



## Prevalence and risk factors of migraine headache among university students: A cross-sectional study in Lebanon

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### Abstract

#### Background

Migraine constitutes a major public health concern since it negatively affects both the quality of life and the productivity of patients. Migraine among students can cause impaired academic performance and limit their daily activities.

#### Objective

This study aims to assess the prevalence of migraine among university students using the ID Migraine screening tool and to evaluate risk factors associated with migraine.

#### Methods

A cross-sectional study was performed over a period of six months targeting 1144 university students recruited from the different faculties.

#### Results

Migraine was suggested in 35.8% of subjects based on ID-Migraine. Migraine prevalence was significantly higher among women (42% versus 23.3% of men). After adjusting for covariates, women, daily coffee consumption, having unorganized meals, eating fast food and fasting were the main predictors of migraine. Almost 41% of migraine students had a family history of migraine and only 26.7% sought medical help. Interestingly, most of the migraine students (84.8%) took headache medications without referring them to their doctor.

#### Conclusion

Recognizing headache risk factors among migraine students and adopting lifestyle changes accordingly can be an effective strategy to prevent the chronification of the attacks, decrease headache frequency and improve patients' quality of life.



## Introduction

Headache disorders represent a major public health concern since it negatively affects both the quality of life and productivity of patients.<sup>1</sup> It is experienced by up to 75% of adults worldwide and often is underdiagnosed or mistreated.<sup>1</sup> Comorbidities that can be associated with headaches and cause a short and long-term reduction in the quality of life include disorders such as back pain, anxiety, and depression.<sup>2</sup>

Migraine patients often have an increased sensitivity of the brain, known as sensitization, which can be triggered by external and internal stimuli.<sup>3,4</sup> These stimuli are known as headache precipitating factors or triggers that can differ between patients and throughout different headache attacks.<sup>5</sup> The main reported headache triggers are stress, the beginning of the menstrual cycle in women, hunger, changes in the weather, a lack of sleep, strong scents such as perfumes, neck pain, light, alcohol, smoking, sleeping late, heat, certain foods, heavy exercise and sexual activity.<sup>6,7</sup>

Diagnostic criteria have been developed to facilitate migraine diagnosis and management. These have allowed studies to achieve comparable statistics on the prevalence, incidence, and course of diseases.<sup>8</sup> Particularly, the introduction of “explicit diagnostic criteria for headache syndromes” in 1988 by the International Headache Society (IHS) was a cornerstone in migraine assessment.<sup>8</sup> Accordingly, the three-item Identification of Migraine (ID Migraine), a brief self-administered screening test, was developed and validated as a practical tool to diagnose possible migraine cases.<sup>9</sup>

Previous studies reported a higher prevalence of migraine among women<sup>10</sup> and adults between 20 and 65 years of age.<sup>11</sup> Moreover, several studies conducted in university settings showed a varying prevalence of migraine among students, particularly medical students.<sup>12,13</sup> In Lebanon, a recent study found that 12.1% of medical students suffered from migraine.<sup>14</sup> Nonetheless, the extrapolation of these findings may differ between students and therefore cannot be applied to non-medical university students.

Migraine among students is associated with impaired academic performance and limited daily activities.<sup>15</sup> It can affect their quality of life given the constant concentration, exams, academic demands and efficient knowledge acquisition given that migraine students tend to skip more classes compared to their colleagues.<sup>16</sup> Therefore, this

study aims to calculate the prevalence of migraine among students in the Lebanese University using the ID Migraine screening tool and to investigate risk factors associated with migraine.

## Methods

### Study design

An observational cross-sectional study was carried out over a period of six months between January and June 2018 targeting students enrolled during the academic year 2017/2018 in the faculties of the Lebanese University campus in Beirut. Data were collected using a survey developed after an extensive literature review.

### Sample size calculation and distribution

Epi-info was used to calculate the required sample size, using the following equation:

$$N = \frac{(Z_{1-\alpha/2})^2 p(1-p)}{d^2}$$

where Z is a standard normal variate ( $Z_{1-\alpha/2} = 1.96$  at 95% confidence interval), d is the absolute accuracy or precision (5% margin of error), p is the expected proportion of the population with a specific outcome and was set at 0.279 taking into consideration data from a study carried out in Kuwait University that used the same tool for migraine assessment.<sup>17</sup> This yielded a necessary sample size of 1236 participants to be able to detect the prevalence of migraine among university students. Stratified sampling was done according to proportional allocation. Students were grouped into nine strata based on the nine faculties from the same campus of the Lebanese University. Each Faculty (stratum) is then sampled as an independent sub-population from which students were randomly selected at a frequency that mimicked the distribution of students in the different faculties: Faculty of Sciences (39.4% vs. 37.6%), Faculty of Law (18.2% vs. 21.4%), Faculty of Business (19.4% vs. 19.8%), Faculty of Fine arts (6.0% vs. 5.5%), Faculty of Engineering (5.1% vs. 4.8%), Faculty of Public health (4.2% vs. 3.8%), Faculty of Dentistry (2.9% vs. 2.7%), Faculty of Medicine (2.2% vs. 2.3%) and Faculty of Pharmacy (2.6% vs. 2.1%).

### Data collection



Data were collected using a uniform survey through face-to-face interviews. It was developed after a literature review taking into consideration two experts' opinions. Interviews were performed during the academic time and data completion took on average 16 minutes per participant. The survey included questions about the general characteristics of the participants (age, sex, marital status, governorate of residence, faculty, academic year, availability and type of medical coverage (public or private insurance) and overall academic satisfaction (high, moderate, or low satisfaction)).

### Risk factors associated with having migraine

All participants were asked to provide information concerning their lifestyle habits such as alcohol consumption, cigarettes or shisha smoking. Moreover, the survey collected students' dietary data including daily coffee drinking, meal patterns (organized and unorganized), and the consumption of food rich in specific ingredients (carbohydrates, fat, vegetables/fruits, spices, fast food, and dairy products). To allow the classification of the types of food, students were given 3 examples for each type. Behavioral information was also provided including fasting [never, sometimes (1-3 times/ week) and often (>3 times/ week)], long-time sun exposure, and wearing tight clothes [never, sometimes (1-3 times/week) and often (>3 times/ week)]. Fasting was defined as skipping one of the main meals, not eating for more than 6 hours or fasting during Ramadan month (approximately 12 hours). Long-time sun exposure was defined as daily sunshine exposure for more than 2.5 hours reported to be the average sun exposure of university students.<sup>18</sup> Tight clothes were defined as tight pants or jeans, including workout leggings or skinny jeans and were reported to be a triggering factor of migraine attacks.<sup>19</sup>

### ID-migraine screener

A stepwise initial evaluation was conducted. Students having two or more headaches in the last 3 months were considered those with potentially troublesome headaches. Afterward, those subjects were asked the three-item ID screener (Available in English<sup>20</sup> and validated in Arabic<sup>21</sup>) if they gave at least one positive answer to these questions: "Do you have headaches that limit your ability to study or enjoy life?", and "Do you want to talk to your healthcare professional about your headaches?" A diagnosis of a high probability of migraine was considered if the student had at least two positive answers to these questions: During the last 3 months, 1. did you feel nauseated or sick in your stomach with your headaches? 2. Did light bother you

when you had a headache (a lot more than when you do not have headaches)? 3. Did your headache limit your ability to work, study or do what you needed to do for at least 1 day? A diagnosis of migraine required at least two positive responses.

### Clinical characteristics of headaches episodes

Probable migraine students were then asked about the clinical aspects of their headache including the number of headache episodes per month and duration of each episode, time (morning, midday, evening, or anytime), and patterns of headache (sudden or progressive). The severity of the headache was assessed through a four-point scale where 0=no headache; 1=mild headache; 2=moderate headache; 3=severe headache. This scale is recommended for use in migraine research by the International Headache Society.<sup>22</sup> In addition, the survey collected information regarding having a family history of migraine, seeking medical help, receiving or not a treatment and compliance with the prescribed treatment. Furthermore, students were asked if they take analgesics without referring to their doctor to manage their pain. The survey and the ID screener were available in both English and Arabic and were piloted on 30 students to clarify any misunderstanding or lack of clarity.

### Statistical analysis

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS Inc, Chicago, Illinois) Version 27. Continuous variables (age, number of headache episodes per month and duration of each episode) are presented using means and standard deviations, whilst categorical variables are presented using frequencies and percentages. Bivariate analyses were conducted taking the characteristics and risk factors of migraine as independent variables and the migraine status of the student as the dependent variable. In addition, a bivariate analysis was conducted to assess the association between the general and clinical characteristics of migraine among students and sex (dichotomous). The Chi-square/Fisher exact test was used to compare percentages between associate categorical variables. The unpaired student t-test/ Mann-Whitney test was used for the comparison of data between two different groups. A multivariate analysis using a logistic regression model was performed to assess the predictors of migraine among university students producing Odd Ratios with 95% CI. Risk factors variables were only selected if they had p-values <0.20 in bivariate analyses. A p-value <0.05 was considered statistically significant.



### Ethical considerations

This study used a survey for data collection without any type of invasive procedures or intervention. The study protocol, survey and consent form were reviewed and approved by the institutional review board of the faculty of pharmacy of the Lebanese University on November 14, 2017. Data were completely anonymous and non-identifiable; storage of data follow-up university general data protection regulation guidelines and written informed consent was obtained from each student together with official approval from the rectorate and the deans/ principals of the different faculties included after reviewing the study protocol and tool. They were also informed that they could withdraw their participation at any point during the interview. At the end of the interview, students were informed about the results of the screening, and in the case of probable migraine, they were advised to seek medical care for validation. Findings were considered for research purposes only and no financial incentives were provided.

## Results

### General characteristics of the sample

In total 1284 students were approached out of which 1144 were included based on the previously defined criteria (89.1%). The sample included more women (N=765, 66.9%) than men (N=379, 33.1%) comparable to the gender distribution in the university<sup>23</sup> (69.8% women and 30.2% men). The mean age of the sample was 20.2 ± 2.8 years. The majority of the students were in their first or second year of study (N=733, 64.6%) followed by those in the third or fourth year (N=293, 25.8%) and only 109 (9.6%) were in their fifth year or more. According to the ID-migraine definition, 410 students (35.8%) were diagnosed with migraine. Table 1 compares the general characteristics of migraine to non-migraine students. Statistically significant differences were noted in terms of sex and faculty attended with the predominance of women in the migraine group (N=321, 78.3%) compared to a lower percentage in the non-migraine group (N=444, 60.5%; p<0.001) and a lower percentage of those with migraine attending the faculty of sciences and law (37.3% and 11.5% respectively) in comparison with non-migraine students (42.4% and 21.9% respectively; p=0.002). Nevertheless, no significant differences were reported in terms of age, academic year, medical coverage, and academic satisfaction (p>0.05).

**Table 1.** Distribution of the general characteristics of migraine students in comparison to non-migraine students

Variables	Migraine Students		Non-migraine students		p-value
	Frequency	Percentage	Frequency	Percentage	
<b>Sex</b>	(N=410)		(N=734)		
Man	89	21.7%	290	39.5%	<0.001
Woman	321	78.3%	444	60.5%	
<b>Age (Mean ± standard deviation)</b>	20.3 ± 2.6		20.2 ± 2.9		0.694
<b>Faculty attended</b>	(N=410)		(N=734)		
Sciences	174	37.3%	277	42.4%	0.002
Law	47	11.5%	161	21.9%	
Business	89	21.7%	133	18.1%	
Fine arts	29	7.1%	40	5.4%	
Engineering	19	4.6%	39	5.3%	
Public health	22	5.4%	26	3.5%	
Dentistry	9	2.2%	24	3.3%	
Medicine	9	2.2%	16	2.2%	
Pharmacy	12	2.9%	18	2.5%	
<b>Academic year</b>	(N=406)		(N=729)		
1-2	251	61.8%	482	68.1%	0.312
3-4	115	28.3%	178	24.4%	
>4	40	9.9%	69	9.5%	
<b>Medical coverage</b>	(N=387)		(N=683)		
Public insurance	218	56.3%	390	57.1%	0.564
Private insurance	102	26.4%	191	28%	
None	67	17.3%	102	14.9%	
<b>Academic satisfaction</b>	(N=402)		(N=716)		
High	248	61.7%	475	66.3%	0.268
Moderate	113	28.1%	172	24%	
Low	41	10.2%	69	9.6%	

Results given in terms of frequency (percentage) or mean ± standard deviation.

### Migraine prevalence and characteristics of migraine episodes

Table 2 shows the prevalence of migraine among students in the Lebanese University, by gender and age group. It also displays the characteristics of migraine episodes such as the number of headache episodes per month, the average duration of each episode and their severity. Migraine was significantly more prevalent among women compared to men (respectively 42% (N=321) and 23.5% (N=89), p<0.001). The mean age of migraine students was 20.3 ± 2.6 years with an average of 7.6 ± 9.6 episodes per



month. The majority of the sample had moderate (61.9%) and severe (32.6%) pain with a higher onset during midday (37.8%). There was no significant difference between men and women as regard age, the number of onsets, duration of the migraine, and the severity and time of the headache ( $p > 0.05$ ). Moreover, no statistically significant differences in the prevalence of migraine were noted when distributed by academic year (Years 1-2, 34.2%; Years 3-4, 39.2%; More than 4, 36.7%;  $p = 0.312$ ).

**Table 2.** Distribution of the general and clinical characteristics of migraine

Variables	Total	Men	Women	p-value
<b>Prevalence of migraine</b> (N=1144)	410 (35.8%)	89 (23.5%)	321 (42%)	<b>&lt;0.001</b>
<b>Age (years)</b> (N=404)	20.3 ± 2.6	20.6 ± 2.2	20.2 ± 2.7	0.144
<b>Number of headache episodes per month</b> (N=338)	7.6 ± 9.6	8.9 ± 13.9	7.3 ± 8.1	0.182
<b>Average duration of each episode (hours)</b> (N=279)	7.8 ± 11.3	7.2 ± 11.8	7.9 ± 11.2	0.641
<b>Severity of headache (N=397)</b>				
Mild	22 (5.5%)	5 (5.8%)	17 (5.5%)	0.949
Moderate	246 (61.9%)	52 (60.5%)	194 (62.4%)	
Severe	129 (32.6%)	29 (33.7%)	100 (32.2%)	
<b>Time of headache (N=400)</b>				
Morning	27 (6.7%)	9 (10.6%)	18 (5.7%)	0.290
Midday	151 (37.8%)	32 (37.6%)	119 (37.8%)	
Night	90 (22.5%)	21 (24.7%)	69 (21.9%)	
Anytime	132 (33%)	23 (27.1%)	109 (34.6%)	
<b>Headache attack (N=400)</b>				
Sudden	204 (51%)	37 (43.5%)	167 (53%)	0.121
Progressive	196 (49%)	48 (56.5%)	148 (47%)	

Results given in terms of frequency (percentage) or mean ± standard deviation.

Almost 41% of migraine students had someone in the family with a history of migraine. Out of the 410 students, 132 (32%) think they have migraine and 109 (26.7%) sought medical help. More than half of students seeking medical assistance were diagnosed with migraine (N=54, 59.3%). Interestingly, almost 85% of migraine students took headache medications without referring their doctor with paracetamol as the main analgesic (N=306, 81.2%) (Table 3).

**Risk factors associated with migraine**

Table 4 displays the comparison between the two groups as regards risk factors (lifestyle characteristics and dietary

habits) associated with migraine. Among migraine students, cigarette smokers (N=32, 7.8%) were significantly less than those non-migraine students (N=106, 14.4%;  $p = 0.004$ ).

**Table 3.** Medical and behavioral characteristics of migraine students

Questions	N (%)
Family history of migraine? (N=406)	166 (40.9%)
Do you think you have a migraine? (N=410)	131 (32.0%)
Did you seek medical help? (N=408)	109 (26.7%)
Did the doctor diagnose you with migraine? (N=91)	54 (59.3%)
Did the doctor prescribe you a treatment for migraine? (N=106)	69 (65.1%)
Did you take the prescribed medications? (N=65)	52 (80.0%)
Do you take headache medications without referring them to the doctor? (N=401)	340 (84.8%)
Do you take Paracetamol without referring to the doctor for your headache? (N=377)	306 (81.2%)
Do you take NSAIDs without referring to the doctor for your headache? (N=376)	172 (45.7%)

Results are given in terms of frequency (percentage); NSAIDs: Non-steroidal anti-inflammatory drugs

**Table 4.** Risk factors associated with migraine in both migraine and non-migraine students

Variables	Migraine Students (N=410)		Non-migraine students (N=734)		p-value
	Frequency	Percentage	Frequency	Percentage	
Cigarettes smoking	32	7.8%	106	14.4%	0.004
Shisha smoking	91	22.2%	163	22.3%	0.987
Alcohol consumption	35	8.5%	82	11.2%	0.158
Daily coffee drinking	346	84.4%	570	77.7%	0.006
Organized	98	23.9%	233	31.7%	0.005
Unorganized	312	76.1%	501	68.3%	
Carbohydrate-rich food	178	43.4%	276	37.6%	0.054
Fat-rich food	58	14.1%	110	15%	0.700
Vegetables/fruits-rich food	184	44.9%	327	44.6%	0.915
Spices-rich food	115	28%	165	22.5%	0.036
Fast-food consumption	141	34.4%	200	27.2%	0.011
Dairy products consumption	142	34.6%	264	36%	0.651
Having a dietary regimen	70	17.1%	100	13.6%	0.116
<b>Fasting</b>					
Never	38	9.3%	111	15.1%	0.019
Sometimes	211	51.5%	353	48.1%	
Often	161	39.2%	270	36.8%	
Long-time sun exposure	139	33.9%	269	36.6%	0.352
<b>Wearing tight clothes</b>					
Never	246	60%	497	67.7%	0.027
Sometimes	103	25.1%	142	19.3%	
Often	61	14.9%	95	12.9%	



However, significant higher percentage of migraine students were daily coffee drinkers (84.4% vs. 77.7%;  $p=0.006$ ), had unorganized meals (76.1% vs. 68.3%;  $p=0.005$ ), consumed spices-rich food (28% vs. 22.5%;  $p=0.036$ ), fast-food more than two times per week (34.4% vs. 27.2%;  $p=0.011$ ), fasted consistently (39.2% vs. 36.8%;  $p=0.019$ ) and wore sometimes tight clothes (25.1% vs. 19.3%;  $p=0.027$ ).

After adjusting for covariates, the odds of having migraine are 2.38 times higher in women compared to men (OR 2.38; CI 1.79-3.20;  $p$ -value $<0.001$ ) and 1.50 times higher in students that drank coffee on daily basis compared to non-drinkers (OR 1.50; CI 1.08-2.08;  $p=0.016$ ). In addition, the odds of a university student having a migraine is 1.44 times higher among those having unorganized meals in comparison to those with organized meals pattern (OR 1.44; CI 1.08-1.91;  $p=0.012$ ) and 1.36 times higher in students consuming fast foods more than twice a week (OR 1.36; CI 1.04-1.79;  $p=0.025$ ). Fasting was reported as a significant predictor of having migraine considering that 1.68 higher odds were noted among students fasting consistently (OR 1.68; CI 1.09-2.57;  $p=0.018$ ) and 1.56 higher odds among those fasting sometimes (OR 1.56; CI 1.03-2.37;  $p=0.035$ ) in comparison to students who never fasted (Table 5).

**Table 5.** Predictors of migraine among Lebanese university students

Variables	Unadjusted model		Adjusted model	
	OR [95% CI]	p-value	OR [95% CI]	p-value
Woman (man as reference)	2.36 [1.79-3.11]	<b>&lt;0.001</b>	2.38 [1.79-3.20]	<b>&lt;0.001</b>
Cigarettes smoking	0.52 [0.35-0.77]	<b>0.001</b>	-	-
Alcohol consumption	0.74 [0.49-1.13]	0.160	-	-
Daily coffee drinking	1.56 [1.13-2.14]	<b>0.007</b>	1.50 [1.08-2.08]	<b>0.016</b>
Unorganized Meals (Organized as reference)	1.48 [1.12-1.95]	<b>0.005</b>	1.44 [1.08-1.91]	<b>0.012</b>
Carbohydrate-rich food	1.27 [0.99-1.63]	0.054	-	-
Spices-rich food	1.34 [1.02-1.77]	<b>0.036</b>	-	-
Fast-food consumption	1.40 [1.08-1.81]	<b>0.011</b>	1.36 [1.04-1.79]	<b>0.025</b>
Having a dietary regimen	1.31 [0.94-1.82]	0.116	-	-
Fasting (Never as reference)				
Sometimes	1.75 [1.16-2.62]	<b>0.007</b>	1.56 [1.03-2.37]	<b>0.035</b>
Often	1.74 [1.15-2.65]	<b>0.009</b>	1.68 [1.09-2.57]	<b>0.018</b>
Wearing tight clothes (Never as a reference)				
Sometimes	1.47 [1.09-1.97]	<b>0.011</b>	-	-
Often	1.29 [0.91-1.85]	0.152	-	-

\* Diagnosis as migraine students according to the ID screener with

baseline answer "no" \*\*OR: Odds Ratio; CI: Confidence interval \*\*\*omnibus test ( $p<0.001$ ), Nagelkerke r square (0.077), Hosmer & Lemeshow ( $p=0.383$ )

## Discussion

The present study targeted students registered in different faculties of the Lebanese University. To date, it is the first university survey assessing the prevalence of migraine based on self-reports among medical and non-medical university students. A high migraine prevalence was noted in the study sample, significantly greater among women. Several predictors for migraine were assessed and significant associations were identified including daily coffee drinking, meal patterns, fasting and fast-food regular consumption.

According to ID-migraine, 410 students (35.8%) had a high probability of having migraine in agreement with a nationwide survey in Italy using the same tool where the prevalence of definite migraine was 40%.<sup>24</sup> However, this prevalence is higher than the one observed among a sample of medical students in the Lebanese university in a study recently published (12.1%).<sup>25</sup> A systematic review assessing the epidemiology of migraine in the Arab countries concluded a prevalence range of 12.2% and 27.9% among students<sup>26</sup>, with a much higher prevalence among women (61.8%).<sup>12</sup> Part of the difference can be due to the fact that the majority of the approached students were women (66.9%) with a significantly higher prevalence of migraine (42%) in comparison to men (23.3%) in addition to the significant differences in the prevalence of migraine among students from different fields ( $p=0.002$ ).

When comparing both groups, more migraine students were daily coffee drinkers ( $p=0.006$ ) in coherence with a cross-sectional study<sup>27</sup> conducted in Burkina Faso in 2021 caffeine has been linked to migraine both as a trigger and a headache relief agent since caffeine overuse may lead to migraine aggravation and sudden withdrawal may trigger the attacks.<sup>28</sup> Having unorganized meal patterns was one of the significant predictors of having migraine since those with unorganized meals had 1.44 times higher odds of being diagnosed as migraine patients in comparison to those with an organized pattern. In agreement, a case-control study in 2010 reported a significantly larger proportion of migraine patients had irregular diet programs and irregular meal schedules.<sup>29</sup> Furthermore, our study showed that those consuming fast food more than twice a week had 1.36 times higher odds of being diagnosed with migraine, in consistence with a review tackling dietary considerations in migraine management given that fast food



consumption may trigger attacks due to the negative impact of excessive snacking, quality, crowded eating-environment, food acquisition and lack of socializing during meals.<sup>30</sup> The international headache society acknowledged the effect of fasting as a migraine precipitant where the likelihood of headache attacks increases with the duration of the fast.<sup>31</sup> In accordance, our study reported that the more frequent fasting periods were the greater the odds of a student being diagnosed with migraine in comparison to those who did not fast.

As regards the clinical patterns of migraine, the average reported number of migraine days per month was  $7.6 \pm 9.6$  with no significant association with the sex of the students in contrast with a study in 2018 where migraine frequency was higher among men.<sup>32</sup> Most of the migraine students had moderate (61.9%) and severe (32.6%) pain in comparison with a cross-sectional study carried out in Kuwait among medical students where 57% and 28.3% of students had a moderate and severe intensity of pain respectively.<sup>33</sup> In our study, a higher onset was reported during midday and night in coherence with the temporal patterns of migraine reported in a cross-sectional infodemiology study with the highest peak observed at 22h.<sup>34</sup> No differences in the clinical distribution of migraine were identified in terms of sex in agreement with the Kuwait study. Nevertheless, in contrast with the same study, no statistically significant differences were observed in terms of the academic year.<sup>35</sup>

Almost 41% of migraine students had a family history of migraine in agreement with the findings of a cross-sectional study published in 2020 where family history was significantly correlated with an earlier age at onset.<sup>36</sup> Only 32% of students thought they have migraine and those beliefs were translated into their behavior given that 26.7% sought medical help although a previous study outlined that educated persons are more likely to consult a doctor. This finding highlights the importance of increasing awareness and education among patients and healthcare providers through continuing education programs targeting different stakeholders. Interestingly, most of the migraine students (84.8%) reported that they took headache medications without referring to the doctor in agreement with a cross-sectional study in Italy where self-medication was higher among those with definite or probable migraine.<sup>36</sup>

This study also has limitations. The sample only included students registered in the faculties of the Lebanese University which is the only public university in Lebanon. This may affect the application of the study findings to private universities. Selection bias might have arisen since only motivated and interested students were selected. The use of

a self-administered survey might create misunderstandings with the risk of subjectivity in the answers. Interviewer bias was minimized by providing uniform training to the pharmacists doing the interviews and recall bias was reduced by asking short-term interval or daily practice questions. Moreover, the students diagnosed with migraine were not assessed by a neurologist to confirm the diagnosis. Further studies targeting private universities with clinical validation of migraine diagnosis are recommended for a better assessment of the prevalence of migraine among university students.

## Conclusion

Headache is among the most prevalent, burdensome, and costly disorders worldwide. A high prevalence of migraine was noted among university students in Lebanon. Recognizing headache risk factors among migraine patients can be an effective strategy to prevent the development of migraine, decrease headache frequency and potentially improve patients' quality of life. Women, coffee drinking, having unorganized meals, fast-food consumption and fasting were the main predictors of migraine among students. To allow an early diagnosis and better treatment, primary care physicians should consider university students as a key migraine population taking into consideration the lifestyle characteristics of the patients.

### Author's contribution:

GH, Conceptualization, formal analysis, Validation, and Writing-original draft; RM, Data curation, formal analysis, methodology, and writing-original draft; MG, Conceptualization, Methodology, Supervision, Writing-review, and editing; DK, Methodology, project administration, writing-original draft; AA, SA, Conceptualization, data curation, methodology, Writing-review and editing

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