Original Article

Health-related Quality of Life of University Students in Lebanon: A Comparative Cross-Sectional Study Between Students with and without Migraine

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Abstract

Background: migraine can negatively affect students' health, well-being, and physical, mental, and cognitive functions. **Aims:** This study aims to (i) compare the health-related QoL of students with and without migraines, (ii) assess the association between higher QoL scores and the general characteristics of the students, and (iii) evaluate the predictors of higher QoL.
Methods: A cross-sectional study was conducted over four months between November 2019 and April 2020, targeting 1095 students from the public university campus faculties. Data were collected using a validated tool (SF-8) through face-to-face interviews performed by four pharmacy students.
Results: Cases had significantly lower scores in all the physical domains compared to controls, with an overall total score of 62.0 (16.7) compared to 73.1 (18.4) (p<0.001). Similarly, lower overall scores for the mental domains were noted for cases (61.3 (16.7)). Caffeine consumption affected mental scores, where 71.9% of non-consumers had significantly higher scores than others (54.5%; p=0.015). Moreover, the higher the academic satisfaction, the better the QoL, with 61.2% of students who reported high satisfaction having higher scores in the mental domains compared to only 34.2% of those reporting low academic satisfaction (p=0.008). On the other hand, 62.6% of male students without migraine had significantly higher PC scores than females (48.2%; p<0.001), and those in their last academic years had substantially higher PC scores compared to those in their first two years (p=0.004). Cigarette and waterpipe smokers had lower PC scores among controls (p=0.042 and 0.012, respectively), and around 60% of those practicing sports had higher PC and MC scores (p<0.001).
Conclusion: Migraine adversely affected students on both physical and psychological aspects, translated by lower QoL scores. The predictors of a better QoL should be considered when developing treatment plans and supporting those affected by this condition.

Keywords: University students; Migraine; Physical component; Mental component; Quality of Life; Predictors.

Introduction

Migraine is a common and debilitating neurological condition affecting millions worldwide. It is estimated that approximately 1 in 7 people will experience a migraine at some point in their lifetime (Spindler and Ryan, 2020). The exact causes of migraine are still not fully understood, but ongoing research aims to improve the understanding of this complex condition and develop more effective treatments (Spindler and Ryan, 2020, Sudershan et al., 2022).

The prevalence of migraine varies significantly among different populations and can be influenced by several factors, including age, gender, genetics, and environmental factors (El-Metwally et al., 2020, Hatem et al., 2022a). According to the World Health Organization, migraines are one of the leading causes of disability and are more common in women than men (Hatem et al., 2022a, Steiner et al., 2013). In some countries, the prevalence of migraine among women can be as high as 25-30%, while in men, it is estimated to be around 8% (Tsai et al., 2022). However, it is essential to note that these figures can vary greatly depending on the population being studied. The prevalence of migraine is thought to increase with age, with some studies suggesting that the incidence of migraine peaks in the fourth decade of life and then gradually decreases (Tsai et al., 2022, Hsu et al., 2020).

Migraines can significantly impact patients' Quality of Life (QoL), due to their complexity and associated headaches that can last for several days (Pradeep et al., 2020). People with migraine may experience various symptoms, including severe headache pain, sensitivity to light, sound, and touch, nausea, vomiting, and more (Laurell et al., 2016). These symptoms can make it challenging to carry out everyday activities and result in significant levels of disability and reduced QoL. Studies have shown that patients with migraine often have lower levels of physical and social functioning, higher levels of anxiety and depression, and reduced ability to perform daily activities, such as work or school (Leonardi and Raggi, 2019, Alwhaibi and Alhawassi, 2020, Peres et al., 2017). Furthermore, migraines can majorly impact employment and earning potential, with many people having to take time off work or reduce their hours due to the severity of their symptoms (de Dhaem and Sakai, 2022).

The prevalence of migraine among university students in Lebanon is 35.8% (Hatem et al., 2022a), significantly higher than the one reported among medical students (12.1%) (Chahine et al., 2022). Students with migraines reported headaches following stressful periods such as exams, lack of sleep, climate changes, and fatigue while sleeping and relaxing were the main reported relieving factors (Mosleh et al., 2022). Research showed that migraines could negatively affect students' health, well-being, and physical, mental, and cognitive functions (Steiner et al., 2022). Among others, the short form 8-item (SF-8) questionnaire is a tool developed to assess the health-related QoL in different populations by comparing the burden of diseases across different age and treatment groups (Yiengprugsawan et al., 2020).

Aim of the study: Migraine can significantly impact the health-related QoL of students. It can affect both physical and emotional well-being since it often causes severe headaches, nausea, vomiting, and sensitivity to light and sound in addition to anxiety, frustration and depression. These symptoms can interfere with daily activities, including studying, attending classes, and participating in social events. This study aims to (i) compare the health-related QoL of students with and without migraines, (ii) assess the association between higher QoL scores and the general characteristics of the students, and (iii) evaluate the predictors of higher QoL.

Methods

Study design: A cross-sectional study was carried out over six months between November 2019 and April 2020, targeting students from the public university campus faculties. Data were collected using a validated tool (SF-8) through face-to-face interviews performed by four pharmacy students.

Ethical considerations: This study used a questionnaire for data collection without invasive procedures or interventions. The institutional review board of the faculty of

pharmacy at the Lebanese University, approved it. After reviewing the study protocol and tool, written approvals from the rectorate and the deans/ principals of the different faculties were also obtained. Data were anonymous, non-identifiable, and stored according to the university's general data protection regulation guidelines. Written informed consent was obtained from each student. Participants were acknowledged that they could withdraw their participation at any point during the interview.

Sample size calculation: 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 (Z1-α/2= 1.96 at 95% confidence interval), d is the absolute accuracy or precision (5% marginal error), p is the expected proportion of the population with a specific outcome and was set at 35.8% based on prevalence data of migraine among university students in Lebanon (Hatem et al., 2022a). This yielded a necessary sample size of 354 participants diagnosed with probable migraine. Each Faculty was sampled as an independent sub-population from which students were randomly selected. Probable migraine diagnosis was based on the ID-screening tool, previously adopted in similar studies (Mosleh et al., 2022, Hatem et al., 2022a). To allow a comparison of the QoL between students with migraine and those without migraine, an allocation of 1:2 was set. The flowchart of the selection of students is presented in Figure 1. A power analysis was performed using G-power (3.1) software resulting in a power of 84.8%.

Data collection: Four pharmacy students approached the potential participants from different faculties. They explained the study's aims orally and invited them to participate by filling out a survey on a tablet. The first page of the survey included the study's aims (written), the estimated time to answer the questionnaire (10 minutes), statements on the anonymity and confidentiality of their responses and consent to use their data for research purposes only.

Study tool: The 8-item Short Form (SF-8) survey (validated on the Lebanese population) was used, and the corresponding answers were afterward graded over 100 (Khalifeh et

al., 2015). These questions will generate eight subscales: physical functioning (PF), physical role (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), emotional role (ER), and mental health (MH). The first four scores lead to the physical composite score (PC), while the last four can be summed to create the mental composite score (MC). The general characteristics of the participants were also collected. They included sex, age, Body Mass Index (BMI), faculty attended, academic year, the governorate of residence (including six governorates in Lebanon), and marital and employment status. Students were also asked if they had medical insurance and its type and about their academic satisfaction (categorized into low, moderate, and high). Lifestyle information, such as cigarette, waterpipe (or shisha) smoking, daily caffeine consumption, and regular physical activity practice, were registered. The survey was provided in English and Arabic, depending on the student's preferences.

Statistical analysis: Statistical analyses were conducted using Statistical Package for Social Sciences (SPSS Inc, Chicago, Illinois) Version 28 (Muijs, 2022). Considering the values of skewness (-0.476) and kurtosis (0.047), data are normally distributed and converged toward their expected values (Hatem et al., 2022b). Categorical variables are presented through frequencies and percentages, while the age of the students and the different scores are presented through means and standard deviations. The index had good reliability (Cronbach alpha of 0.758 and 0.707 for the PC and MC, respectively) and positive inter-item correlations. Each score's skewness, minimum, and maximum are presented in addition to their percentiles (25th, 50th, and 75th). The independent sample T-test was used to assess the relationship between the SF-8 scale scores in cases and controls. Afterward, the total PC and MC scores were dichotomized (lower and high scores), independently taking the mean values as cut-off points for cases and controls. Bivariate analyses were performed to test the association between having lower or higher scores and the participants' general

characteristics. Three different analyses were conducted: between cases and controls and comparing cases and controls. Chi-square/Fisher exact tests were used to compare percentages between the associated categorical variables. A multivariate analysis was performed using logistic regression models to explore the predictors of higher PC and MC scores in cases and controls. Covariates were included in the model if they had a p-value<0.200 in the bivariate analyses. The models were then adjusted, generating Odds ratios and 95% confidence intervals. A p-value<0.05 was considered statistically significant.

Ethics approval and consent to participate: 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. Written informed consent was obtained from every participant.

Results

Comparison of the general characteristics of students with and without migraine

Overall, 1219 students were approached, of whom 1095 (89.8%) agreed to participate in the study. Table 1 compares the general characteristics of the participants based on their migraine status. Both groups comprised more females than males, with a significantly higher percentage of females among students with migraine (81.9%) compared to other students (60.3%; p<0.001). Age distribution between groups was comparable, with the majority younger than 30. More cases (48.5%) than controls (37.5%) studied in the faculty of sciences, while only 9% of students with migraine studied in the faculty of law compared to a significantly higher percentage of controls (22.1%; p<0.001). Around two-thirds of the participants were in their first two academic years, and most of them were single and non-workers, with no significant differences between groups (p>0.05). As regards their lifestyle habits, students without migraine (15.8%) smoked cigarettes more than those with probable migraine (6.6%; p<0.001). In contrast, daily caffeine consumption was significantly more observed among cases (84.1%) than among controls (77.5%; p=0.011). Most students in both groups reported high or moderate academic

satisfaction, and almost 10% reported low satisfaction.

Health-related quality of life of medical students

Table 2 represents the mean score of each of the SF-8 survey domains, their skewness, maximum, minimum, and median. All scales had a high level of internal consistency reliability coefficient. Cases had significantly lower scores in all PC domains compared to controls, with an overall total score of 62.0 (16.7) compared to 73.1 (18.4) (p<0.001). Similarly, lower overall scores for the MC domains were noted for cases [61.3 (16.7)] in comparison to controls [66.6 (16.6)]. Among students without migraine, the median values were 73.8 and 68.8 for the PC and MC, respectively. In contrast, these values were lower in cases (61.3 and 62.5). Among the PC domains in cases, PF had the highest mean (71.1), and GH had the lowest one (52.8), while between the MC, the VT and MH scales had the lowest mean (57.1 and 54.5, respectively).

Association between the PC and MC scores and the general characteristics of students with or without migraine

The bivariate analysis associating the total scores of the PC and MC domains and the general characteristics of students with or without migraine is presented in Table 3. Among cases, no significant differences were noted with the PC scores (p>0.05). Caffeine consumption affected the MC scores, where 71.9% of non-smokers had significantly higher scores than smokers (54.5%; p=0.015). The higher the academic satisfaction, the higher the MC scores, with 61.2% of students who reported high satisfaction having higher MC scores compared to only 34.2% of those reporting low academic satisfaction (p=0.008). On the other hand, 62.6% of male students without migraine had significantly higher PC scores than females (48.2%; p<0.001), and those in their last academic years had substantially higher PC scores compared to those in their first two years (p=0.004). Cigarette and waterpipe smokers had lower PC scores among controls (p=0.042 and 0.012, respectively), and around 60% of those practicing sports had higher PC and MC scores (p<0.001). Similar associations were found regarding the MC scores: males had

significantly higher scores (63.0%) compared to almost half of the females (p=0.002). Comparatively, cigarette and waterpipe smokers had lower MC scores (p<0.001 and p=0.028, respectively).

Predictors of higher QoL among students with and without migraine

The predictors of higher PC and MC scores in students with and without migraine are presented in Table 4. Among cases and after adjusting for covariates, students in their fifth year or more had 2.23 times higher odds for higher PC scores than those in their first two years (OR 2.23, 95% CI 1.06-4.68). Students with migraine who consumed caffeinated drinks daily had 51% lower odds of higher MC scores than non-consumers (OR 0.49, 95% CI 0.26-0.91). The odds of higher MC scores were significantly associated with

academic satisfaction since those with moderate satisfaction had 2.72 times higher odds of higher scores (OR 2.72, 95% CI 1.24-6.00), and those reporting a high academic satisfaction had 2.99 times higher odds (OR 2.99, 95% CI 1.44-6.22) compared to students with migraine with low academic satisfaction. In contrast, among controls, females had 47% lower odds of higher PC scores than males (OR 0.53, 95% CI 0.38-0.74). Cigarette and waterpipe smokers had 37% and 38% lower odds of higher PC scores than non-smokers (OR 0.63, 95% CI 0.41-0.97) and (OR 0.62, 95% CI 0.44-0.88), respectively. Moreover, students practicing sports had 1.45-fold higher odds of higher PC scores than others (OR 1.45, 95% CI 1.06-1.98). Similarly, the odds of higher MC scores decreased among females and cigarette and waterpipe smokers and increased among those practicing sports.
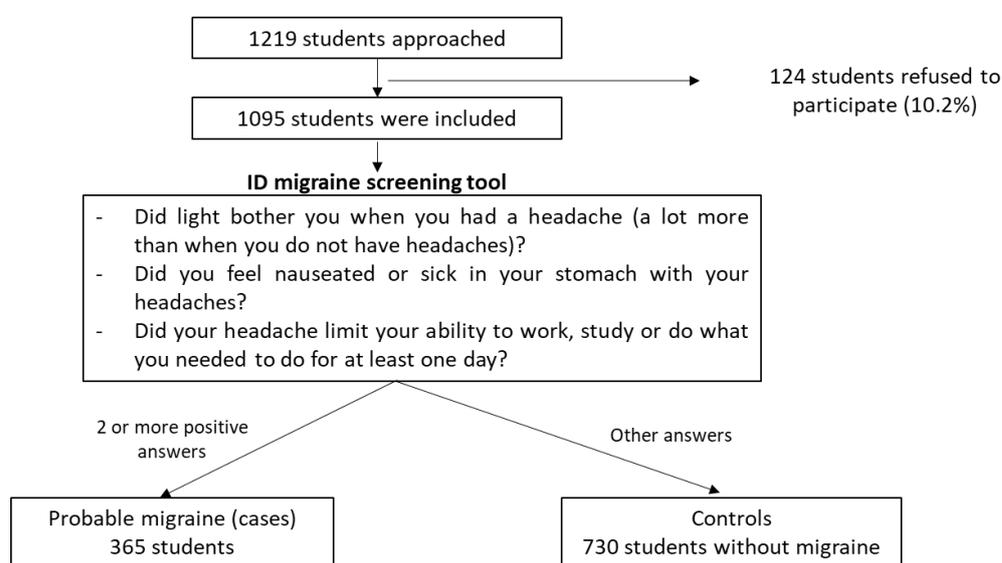
Figure 1. Flowchart of the selection of students with and without migraine

Table 1. Comparison of the general characteristics of students with and without migraine

		Migraine students (Cases)	Students without migraine (Controls)	
		N=365	N=730	
		Frequency (%)	**Frequency (%)**	**p-value**
Sex	Male	66 (18.1%)	290 (39.7%)	**<0.001**
	Female	299 (81.9%)	440 (60.3%)	
Age (years)	**Mean ± SD**	20.2 ± 2.6	20.2 ± 2.9	0.865
	<30	358 (98.1%)	708 (97.0%)	0.287
	≥30	7 (1.9%)	22 (3.0%)	
BMI	**Mean ± SD**	22.6 ± 7.4	22.7 ± 9.2	0.950
Faculty attended	Sciences	177 (48.5%)	274 (37.5%)	
	Law	33 (9.0%)	161 (22.1%)	
	Business	54 (14.8%)	133 (18.2%)	
	Engineering	19 (5.2%)	39 (5.3%)	
	Fine arts	30 (8.2%)	39 (5.3%)	**<0.001**
	Public health	22 (6.0%)	26 (3.6%)	
	Dentistry	9 (2.5%)	24 (3.3%)	
	Medicine	9 (2.5%)	16 (2.2%)	
	Pharmacy	12 (3.3%)	18 (2.5%)	
Academic year	1-2	228 (62.8%)	479 (66.1%)	
	3-4	100 (27.5%)	178 (24.6%)	0.532
	>4	35 (9.6%)	68 (9.4%)	
Governorate of residence	Beirut	204 (56.4%)	399 (55.4%)	
	Mount Lebanon	89 (24.6%)	170 (23.6%)	
	South	35 (9.7%)	66 (9.2%)	0.879
	Bekaa	19 (5.2%)	43 (6.0%)	
	North	8 (2.2%)	24 (3.3%)	
	Nabatiyeh	7 (1.9%)	18 (2.5%)	
Marital status	Single	358 (98.1%)	708 (97.0%)	0.287
	Married	7 (1.9%)	22 (3.0%)	
Employment	Does not work	289 (86.0%)	575 (83.5%)	0.291
	Works	47 (14.0%)	114 (16.5%)	
Health insurance	None	60 (17.4%)	102 (15.0%)	
	Public insurance	194 (56.4%)	388 (57.1%)	0.565
	Private insurance	90 (26.2%)	190 (27.9%)	
Cigarette smoking	Yes	24 (6.6%)	115 (15.8%)	**<0.001**
	No	341 (93.4%)	615 (84.2%)	
Waterpipe smoking	Yes	80 (21.9%)	185 (25.3%)	0.212
	No	285 (78.1%)	545 (74.7%)	
Caffeine daily consumption	Yes	307 (84.1%)	566 (77.5%)	**0.011**
	No	58 (15.9%)	164 (22.5%)	
Regular physical activity	Yes	202 (55.3%)	430 (58.9%)	0.261
	No	163 (44.7%)	300 (41.1%)	
Academic satisfaction	Low satisfaction	38 (10.6%)	69 (9.7%)	
	Moderate satisfaction	100 (28.0%)	170 (23.9%)	0.250
	High satisfaction	219 (61.3%)	473 (66.4%)	

Results are given in terms of frequency (percentage) or Mean ± Standard Deviation.

Table 2. Health-related quality of life of medical students: scores of the different domains

	Physical components (PC)					
	Cases	Controls	Cases	Controls	Cases	Controls
	PF	PF	RP	RP	BP	BP
N	360	720	358	706	361	722
Mean (SD)	71.1 (23.8)	79.8 (23.9)	68.9 (22.9)	77.6 (23.8)	54.1 (23.8)	69.5 (25.8)
Skewness (SE)	-0.6 (0.1)	-1.1 (0.1)	-0.6 (0.1)	-0.8 (0.1)	0.2 (0.1)	-0.3 (0.1)
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	100.0	100.0	100.0	100.0	100.0	100.0
Median	75.0	75.0	75.0	75.0	60.0	80.0
p-value	<0.001		<0.001		<0.001	
	Cases	Controls	Cases		Controls	
	GH	GH	Total PC score		Total PC score	
N	363	727	355		700	
Mean (SD)	52.8 (22.3)	65.7 (22.7)	62.0 (16.7)		73.1 (18.4)	
Skewness (SE)	-0.2 (0.1)	-0.4 (0.1)	-0.2 (0.1)		-0.6 (0.1)	
Minimum	0.0	0.0	5.0		5.0	
Maximum	100.0	100.0	100.0		95.0	
Median	60.0	60.0	61.3		73.8	
p-value	<0.001		<0.001			
	Mental components (MC)					
	Cases	Controls	Cases	Controls	Cases	Controls
	VT	VT	SF	SF	RE	RE
N	361	719	361	717	362	723
Mean (SD)	57.1 (22.2)	56.7 (22.0)	65.7 (27.4)	72.1 (26.0)	67.8 (25.5)	73.7 (25.8)
Skewness (SE)	-0.3 (0.1)	-0.4 (0.1)	-0.5 (0.1)	-0.7 (0.1)	-0.5 (0.1)	-0.7 (0.1)
Minimum	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	100.0	100.0	100.0	100.0	100.0	100.0
Median	50.0	50.0	75.0	75.0	75.0	75.0
p-value	0.804		<0.001		<0.001	
	Cases	Controls	Cases		Controls	
	MH	MH	Total MC score		Total MC score	
N	359	723	357		708	
Mean (SD)	54.5 (32.3)	63.3 (29.8)	61.3 (16.7)		66.6 (16.6)	
Skewness (SE)	-0.0 (0.1)	-0.4 (0.1)	-0.2 (0.1)		-0.5 (0.1)	
Minimum	0.0	0.0	6.25		0.0	
Maximum	100.0	100.0	100.0		100.0	
Median	50.0	75.0	62.5		68.8	
p-value	<0.001		<0.001			

[a] Number of items per scale. SD: Standard Deviation; SE: Standard Error.

Table 3. Association between having lower/higher PC and MC scores and the general characteristics of the two groups of students (with or without migraine)

		Lower PC score	Higher PC score		Lower PC score	Higher PC score	
		Cases	Cases	p-value	Controls	Controls	p-value
Sex	Male	26 (38.2%)	42 (61.8%)	0.061	108 (37.4%)	181 (62.6%)	**<0.001**
	Female	151 (50.8%)	146 (49.2%)		228 (51.8%)	212 (48.2%)	
Faculty	Medical	28 (51.9%)	26 (48.1%)	0.593	37 (44.0%)	47 (56.0%)	0.690
	Non-medical	149 (47.9%)	162 (52.1%)		299 (46.4%)	346 (53.6%)	
Academic year	1-2	119 (52.4%)	108 (47.6%)		235 (49.2%)	243 (50.8%)	
	3-4	45 (45.0%)	55 (55.0%)	0.074	79 (44.4%)	99 (55.6%)	**0.004**
	>4	12 (33.3%)	24 (66.7%)		19 (27.9%)	49 (72.1%)	
Marital status	Single	175 (48.9%)	183 (51.1%)	0.450	323 (45.7%)	384 (54.3%)	0.214
	Married	2 (28.6%)	5 (71.4%)		13 (59.1%)	9 (40.9%)	
Employment	Does not work	145 (50.2%)	144 (49.8%)	0.875	262 (45.6%)	312 (54.4%)	0.496
	Works	23 (48.9%)	24 (51.1%)		56 (49.1%)	58 (50.9%)	
Health insurance	None	33 (54.1%)	28 (45.9%)		52 (51.0%)	50 (49.0%)	
	Public	90 (46.6%)	103 (53.4%)	0.561	168 (43.3%)	220 (56.7%)	0.113
	Private	45 (50.6%)	44 (49.4%)		98 (51.6%)	92 (48.4%)	
Cigarette smoking	Yes	10 (41.7%)	14 (58.3%)	0.489	63 (54.8%)	52 (45.2%)	**0.042**
	No	167 (49.0%)	174 (51.0%)		273 (44.5%)	341 (55.5%)	
Waterpipe smoking	Yes	40 (50.6%)	39 (49.4%)	0.667	100 (54.1%)	85 (45.9%)	**0.012**
	No	137 (47.9%)	149 (52.1%)		236 (43.4%)	308 (56.6%)	
Daily caffeine consumption	Yes	152 (49.4%)	156 (50.6%)	0.446	257 (45.4%)	309 (54.6%)	0.490
	No	25 (43.9%)	32 (56.1%)		79 (48.5%)	84 (51.5%)	
Regular physical activity	Yes	96 (47.1%)	108 (52.9%)	0.537	175 (40.8%)	254 (59.2%)	**<0.001**
	No	81 (50.3%)	80 (49.7%)		161 (53.7%)	139 (46.3%)	
Academic satisfaction	Low	17 (44.7%)	21 (55.3%)		29 (42.0%)	40 (58.0%)	
	Moderate	47 (47.0%)	53 (53.0%)	0.710	86 (50.6%)	84 (49.4%)	0.365
	High	111 (50.7%)	108 (49.3%)		213 (45.1%)	259 (54.9%)	
		Lower MC score	**Higher MC score**		**Lower MC score**	**Higher MC score**	
		Cases	Cases	p-value	Controls	Controls	p-value
Sex	Male	24 (35.3%)	44 (64.7%)	0.169	107 (37.0%)	182 (63.0%)	**0.002**
	Female	132 (44.4%)	165 (55.6%)		213 (48.4%)	227 (51.6%)	
Faculty	Medical	24 (44.4%)	30 (55.6%)	0.784	36 (42.9%)	48 (57.1%)	0.838
	Non-medical	132 (42.4%)	179 (57.6%)		284 (44.0%)	361 (56.0%)	
Academic year	1-2	96 (42.3%)	131 (57.7%)		218 (45.6%)	260 (54.4%)	
	3-4	41 (41.0%)	59 (59.0%)	0.809	76 (42.7%)	102 (57.3%)	0.176
	>4	17 (47.2%)	19 (52.8%)		23 (33.8%)	45 (66.2%)	
Marital status	Single	151 (42.2%)	207 (57.8%)	0.142	310 (43.8%)	397 (56.2%)	0.881
	Married	5 (71.4%)	2 (28.6%)		10 (45.5%)	12 (54.5%)	
Employment	Does not work	123 (42.6%)	166 (57.4%)	0.783	260 (45.3%)	314 (54.7%)	0.097
	Works	19 (40.4%)	28 (59.6%)		42 (36.8%)	72 (63.2%)	
Health insurance	None	24 (39.3%)	37 (60.7%)		53 (52.0%)	49 (48.0%)	
	Public	86 (44.6%)	107 (55.4%)	0.742	157 (40.5%)	231 (59.5%)	0.090
	Private	37 (41.6%)	52 (58.4%)		87 (45.8%)	103 (54.2%)	
Cigarette smoking	Yes	9 (37.5%)	15 (62.5%)	0.591	67 (58.3%)	48 (41.7%)	**<0.001**
	No	147 (43.1%)	194 (56.9%)		253 (41.2%)	361 (58.8%)	
Waterpipe smoking	Yes	37 (46.8%)	42 (53.2%)	0.406	94 (50.8%)	91 (49.2%)	**0.028**
	No	119 (41.6%)	167 (58.4%)		226 (41.5%)	318 (58.5%)	
Daily caffeine consumption	Yes	140 (45.5%)	168 (54.5%)	**0.015**	242 (42.8%)	324 (57.2%)	0.248
	No	16 (28.1%)	41 (71.9%)		78 (47.9%)	85 (52.1%)	
Regular physical activity	Yes	82 (40.2%)	122 (59.8%)	0.269	167 (38.9%)	262 (61.1%)	**0.001**
	No	74 (46.0%)	87 (54.0%)		153 (51.0%)	147 (49.0%)	
Academic satisfaction	Low	25 (65.8%)	13 (34.2%)		35 (50.7%)	34 (49.3%)	
	Moderate	42 (42.0%)	58 (58.0%)	**0.008**	72 (42.4%)	98 (57.6%)	0.470
	High	85 (38.8%)	134 (61.2%)		205 (43.4%)	267 (56.6%)	

Results are given in terms of frequency (percentage)

Table 4. Predictors of higher QoL among students with and without migraine

Cases	Higher PC score		Higher MC score	
	Crude model	**Adjusted model**	**Crude model**	**Adjusted model**
	OR [95% CI]	**OR [95% CI]**	**OR [95% CI]**	**OR [95% CI]**
Female sex (male as reference)	0.60 [0.35-1.03]	0.62 [0.36-1.06]	0.68 [0.39-1.18]	0.69 [0.39-1.21]
Academic year (1-2 as a reference)				
3-4	1.35 [0.84-2.16]	1.33 [0.83-2.13]		
>4	2.20 [1.05-4.62]	**2.23 [1.06-4.68]**		
Marital status (Single as a reference)			0.29 [0.06-1.52]	
Caffeine consumption (No as a reference)			0.47 [0.25-0.87]	**0.49 [0.26-0.91]**
Academic satisfaction (Low as reference)				
Moderate			2.66 [1.22-5.78]	**2.72 [1.24-6.00]**
High			3.03 [1.47-6.25]	**2.99 [1.44-6.22]**
Controls	Higher PC score		Higher MC score	
	Crude model	**Adjusted model**	**Crude model**	**Adjusted model**
	OR [95% CI]	**OR [95% CI]**	**OR [95% CI]**	**OR [95% CI]**
Female sex (male as reference)	0.56 [0.41-0.75]	**0.53 [0.38-0.74]**	0.63 [0.46-0.85]	**0.58 [0.41-0.80]**
Academic year (1-2 as a reference)				
3-4	0.88 [0.53-1.47]		1.13 [0.79-1.59]	
>4	0.71 [0.40-1.25]		1.64 [0.96-2.80]	
Employment (non-worker as a reference)			1.42 [0.94-2.15]	
Health insurance (None as a reference)				
Public insurance	1.36 [0.88-2.11]		1.59 [1.03-2.47]	
Private insurance	0.98 [0.60-1.58]		1.28 [0.79-2.07]	
Cigarette smoking (No as a reference)	0.66 [0.44-0.98]	**0.63 [0.41-0.97]**	0.50 [0.34-0.75]	**0.47 [0.31-0.73]**
Waterpipe smoking (No as a reference)	0.65 [0.47-0.91]	**0.62 [0.44-0.88]**	0.69 [0.49-0.96]	**0.71 [0.50-0.99]**
Physical activity (No as a reference)	1.68 [1.25-2.26]	**1.45 [1.06-1.98]**	1.63 [1.21-2.20]	**1.42 [1.03-1.94]**

Question: PC score or MC score? The baseline answer is "Lower score". OR: Odds ratio; CI: Confidence Interval

Discussion

The present study aimed to compare the health-related QoL of university students with migraine and to assess the predictors of higher QoL scores. Students with migraine included more females than males, with significantly higher percentages of those attending the faculty of sciences and non-smokers. Overall, the PC domains had higher scores than the MC domains, noticeably lower among students with migraine (p<0.001). Cases with lower MC scores were mainly caffeine consumers and those reporting low academic satisfaction. Being in their last academic years significantly increased the odds of higher PC scores only among cases. Caffeine consumption decreased the odds of higher MC scores, while the more academic satisfaction, the higher these odds were noted.

Female students were predisposed to migraine more than their male congeners. Previous research also showed a higher occurrence of migraine up to four times more among women (Al-Hassany et al., 2020). Significant gender-based differences in headaches were reported, suggesting that migraine is a female disease (Rossi et al., 2022). This gender disparity can be attributable to several biological factors, such as sex hormones and sex hormonal fluctuations, primarily estrogen and progesterone (Ahmad and Rosendale, 2022). These hormones play an important role in neuro-excitability, which can explain the increased incidence of migraine during the menstrual period and throughout the reproductive years of women (Krause et al., 2021). In this study, most students with probable migraine were attending the faculties of sciences, law, and business. Students in the medical field (public health, dentistry, medicine, and pharmacy) were less prone to the disorder than in previous findings (Anaya et al., 2022, Shrestha et al., 2022). Students in the first and second academic years had a higher prevalence of migraine than others, possibly related to the academic workload, irregular sleep, and stress in such periods (Yu et al., 2020, Rafi et al., 2022). Most students with migraine were non-smokers. This could be explained by the fact that most of them were aware of the impact of smoking on the exacerbation of migraine

episodes since it can induce attacks by different mechanisms, such as alterations in nitric oxide levels in the brain, alterations of monoamine oxidase activity, vascular changes, and increasing the metabolism of common migraine medications resulting in decreased clinical efficacy (AlHarbi and AlAteeq, 2020, Goadsby et al., 2017). Caffeine intake was significantly higher among students with migraine, possibly associated with vasoconstrictive proprieties that can help alleviate the corresponding headaches (Thuraiaiyah et al., 2022). Nevertheless, a recent report showed that the regular use of caffeine might exacerbate migraine in a dose-dependent manner (Agbetou and Adoukonou, 2022).

Findings from this study showed significantly lower QoL among students with migraine, translated by lower PC and MC scores. Previous studies also reported lower QoL of migraine patients compared to healthy controls (Al Ghadeer et al., 2021, Domitrz and Golicki, 2022), but with lesser differences in the different domains. A recent study found a significant impact of migraine on younger populations with different lifestyle factors and characteristics affecting their response to treatment (Abu-Arafeh, 2022). In this study, migraine negatively impacted the health-related QoL of university students with migraine both physically and psychologically. The data collection period concurred with other stressors that might have exacerbated the results, such as the beginning of the pandemic, political unrest, and the economic crisis in Lebanon. More recently, students were shifting to a new mode of education which can also affect their QoL due to several technical and practical constraints (Awada et al., 2023), in addition to the impact of quarantines, and school closures on both their mental and physical states (Hatem and Goossens, 2022). Headaches can be associated with many functional disabilities among university students (Thiagarajan et al., 2022). Among others, patients with migraine had a higher likelihood of employment disability in both the short and long terms (Shapiro et al., 2023), which can adversely contribute to their academic satisfaction and performance. The successive quarantines worsened the migraine status among around

42% of patients due to their inability to access healthcare and their excessive use of analgesics (Jokubaitis et al., 2023). Moreover, their limited access to relieving factors such as aerobic and strength training could have exacerbated the pain intensity and frequency of migraine episodes (Varangot-Reille et al., 2022). University students were also affected psychologically, with two ten times higher odds of burnout, mood, and anxiety disorders among those with migraine (Peres et al., 2017). Higher levels of depression, anxiety, and stress symptoms were also reported, which might have attenuated the improvement in disability (Thaxter and Smitherman, 2022). Several predictors of higher QoL were found in this study, differing between cases and controls. Students with migraine in their last academic years had more than two-fold higher likelihood of higher PC scores than those in their first two years, in agreement with previous research (Chahine et al., 2022, Awada et al., 2023). A recent meta-analysis showed that migraine could increase absenteeism, with impaired academic performance and difficulties in activities of daily living (Flynn et al., 2023). Moreover, it was noted that the more their academic satisfaction, the higher their MC scores. This result could be related to higher education courses' instructional quality, which positively protected students' mental health (Rubach et al., 2022). Lifestyle factors such as cigarette and waterpipe smoking lowered the odds of better QoL only among controls, while caffeine consumption adversely affected these odds among cases. The prevalence and severity of migraine were associated with caffeine levels and exacerbated headache episodes (Hikita et al., 2023), which call for increased awareness of the importance of lifestyle modifications to improve the QoL of university students.

This study has limitations. A neurologist did not interview students to confirm the diagnosis of migraine, which could induce a wrong diagnosis since the latter was based on the ID screening tool. Selection bias might arise given that motivated students had a higher likelihood of participation in the study. Moreover, a self-administered questionnaire was used for data collection, and as a result, recall bias could induce differences in understanding some asked questions.

Nevertheless, stratification increased the study's external validity and can allow the generalizability of the findings to other university students in similar settings worldwide.

Conclusion: Overall, university students with migraine had lower QoL compared to other students. Migraine adversely affected students on both physical and psychological aspects, translated by lower QoL scores. Being in the last study years and having higher academic satisfaction significantly increased students' QoL scores, while caffeine consumption decreased them. It is crucial to consider the different predictors of a better QoL when developing treatment plans and providing support to those affected by this condition.

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