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PREVALENCE OF FIBROMYALGIA AMONG MEDICAL STUDENTS AND ITS IMPACT ON THEIR QUALITY OF LIFE: A CROSS-SECTIONAL STUDY

By

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Abstract

Introduction: Fibromyalgia (FM) is a multifaceted chronic pain syndrome characterized by widespread musculoskeletal pain, fatigue, cognitive impairment, psychiatric disorders, and sleep disturbances. Medical students, subjected to high stress and demanding schedules, may be particularly susceptible to FM, yet its prevalence and impact on their quality of life remain underexplored. **Aim of Work:** To investigate the prevalence of FM among medical students using the 2016 modified ACR criteria, and to identify possible associated factors, including sociodemographic and academic characteristics, lifestyle habits, sleeping patterns, and chronic comorbidities. Also, the study investigated the impact of FM on participants' quality of life. **Materials and Methods:** Analytical cross-sectional study was conducted among 300 medical students randomly selected through stratified sampling method. An interview questionnaire was used for diagnosis of FM according to 2016 ACR criteria, while quality of life was evaluated by the standardized WHO brief Quality of Life Scale. **Results:** FM was prevalent among 14.7% of study participants, female gender, poor physical activity, positive family history, sleeping disturbances and chronic comorbidities were the main significant risk factors. Affected students reported symptoms such as headaches (88.6%), abdominal pain (90.9%), and depressive mood (86.4%), with moderate severity in fatigue (59.1%) and cognitive issues (40.9%). FM has a strong negative impact on all aspects of quality of life including physical, psychological and social functioning. Logistic regression identified younger age, female gender, and poor physical exercise as significant predictors. **Conclusion and Recommendations:** A considerable percentage of medical students (14.7%) suffered from FM, which significantly impacted their quality of life in all domains. Urgent need is required to increase awareness and institutional support for affected students.

Keywords: Fibromyalgia, Chronic pain, Medical students, and Quality of life

Introduction

Introduction

Fibromyalgia (FM) is a chronic syndrome characterized by widespread musculoskeletal pain, fatigue, and associated symptoms such as headaches, sleep disturbances, and cognitive impairments *(*Giorgi et al., 2023*)*. It has been linked to various conditions, including infections, diabetes, autoimmune disorders, and psychological stress (Siracusa et al., 2021). Fibromyalgia-ranks as the second most common rheumatic condition after osteoarthritis, with a global prevalence ranging from 2% to 8%, depending on diagnostic criteria. It is three times more common in females than males and is frequently observed in older and obese individuals (Heidari et al, 2017*)*. The diagnostic approach has evolved from focusing on tender points to a broader symptom-based evaluation (Kang et al., 2022). The exact pathophysiology of FM remains unclear, though chronic stress, hypothalamic-pituitary-adrenal axis dysregulation, and neurochemical imbalances are believed to contribute to its onset (Siracusa et al., 2021). While FM is well-documented in the general population, its prevalence and impact among medical students remain underexplored. Medical students endure high levels of stress due to academic pressure, long working hours, and emotional strain, potentially increasing their susceptibility to FM (Alshaikh et al., 2023). Studies have reported high rates of psychiatric disorders, sleep disturbances, and burnout in this population (Al-Shahrani et al., 2023). Prevalence estimates among medical students vary, with rates of 12.5% in Egypt, 10% in Poland, and 9.6% in Saudi Arabia, likely due to differences in diagnostic methods (Moghazy et al., 2023; Patel et al., 2021; Samman et al., 2021).World Health Organization (WHO) defines Quality of Life (QoL) as an individual's perception of their position in life within their cultural and value system context (WHO, 2023). Fibromyalgia is known to significantly impact QoL, particularly in physical, mental, and social domains (Bucourt et al., 2021). Given the intense academic and clinical demands placed on medical students, FM's effects on their QoL may be particularly pronounced. Thus, clearly investigating FM and its negative consequences among medical students is highly warranted to develop and prioritize effective suitable strategies. To our knowledge, this is the first study to address FM syndrome among Ain Shams University medical students.

Aim of Work

To investigate prevalence of FM among medical students using the 2016 modified ACR criteria, also to identify possible associated factors including sociodemographic and academic characteristics, lifestyle habits, sleeping patterns, and chronic comorbidities. Additionally, the study investigated the impact of FM on participants' quality of life.

Material and Methods

Study Design: It is analytical cross-sectional study

Place and duration of the study: The study was conducted during three months duration from October 2024 to January 2025 at Faculty of Medicine, Ain Shams University, Cairo, Egypt.

Study Sample: Medical students from the first to fifth educational years and interns studying in the academic year (2024–2025) were eligible for participation in the present work. Students with a history of inflammatory arthritis or autoimmune diseases were excluded. A total of 300 participants were randomly selected using stratified random sampling, proportionate allocation was used to determine distribution of this sample across study population based on percentage of students in each academic year. Firstly, the portion of students in each academic level was considered as a stratum; further, we randomly asked students of both male and female divisions to complete the questionnaire. The sample size was determined using the PASS program, assuming a 95% confidence level, a 4% margin of error, and an expected FM prevalence of 13.6% based on a previous study (Hasbani et al., 2022).

Study methods

Study Tools and Procedures:

A validated pre-constructed **questionnaire** was used to collect data, ensuring respondent anonymity. The questionnaire was composed of three parts and self-administered except for the one regard fibromyalgia diagnosis, which was directly interviewed by the researcher to enhance diagnostic accuracy.

First part: was used to collect baseline information including socio demographic characteristics, academic data, sleeping patterns, self-reported weight and height, family history of FM, other chronic medical conditions, daily life habits such as smoking, coffee consumption, and physical exercise. Body Mass Index (BMI) was calculated using the formula BMI = weight (kg) / height (m^2), categorized according to CDC guidelines (CDC, 2022).

Second part: The modified 2016 American College of Rheumatology (ACR) criteria was utilized for FM diagnosis. These criteria were pretested and validated as a standard diagnostic tool and widely used in clinical settings as well in research contexts (Wolfe et al., 2016). It comprises two components: the Widespread Pain Index (WPI) and the Symptom Severity Scale (SSS) score. The Widespread Pain Index is calculated based on the number of body areas in which the patient experienced pain over the past week. The SSS assesses the severity of common FM associated symptoms such as fatigue, waking unrefreshed and cognitive troubles experienced over the last week, and headaches, abdominal pain and depression experienced over the previous 6 months. The summation of WPI and SSS results in a FM severity scale (FSS), which ranges from 0 to 31 points. Students were interviewed by the researchers for accurate diagnosis of cases.FM was identified when all the following criteria were met:

- ➢ (WPI) score of 7 and (SSS) score of 5 OR WPI 4–6 and SSS score of 9.
- ➢ There was generalized pain, which was defined as pain in at least four body regions,
- ➢ Symptoms persisted for at least 3 months at a similar degree

Third part: The standardized English version of WHO Brief Quality of Life Scale was used to measure participants' quality of life. It is widely used in epidemiological research (Achangwa et al., 2022) , to assess the impact of disease on daily activities and perceived health .It's composed of 26 items that assessed four domains: Physical health (7 items), Psychological health (6 items), Social relationships (3 items) and Environment (8 items), two additional items evaluate overall QoL and general health. Responses use a 5-point Likert scale, where higher scores indicate better QoL (WHO, 2023).

A pilot study was conducted prior to data collection on twenty participants to test clarity and applicability of the questionnaires, they found it easy to read, clear and not excessively demanding, however one question regarding sex satisfaction in the social domain of WHO brief Quality of Life Scale was removed as it was not aligned with our Egyptian culture. Those 20 students were not included in the present work.

Consent

Consent was obtained from all study participants after describing the main study objectives and ensuring confidentiality of data.

Ethical Approval

The study was approved by Faculty of Medicine, Ain Shams University Research Ethics Committee (Approval number: FMASU R280/2024).

Data Management

Data was coded and analyzed using SPSS version 20. Quantitative data was presented as mean ± standard deviation (SD), while qualitative data was expressed as numbers and percentages. Statistical analyses included: Pearson's $\chi 2$ test for categorical variables, correlation analysis between FM and health-related QoL scores, multivariate logistic regression to identify factors significant predictors, p-value ≤ 0.05 was considered statistically significant.

Results

Table 1: Characteristics of the studied participants and their association with Fibromyalgia (FM) (No=300)

Variables	Number (%)	FM diagnosed by Diagnostic Criteria 2016		Chi-Square (x^2)	P value	OR (95%CI)
		NO 256 (85.3%)	Yes 44 (14.7%)			
Age (Mean ±SD) (21.42 ± 2.36)						
17- 21	167 (55.7%)	146(57.0%)	21(47.7%)	1.31	0.251	
21.5-26	133(44.3%)	110(43.0%)	23(52.3%)			
Gender						
Male	125(41.7%)	121(47.3%)	9.1%))4	22.512	**0.000****	
Female	175(58.3%)	135(52.7%)	90.9%))40			
BMI						
Underweight	18(6%)	17(6.6%)	1(2.3%)	6.740	0.081	0.107 (0.072-0.142)
Normal	158(52.7%)	140(54.7%)	18(40.9%)			
Overweight	89(29.7%)	73(28.5%)	16(36.4%)			
Obese	35(11.7%)	26(10.2%)	9(20.5%)			
Smoking	19(6.3%)	17(6.6%)	4.5%))2	0.278	0.598	
Caffeine Consumption	159(53%)	136(53.1%)	23(52.3%)	0.011	0.917	
Practicing physical exercise						
Low	185(61.7%)	150(58.6%)	35(79.5%)	7.032	**0.030****	0.040 (0.018-0.062)
Moderate	94(31.3%)	87(34.0%)	7(15.9%)			
High	21(7%)	19(7.4%)	2(4.5%)			
Positive family history of FM	32(10.7%)	22(8.6%)	10(22.7%)	7.871 **F.E**[a]	**0.005***	
Irritable bowel syndrome	116(38.7%)	89(34.8%)	27(61.4%)	11.200	**0.001****	
Hypothyroidism	15(5%)	12(4.7%)	3(6.8%)	0.359 **F.E**[a]	0.549	
Chronic Headache	133(44.3%)	100(39.1%)	33(75.0%)	19.649	**0.000****	
Diabetes	15(5%)	12(4.7%)	3(6.8%)	0.359 **F.E**[a]	0.549	
Depressed mood	150(50%)	114(44.5%)	36(81.8%)	20.881	**0.000****	
Low back pain	117(39%)	81(31.6%)	36(81.8%)	39.737	**0.000****	
Severe Post COVID infection	39(13%)	29(11.3%)	10(22.7%)	4.314	**0.038***	

BMI = Body Mass Index [a] F.E: Fisher's Exact test

*Statistically significant (p<0.05) **Highly statistically significant (p<0.01)

Table 1 showed that among the different illustrated sociodemographic data; only gender (being female), lack of physical exercise and positive family history were significantly associated with FM, as regard the presence of comorbidities associated, irritable bowel syndrome, chronic headache, depressed mood, low back pain and experienced severe symptomatic post COVID infection were statistically significant, all other variables were not statistically significant ($P > 0.05$).

All academic variables including educational year, academic grade and studying hours were insignificant ($p>0.05$). (Data was not tabulated).

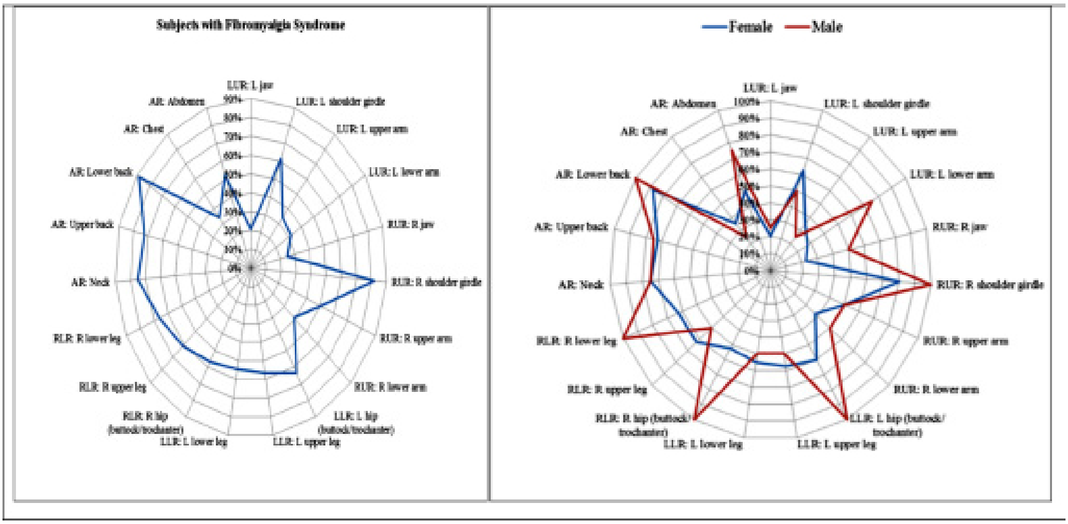

Figure (1): Distribution of widespread pain among affected students with FM syndrome and between males and females (No=44)

The sites of distribution of widespread pain in affected students were illustrated in Fig.1. According to the body regions, most affected students reported pain in the lower back (88.6%), followed by right shoulder girdle (81.8%) neck (75%) and upper back (72.7%). Regards the site of pain distribution according to gender, the majority of affected female participants reported pain in the lower back (87.5%), followed by the right shoulder girdle, neck and upper back (80%, 75% and72.5% respectively), while all affected male participants (100%) reported pain in lower back, hip in both sides, right lower leg and right shoulder girdle, followed by neck and upper back (75%).

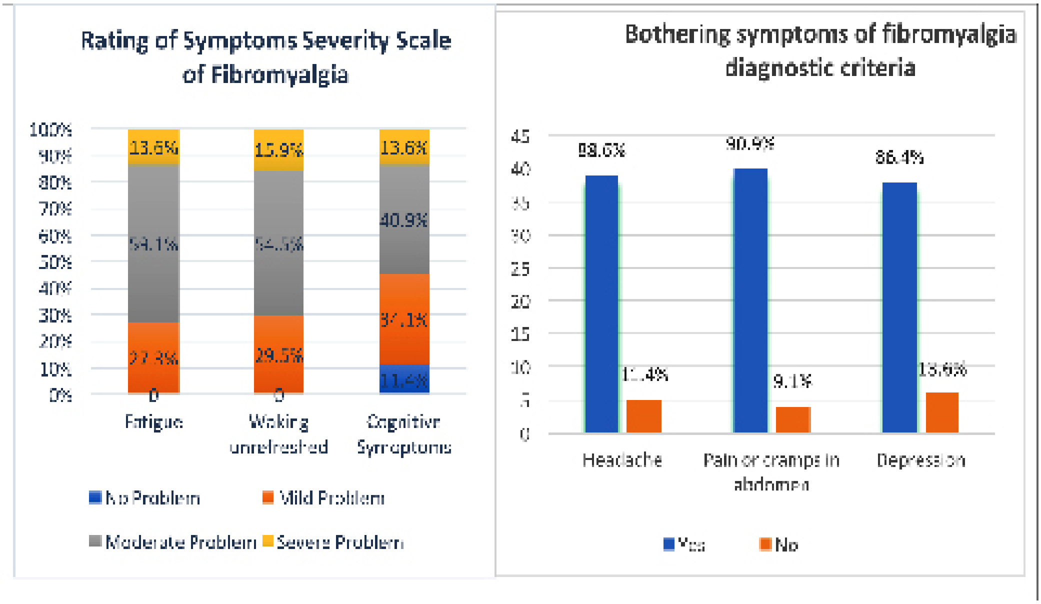

Figure (2): Rating symptoms severity scale and bothering symptoms of FM among affected students

Figure 2 showed rating of symptoms severity scale of FM as reported by affected students where 27.3%% and 59.1% reported mild and moderate problems of fatigue respectively, while 29.5% and 54.5% reported mild and moderate problems of waking unrefreshed respectively, meanwhile, 34.1% and 40.9% reported mild and moderate problems of cognitive symptoms. In addition, most affected participants reported bothering symptoms of headache, abdominal pain or cramps and depression (88.6%, 90.9% and 86.4%) respectively.

On investigating sleeping patterns that might be associated with FM: frequent waking up during sleep and sleep apnea were the only statistically significant variables. Other variables such as sleeping time, average hours of sleep/day, taking naps, snoring during sleep and taking sleeping pill did not reach a statistically significant level (P > 0.05). (Data was not tabulated).

Table (2): Correlation between health-related Quality of Life (QoL) scores and FM (No=300)

		FM diagnosis	Quality of life domain Scores				
			QOL	Physical	Psychological	Social	Environment
FM diagnosis	Pearson's correlation	1	-0.298	- 0.311	-0.213	-0.185	-0.041
(Mean ± SD) **0.354 ± 0.15**	Sig. (2. tailed)		0.000 *	0.000 *	0.000 *	0.001 *	0.480
QOL score	Pearson's correlation	-0.298	1	0.552	0.606	0.477	0.450
(Mean ± SD) 60.29 ± 21.87	(Sig. (2. tailed	0.000 **		0.000 *	0.000 *	0.00 **	0.000 **
Physical domain score	Pearson's correlation	-0.311	0.552	1	0.707	0.482	0.512
(Mean ± SD) 57.80 ±16.28	Sig. (2. tailed)	0.000 *	0.000 *		0.000 *	0.000*	0.000 *
Psychological Domain score	Pearson's correlation	-0.213	0.606	0.707	1	0.543	0.496
(Mean ± SD) 49.79 ±17.33	Sig. (2. tailed)	0.000*	0.000*	0.000 *		0.000 *	0.000 *
Social Domain score	Pearson's correlation	-0.185	0.477	0.482	0.543	1	0.468
(Mean ± SD) 54.75 ± 23.47	Sig. (2. tailed)	0.001 *	0.000 *	0.000 *	0.000 *		0.000*
Environment Domain score	Pearson's correlation	-0.041	0.450	0.512	0.496	0.468	
(Mean ± SD) 53.39 ± 17.11	Sig. (2. tailed)	0.480	0.000*	0.000 *	0.000*	0.000 *	1

QoL= Quality of life *Correlation is significant at the 0.01 level (2-tailed).

As illustrated in table 2;a statistically significant negative correlation was observed between FM diagnosis and three domains of quality of life including physical, psychological and social domain ($P < 0.01$), while environmental domain was negatively correlated with FM diagnosis, but was not statistically significant ($p>0.05$).

Table (3): Logistic regression of independent predictors of FM (No =300).

Variables	B	S. E	Wald	Sig.	Exp(B)	95% CI	
						Lower	Upper
Age	-0.388	0.176	4.833	**0.028***	0.679	0.480	0.959
Gender (female)	-2.485	1.019	5.943	**0.015***	0.083	0.011	0.614
BMI	1.534	0.971	2.495	0.114	4.636	0.691	31.092
Smoking	-0.223	1.871	0.014	0.905	0.800	0.020	31.290
Caffeine consumption	-0.459	0.715	0.412	0.521	0.632	0.156	2.566
Practice physical exercise	-0.883	0.708	1.552	0.213	0.414	0.103	1.658
University educational year	0.254	0.214	1.407	0.235	1.290	0.847	1.964
Average hours spent by electronic devices	0.171	0.384	0.198	0.657	1.186	0.558	2.521
Family history of fibromyalgia	0.696	0.858	0.658	0.417	2.006	0.373	10.791
Average hours of sleep/day	0.164	0.184	0.789	0.374	1.178	0.821	1.691
Presence of Comorbidities **Irritable bowel syndrome**	-0.131	0.666	0.039	0.844	0.877	0.238	3.234
Hypothyroidism	-1.940	1.394	1.936	0.164	0.144	0.009	2.209
Headache	0.571	0.758	0.568	0.451	1.771	0.401	7.828
Anxious or depressed mood	1.120	0.830	1.822	0.177	3.066	0.603	15.590
Diabetes	0.147	1.160	0.016	0.899	1.158	0.119	11.244

BMI: Body Mass Index *: Statistically significant ($p<0.05$)

As shown in table 3: Multiple logistic regression found that age (younger students) and gender (female) were the only significant predictors of FM among the studied group ($P < 0.05$)

Discussion

To our knowledge, this is the first study investigating FM syndrome among medical students at Ain Shams University using the modified 2016 ACR diagnostic criteria. The study aimed to assess the prevalence, determinants, and health-related quality of life impacts of FM in this group. The findings revealed that 14.7% of participants were affected (Table 1). This prevalence rate exceeded the general population prevalence for FM in the Eastern Mediterranean region, which ranges from 0.69% to 8.3% (Heidari et al., 2017). The elevated rate observed could be attributed to the unique stressors faced by medical students, including rigorous academic demands, prolonged study hours, and emotional strain (Alotaibi et al., 2020).This finding was consistent with a recent Egyptian study conducted at Kafr El Sheikh University Hospitals, and reported FM prevalence of 12.5% among medical students using the 2016 diagnostic criteria (Moghazy et al., 2023). However, a Turkish study reported a lower prevalence of 6.9% among medical students, likely due to the use of the older ACR 1990 criteria, which primarily focused on chronic pain history and tender point examination (Eyigor et al., 2008). Concerns regarding the validity of these older criteria led to recommendations against their continued use in clinical practice (Wolfe, 2003).

The significant association between poor physical activity and FM found in the current study emphasized the role of sedentary lifestyles as a contributing factor (Table 1). Previous research has demonstrated that regular physical activity can reduce pain severity and improve overall quality of life in affected individuals (Couto et al., 2022). Furthermore, the study found female gender and positive family history, to be significantly associated with FM (Table 1). These findings were consistent with prior research showing that female students were more prone to FM than their male counterparts (Patel et al., 2021). Similarly, an Egyptian study reported a higher FM prevalence among female university students, emphasizing the gender disparity in FM occurrence (Moghazy et al., 2023). The elevated prevalence among females may point to an inherent vulnerability linked to hormonal differences or psychosocial factors, warranting further exploration, also the significant association found between positive family history and

FM diagnosis emphasized the role of familial and genetic factors in its epidemiology. Similarly, Ablin and Buskila , 2015 reported higher incidences of FM and muscle tenderness among the parents and siblings of FM patients, suggesting substantial genetic elements in FM pathogenesis.

Additionally, irritable bowel syndrome and chronic low back pain were significantly associated with FM diagnosis (Table 1). Similar results were obtained by Tharwat et al., 2023. The significant association between FM and depressive mood found in present work emphasized the crucial link between mental and physical health. This bidirectional relationship, where chronic pain exacerbates mental health disorders and vice versa, has been extensively described in previous research (Yao et al., 2023).

Furthermore, the study found a significant association between fibromyalgia and severe post-COVID infection episodes (Table 1), recent evidence has highlighted an emerging link between severe COVID-19 infections and the development of fibromyalgia (FM), particularly in individuals who have experienced prolonged post-viral symptoms (Cankurtaran et al., 2021). The pathophysiology behind this link is still under investigation, but it is believed that COVID-19 may induce an inflammatory response that could trigger or exacerbate underlying genetic predispositions to FM. Additionally, viral infection may lead to immune system deregulation, causing an increase in cytokine levels and chronic inflammation, both of which are implicated in the development of FM. Interestingly, the overlap between Long COVID and fibromyalgia is an area of concern. Both conditions share common clinical features, including chronic widespread pain, cognitive dysfunction, and debilitating fatigue, which complicate diagnosis and treatment (Fialho et al., 2023).

In the present work, pain distribution was analyzed using the standardized Web Pain Index (WPI), providing key insights into FM symptomatology. Results identified the lower back (88.6%), right shoulder girdle (81.8%), neck (75%), and upper back (72.7%) as the most frequently reported areas of pain (Figure 1), reflecting FM's hallmark characteristic of widespread pain (Giorgi et al.,2023). Both genders reported significant pain in the lower back, neck, and upper back, emphasizing the critical involvement of the axial skeleton in FM. These findings aligned with previous studies suggesting that central sensitization, particularly in the axial area contributed to occurrence of FM through heightened pain perception and lower pain thresholds (Nijs et al., 2021). The study also examined FM-associated symptoms such as fatigue, sleep disturbances, and cognitive dysfunction. Over half of the participants reported moderate fatigue (59.1%) and waking unrefreshed (54.5%), while 40% experienced moderate cognitive symptoms (Figure 2). These findings emphasized the significant symptoms burden of FM, similarly Kang et al., 2022 claimed that individuals with FM frequently demonstrated a broad spectrum of debilitating symptoms that severely impacted their daily activities. In addition, study findings revealed that affected students experienced more bothersome symptoms such as headache (88.6%), abdominal pain (90.9%), and depressive mood (86.4%) (Figure 2). The current work also found a significant association between FM and sleep disturbances among the students. Nearly half of FM-affected students (57%) reported frequent waking during sleep, while 20.5% experienced sleep apnea (Data was not tabulated). These findings aligned with the results of Yu et al., 2021, authors suggested that sleeping disturbance was a hallmark feature of FM. Similarly, a Jordanian study found that 66% of affected medical students reported at least one sleep disorder using the SLEEP-50 questionnaire (Yassin et al., 2020). Poor sleep quality is known to exacerbate FM symptoms, creating a vicious cycle where sleep disturbances heighten pain sensitivity, fatigue, and cognitive impairments (Écija et al., 2020).

Another key finding in this study was the significant correlation between FM diagnosis and reduced Quality of Life across physical, psychological (Table 2), and social domains which confirm the results of Tharwat et al., 2019.

In the logistic regression analysis conducted in the current study, age and gender emerged as significant predictors of FM (Table 3). Younger students and females were more likely to experience FM symptoms. This was consistent with Petal et al., 2021, authors found that FM affected students tend to be younger and predominantly female. A possible explanation would be that younger medical students may encounter higher levels of stress, which may contribute to their FM symptoms, and overtime, they may acquire stress-coping mechanisms and gradually build resilience to the demanding learning environment.

Conclusion

A considerable percentage of study participates (14.7%) suffered from FM, the study highlighted several demographic factors significantly associated with FM, including younger age, female gender, low levels of physical activity, and positive family history. In terms of comorbidities, irritable bowel syndrome, chronic headache, depressive mood, and severe symptomatic post-COVID infections were found to be significantly associated. In addition, FM negatively impacted all aspects of quality of life, including physical, psychological, and social domains.

Recommendations

Integrating topics regarding FM epidemiology, the Biophysical Model of Pain and other causes of psychogenic pain into medical curriculum can improve early recognition and proper management. In addition, increasing students' awareness about this disorder and its possible risk factors through workshops, lectures and peer support would probably play an important role in mitigating its impact on their quality of life. Also, access to mental health services, stress management programs, and fitness facilities should be prioritized to support affected students.

Study limitations: This study was cross-sectional in design and accordingly causation cannot be proved. Further longitudinal research is needed to confirm causation and to explore the progression of FM and its long-term consequences.

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Conflict of interest

The authors declared that they have no conflict of interest.

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