of the study's limitations was the use of self-reported questionnaires for data collection, which were prone to recall bias. Another limitation was that the study was cross-sectional, which demonstrated the relationship between variables without concluding a cause-effect relationship. Longitudinal studies should be encouraged to determine the relationship between variables.

**Table 7** Relation between basic characteristics and migraine disability (Total = 281)

Variables	Migraine disability								P-value	
	Grade I = 29		Grade II = 36		Grade III = 56		Grade IV = 160			
	n	%	n	%	n	%	n	%		
Gender	Male	10	34.5	7	19.4	18	32.14	30	18.75	.083
	Female	19	65.5	29	80.6	38	67.86	130	81.25	
Marital status	Single	29	100	36	100	54	96.43	154	96.25	.478
	Married	0	0	0	0	2	3.57	6	3.75	
Living place	Rural	11	37.9	7	19.4	20	35.71	65	40.6	.126
	Urban	18	62.1	29	80.6	36	64.29	95	59.4	
Family history	No	21	72.4	25	69.4	38	67.86	99	61.87	.593
	Yes	8	27.6	11	30.6	18	32.14	61	38.13	
Smoking	No	27	93.1	36	100	52	92.86	157	98.13	.103
	Yes	2	6.9	0	0	4	7.14	3	1.87	
Academic grade	1st grade	1	3.45	1	2.8	3	5.36	10	6.25	.467
	2nd grade	4	13.8	9	25	4	7.14	24	15	
	3rd grade	4	13.8	5	13.8	8	14.29	26	16.25	
	4th grade	6	20.7	9	25	18	32.14	32	20	
	5th grade	8	27.6	6	16.7	5	8.93	21	13.13	
	6th grade	5	17.2	6	16.7	14	25	40	25	
	Intern doctors	1	3.45	0	0	4	7.14	7	4.375	
Academic performance	Faire	0	0	7	7.3	3	6.81	11	6.87	.05*
	Good	8	27.6	5	14.6	9	20.45	34	21.25	
	V. good	5	17.24	8	31.7	6	13.63	58	35.25	
	Excellent	16	55.17	16	46.3	38	59.1	57	35.62	

p: p value for comparing between the studied groups; \*statistically significant at  $p \leq 0.05$

## Conclusion

Migraine is prevalent among medical students, with a female predominance. It is associated with high level of psychological stress and moderate to severe disability with impact on lifestyle and academic performance of the students.

## Recommendations

The Faculty of Medicine should conduct student-led campaigns to raise awareness of the high prevalence of migraine, its diagnosis, and its impact on academic performance. Stress management programs should be developed so that students can learn the proper methods of stress relief. We also recommend assessment of depression and anxiety among Egyptian migraine students as it could be an area of further research.

## Abbreviations

GBD	Global Burden of Diseases
ICHD-3	International Classification of Headache Disorders-3rd edition
K-10	Kessler Psychological Distress Scale
MIDAS	Migraine Disability Assessment questionnaire

MS-Q Migraine Screen Questionnaire  
YLDs Years Lived of Disability

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Not applicable.

## Author contributions

AE, HE, AS, NN and YE were concerned with data collection from different universities, NZ did the statistical analysis of the data, SR and SE were the major contributor of writing manuscript and AE participated in data analysis and final editing of the paper. All authors read and approved the final manuscript.

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## Availability of data and materials

The data will be available on the editor request through communication with the corresponding author.

## Declarations

### Ethics approval and consent to participate

The study was approved by the ethical review board in faculty of medicine, Kafrelsheikh University. Approval code: MKSU 46-12-21. Each participants gave a virtual consent before submitting their response.

### Consent for publication

Not applicable.



**Competing interests**

The authors declare that they have no competing interests.

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