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ORIGINAL RESEARCH

Prevalence and Associated Risk Factors of Fibromyalgia Among Schoolteachers in The Eastern Region of Saudi Arabia

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Purpose: Fibromyalgia (FMS) is a chronic pain syndrome characterized by widespread pain, fatigue, sleep disturbance, and cognitive dysfunction. It is more common in women, often underdiagnosed, and may be shaped by lifestyle and occupational factors. Teachers experience high physical and psychosocial demands, yet FMS prevalence in this group in Saudi Arabia remains unclear. This study assessed FMS prevalence among schoolteachers in the Eastern Province, identified risk factors, and explored its impact on work performance.

Patients and Methods: A cross-sectional study was conducted among 850 teachers aged ≥25 years from private and governmental schools. Participants completed a self-administered online survey including demographics, lifestyle, occupational, and health data, along with the validated Fibromyalgia Survey Diagnostic Criteria (FSDC, 2010 ACR). FMS prevalence and its associations with demographic and lifestyle factors were analyzed using chi-square and *t*-tests. Work performance was evaluated through self-reported measures of motivation, concentration, punctuality, absenteeism, and workplace relationships.

Results: Mean age was 44.8 (±8.7) years; 64% were female and 92.8% Saudi nationals. FMS prevalence was 14.4%, with only 4.5% previously diagnosed. FMS was significantly associated with female gender, divorced/widowed status, physical inactivity, and poor sleep, while BMI and age showed no significant association. Teachers with FMS reported lower motivation and concentration, but no differences were found in punctuality, absenteeism, or workplace relationships.

Conclusion: FMS affects approximately one in seven schoolteachers in the Eastern Province of Saudi Arabia, with the majority of cases remaining undiagnosed. Female gender, physical inactivity, and poor sleep were significantly associated with FMS. Teachers with FMS reported reduced work motivation and concentration. These findings highlight the need for increased awareness of FMS among educators and healthcare providers.

Keywords: fibromyalgia, occupational health, prevalence, risk factors, Saudi Arabia, schoolteachers

Introduction

Fibromyalgia syndrome (FMS) is a chronic condition characterized by widespread pain, unrefreshing sleep, fatigue, and cognitive difficulties, often coexisting with other somatic and psychological conditions.[1] It is considered a central sensitization syndrome arising from complex biological and psychosocial interactions, including neuroendocrine dysregulation and altered pain processing in the central nervous system.[1] Diagnosis relies on clinical criteria such as the American College of Rheumatology (ACR) 2010/2016 criteria,[2,3] as no reliable biomarkers exist. Despite increased awareness, FMS remains underdiagnosed, with patients often seeing multiple providers before receiving a correct diagnosis.[4]

Prevalence estimates of fibromyalgia vary widely due to differences in geographic region, population characteristics, and diagnostic criteria. In the general population, prevalence ranges from 0.2% in Venezuela using the ACR 1990 criteria

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to 6.4% in the United States based on the modified ACR 2010 criteria. Studies applying the modified 2010 criteria consistently report higher prevalence—such as 6.4% in the United States and 5.4% in Scotland—than those using the 1990 criteria, where estimates typically range from 0.2% to 4.7%. This variability across North America, South America, Europe, and Asia underscores the combined influence of methodological and population-specific factors.[5]

FMS disproportionately affects women, with prevalence among adult females ranging from 2.4% to 6.8%. In Turkey, studies applying physician-applied ACR 1990 criteria reported prevalence rates of 3.6% and 6.8%, whereas Norwegian studies based on self-reported medical diagnoses yielded lower estimates of 2.4% and 2.6%. Across diverse settings, fibromyalgia remains significantly more common in women than in men, consistent with its well-established epidemiological profile.[5] The disorder most commonly presents in mid-adulthood, typically between the third and fifth decades of life, though it can also occur in adolescents and older adults.[6]

FMS is a multifactorial condition shaped by both non-modifiable and modifiable risk factors. Non-modifiable factors include female sex and middle age, while modifiable factors encompass lifestyle and health-related determinants. Longitudinal studies have demonstrated increased risk among individuals with obesity or elevated body mass index, smokers, and those who abstain from alcohol.[7] Physical inactivity also appears influential; a large prospective Norwegian study reported a 30% higher risk of self-reported fibromyalgia among women with very low physical activity levels compared with their moderately active counterparts.[6]

Psychosocial and neurobehavioral factors further contribute to fibromyalgia susceptibility. Exposure to childhood adversity, chronic psychological stress, and mental health disorders has been consistently associated with increased risk. Sleep disturbance occupies a central role, functioning both as a defining symptom and an independent risk factor. Non-restorative sleep exacerbates pain sensitivity, and insomnia has been strongly linked to fibromyalgia onset. Comorbid conditions—including tension-type headache, migraine, irritable bowel syndrome, depression, and anxiety—frequently coexist and may reflect shared underlying pathophysiological pathways. Collectively, these data support a model in which fibromyalgia emerges from the interaction between biological vulnerability and environmental exposures, whereby physical inactivity, smoking, psychosocial stress, and disordered sleep act synergistically to drive nociplastic pain.[7]

From an occupational health perspective, fibromyalgia and related musculoskeletal disorders are increasingly recognized as conditions of workplace relevance. Occupations characterized by repetitive movements, prolonged standing, suboptimal ergonomics, and high psychosocial stress consistently report higher rates of musculoskeletal complaints. Teaching exemplifies such an occupation, combining sustained physical demands with substantial emotional and cognitive stress. Teachers routinely spend prolonged hours standing or writing, manage large classrooms, and face considerable workload and performance pressures. Reflecting this burden, surveys in Saudi Arabia have documented exceptionally high rates of work-related musculoskeletal pain among teachers. A cross-sectional study from the Qassim region reported that 91% of schoolteachers experienced musculoskeletal pain in the preceding year, most commonly involving the lower back.[8] Similarly, a study of Israeli kindergarten teachers found a markedly higher prevalence of fibromyalgia compared with the general population, attributing symptoms to occupational stressors such as large class sizes, physical demands, and systemic pressures within the education sector.[9]

Despite this plausible association, a clear research gap persists regarding the prevalence of fibromyalgia among educators. Most epidemiological studies have focused on general or clinical populations, with limited attention to occupational cohorts. In Saudi Arabia, no published studies have specifically evaluated fibromyalgia among schoolteachers, despite evidence that this group frequently experiences unexplained pain and fatigue.[8] Given the country's high national prevalence of FMS[10] and the substantial musculoskeletal burden observed in teachers,[8] investigating fibromyalgia in this population is both timely and warranted. Such data may elucidate occupation-specific risk factors, inform targeted workplace health interventions, and ultimately improve teachers' quality of life and work performance.

Accordingly, this study aimed to determine the prevalence of fibromyalgia syndrome among schoolteachers in the Eastern Province of Saudi Arabia, identify associated risk factors, and assess its impact on work performance.

Materials and Methods

This cross-sectional study was conducted among schoolteachers in the Eastern Province of Saudi Arabia. Data were collected between January and June 2024. Convenience sampling was used to recruit participants through social media

platforms. Based on an estimated FMS prevalence of 13% in Saudi Arabia, a 95% confidence level, and a 3% margin of error, the minimum required sample size was approximately 480 participants. Our final sample of 850 teachers exceeded this requirement. Teachers aged 25 years or older, working in governmental or private schools, and able to read Arabic were eligible. Participation was voluntary and anonymous.

Data were collected using a structured, self-administered electronic questionnaire (QuestionPro®) distributed via social media platforms. Informed consent was obtained electronically prior to participation. The questionnaire comprised sections on demographic characteristics (sex, nationality, age, marital status, and number of children), occupational details (administrative roles, teaching experience, subject taught, age group of students, weekly teaching hours, annual absences, and extracurricular duties), health profile (sleep duration, physical activity, chronic comorbidities, previous diagnosis of FMS, and duration since diagnosis), and work performance, which was evaluated using a 10-point numeric rating scale (1 = very poor, 10 = excellent) covering nine domains of occupational functioning: motivation to work, punctuality, absenteeism, early work departure, concentration, interpersonal relationships with colleagues, students, and management, and overall work quality. The final section applied the Fibromyalgia Survey Diagnostic Criteria (FSDC) based on the 2010 American College of Rheumatology (ACR) criteria.[11] Physical activity was assessed by asking participants how many times per week they engaged in physical activity such as fast walking, gym exercises, or sports. Response options included: none, 1–3 times per week, 3–5 times per week, or 6–7 times per week.

The FSDC included the Symptom Severity Score (SSS), ranging from 0 to 12, which assessed three core symptoms (waking unrefreshed, cognitive difficulties, and fatigue) and three additional symptoms (depression, abdominal cramping, and headache), and the Widespread Pain Index (WPI), ranging from 0 to 19, which recorded pain in 19 non-articular sites. Participants were classified as having FMS if they met either of the following: WPI ≥7 and SSS ≥5, or WPI between 3 and 6 with SSS ≥9, with symptoms persisting for at least three months and no alternative diagnosis to explain the pain.

Statistical analysis was performed using IBM SPSS Statistics, version 26.0 (Armonk, NY: IBM Corp). Categorical variables were presented as frequencies and percentages, while continuous variables were summarized as means and standard deviations. Chi-square tests were used to examine associations between categorical variables and FMS status. Independent samples *t*-tests were used to compare continuous variables (work performance scores) between teachers with and without FMS. Statistical significance was set at $p < 0.05$.

Results

A total of 850 schoolteachers participated in the study, comprising 544 females (64.0%) and 306 males (36.0%), with a mean age of 44.8 ± 8.7 years. The largest age group was 41–50 years (46.5%), and most participants were married (88.6%) and of Saudi nationality (92.8%). More than half taught at the elementary level (52.1%), followed by high school (25.5%) and intermediate level (22.4%). The mean duration of employment was 17.8 ± 8.3 years and mean weekly teaching hours were 19.6 ± 8.3 hours. Most participants (68.9%) perceived their workload as high, and 57.3% reported performing tasks other than teaching. The history of chronic disease was reported by 31.5%, while only 4.5% had a family history of FMS. The majority (59.3%) reported sleeping 5–6 hours per day, and only 36.4% engaged in regular physical activity. The mean BMI was 28.3 ± 5.2 kg/m^2, with 73.1% classified as overweight or obese (Table 1).

The proportion of participants with a Symptom Severity Score (SSS) ≥5 was 53.8%, while a Widespread Pain Index (WPI) ≥7 was recorded in 52.0% (Table 2). Based on the 2010 ACR criteria, FMS was identified in 122 participants, giving a prevalence of 14.4% (Figure 1).

Table 1 Demographic Characteristics

Variable	Category	N	Percentage (%)
Sociodemographic			
Gender	Male	306	36.0
	Female	544	64.0

(*Continued*)

Table 1 (Continued).

Variable	Category	N	Percentage (%)
Age (years)	20–30	40	4.7
	31–40	210	24.7
	41–50	395	46.5
	51–60	182	21.4
	>60	23	2.7
Nationality	Saudi	789	92.8
	Non-Saudi	61	7.2
Marital status	Single	54	6.4
	Married	753	88.6
	Divorced/Widowed	43	5.1
Work Characteristics			
Level of teaching	Elementary	443	52.1
	Intermediate	190	22.4
	High school	217	25.5
Subject matches specialty	Yes	700	82.4
	No	150	17.6
Workload perceived as high	Yes	586	68.9
	No	264	31.1
Tasks other than teaching	Yes	487	57.3
	No	363	42.7
Administrator responsibilities	Yes	255	30.0
	No	595	70.0
Lifestyle			
Sleeping hours/day	1–2 h	3	0.4
	3–4 h	76	8.9
	5–6 h	504	59.3
	7–8 h	237	27.9
	>8 h	30	3.5
Physical activity	Yes	309	36.4
	No	541	63.6
Physical activity frequency/week	1–3 times	183	21.5
	3–5 times	100	11.8
	6–7 times	26	3.1

(*Continued*)

Table 1 (Continued).

Variable	Category	N	Percentage (%)
Health Status			
Chronic disease	Yes	268	31.5
	No	582	68.5
Diagnosed with FMS	Yes	38	4.5
	No	812	95.5
History of absence from work	Yes	112	13.2
	No	738	86.8
BMI category	< 18.5	7	0.8
	18.5–24.9	222	26.1
	> 24.9	621	73.1
Continuous Variables			
Age (years)	Mean ± SD	44.8 ± 8.7	
Duration of employment (years)	Mean ± SD (range)	17.8 ± 8.3 (1–37)	
Teaching hours/week	Mean ± SD (range)	19.6 ± 8.3 (2–90)	
BMI	Mean ± SD	28.3 ± 5.2	

Table 2 Fibromyalgia Symptoms Distribution

Symptom	Category/Severity	N	Percentage (%)
Symptom Severity Levels (0–3)			
Fatigue	0	234	27.5
	1	295	34.7
	2	230	27.1
	3	91	10.7
Trouble thinking	0	305	35.9
	1	283	33.3
	2	198	23.3
	3	64	7.5
Waking up tired	0	231	27.2
	1	264	31.1
	2	226	26.6
	3	129	15.2

(*Continued*)

Table 2 (Continued).

Symptom	Category/Severity	N	Percentage (%)
Binary Symptoms (Yes/No)			
Pain/cramps in lower abdomen	Yes	384	45.18
Depression	Yes	260	30.59
Headache	Yes	596	70.12
Symptom severity score (≥5)	Yes	457	53.8
	No	393	46.2
Pain Locations (Yes)			
Left shoulder	Yes	263	30.94
Right shoulder	Yes	255	30.0
Left hip	Yes	141	16.59
Right hip	Yes	150	17.65
Left upper arm	Yes	104	12.24
Right upper arm	Yes	110	12.94
Left lower arm	Yes	45	5.29
Right lower arm	Yes	47	5.53
Left upper leg	Yes	103	12.12
Right upper leg	Yes	96	11.29
Left lower leg	Yes	117	13.76
Right lower leg	Yes	97	11.41
Left jaw	Yes	24	2.82
Right jaw	Yes	20	2.35
Chest	Yes	79	9.29
Abdomen	Yes	115	13.53
Lower back	Yes	129	15.18
Upper back	Yes	384	45.18
Neck	Yes	313	36.82
Widespread Pain Index & General Pain			
Pain in ≥7 areas past 3 months (WPI ≥7)	Yes	98	11.5
	No	752	88.5
Pain in any area past 3 months	Yes	442	52
	No	408	48

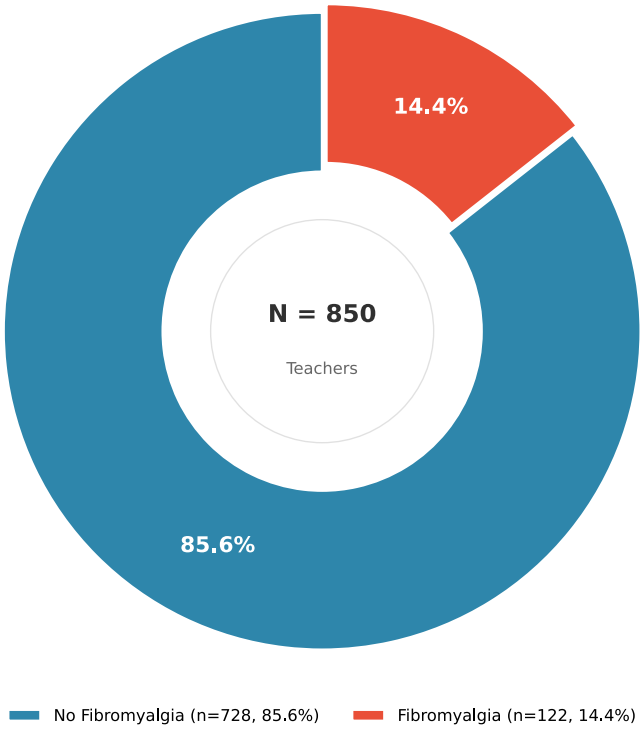

Figure 1 Prevalence of Fibromyalgia Syndrome among schoolteachers in the Eastern Province of Saudi Arabia (N=850).

Comparison of work performance between teachers with and without FMS (Table 3) revealed significantly lower motivation scores among those with FMS (6.48 ± 2.8 vs 7.25 ± 2.4; p = 0.002) and reduced concentration (8.16 ± 2.3 vs 8.62 ± 2.0; p = 0.023). No significant differences were found in punctuality, absenteeism, leaving work early, interpersonal relationships, or quality of work.

Analysis of factors associated with FMS (Table 4) showed significantly higher prevalence among females (88.5% vs 11.5% in males; p < 0.001), Saudi nationals (97.5% vs 2.5%; p = 0.03), and divorced/widowed individuals (9.8% vs 4.3%; p = 0.022). Physical activity was protective, with lower prevalence in active individuals (25.4% vs 38.2%; p = 0.007), and frequency of exercise showed a significant association (p = 0.013). Sleep duration was also associated: teachers with FMS

Table 3 Work-Related Performance Comparison Between Fibromyalgia and Non-Fibromyalgia Groups

Work Performance Variable	Overall (Mean ± SD)	Fibromyalgia (Mean ± SD)	No Fibromyalgia (Mean ± SD)	P-value
Motivation to come to work	7.14 ± 2.5	6.48 ± 2.8	7.25 ± 2.4	0.002
Punctuality of arrival	8.19 ± 2.56	8.02 ± 2.7	8.21 ± 2.5	0.45
Absence from work	5.16 ± 3.99	5.52 ± 3.9	5.09 ± 4.0	0.28
Leaving work early	5.64 ± 3.65	5.38 ± 3.7	5.68 ± 3.6	0.39
Work concentration	8.55 ± 2.05	8.16 ± 2.3	8.62 ± 2.0	0.023
Relationship with colleagues	9.19 ± 1.89	9.19 ± 1.7	9.19 ± 1.9	0.90
Relationship with students	9.17 ± 1.85	9.37 ± 1.4	9.13 ± 1.9	0.193
Relationship with the manager	8.97 ± 2.02	8.85 ± 2.0	8.99 ± 2.0	0.49
Quality of work	8.90 ± 1.91	8.98 ± 1.8	8.88 ± 1.9	0.65

Note: P-values were calculated using independent samples *t*-test.

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Table 4 Association Between Selected Variables and the Presence of FMS

Variable	Category	Fibromyalgia Yes (n, %)	Fibromyalgia No (n, %)	P-value
Gender	Male	14 (11.5%)	292 (40.1%)	< 0.001
	Female	108 (88.5%)	436 (59.9%)	
Age	20–30	2 (1.6%)	38 (5.2%)	0.08
	31–40	27 (22.1%)	183 (25.1%)	0.47
	41–50	63 (51.6%)	332 (45.6%)	0.21
	51–60	28 (23%)	154 (21.2%)	0.65
	>60	2 (1.6%)	21 (2.9%)	0.41
Nationality	Saudi	119 (97.5%)	670 (92%)	0.03
	Non-Saudi	3 (2.5%)	58 (8%)	
Marital status	Single	5 (4.1%)	49 (6.7%)	0.022
	Married	105 (86.1%)	648 (89%)	
	Divorced/Widowed	12 (9.8%)	31 (4.3%)	
Level of Teaching	Elementary school	62 (50.8%)	381 (52.3%)	0.35
	Intermediate school	37 (30.3%)	180 (24.7%)	
	High school	23 (18.9%)	167 (22.9%)	
BMI	< 18.5	2 (1.6%)	5 (0.7%)	0.18
	18.5–24.9	25 (20.5%)	197 (27.1%)	
	> 24.9	95 (77.9%)	526 (72.3%)	
Administrator responsibilities	Yes	42 (34.4%)	213 (29.3%)	0.24
	No	80 (65.6%)	515 (70.7%)	
Physically Active	Yes	31 (25.4%)	278 (38.2%)	0.007
	No	91 (74.6%)	450 (61.8%)	
Exercise frequency/week	1–3 times	23 (18.9%)	160 (22%)	0.013
	3–5 times	8 (6.6%)	92 (12.6%)	
	6–7 times	0 (0%)	26 (3.6%)	
Number of sleeping hours/day	1–2	0 (0%)	3 (0.4%)	0.5
	3–4	22 (18%)	54 (7.4%)	0.0001
	5–6	75 (61.5%)	429 (58.9%)	0.58
	7–8	20 (16.4%)	217 (29.8%)	0.0023
	>8	5 (4.1%)	25 (3.4%)	0.69

Note: P-values were calculated using chi-square test.

were more likely to report 3–4 hours of sleep (18.0% vs 7.4%; p = 0.0001) and less likely to report 7–8 hours (16.4% vs 29.8%; p = 0.0023). Age, BMI, and administrative responsibilities were not significantly associated with FMS.

Discussion

This cross-sectional study provides novel insights into the burden of fibromyalgia among schoolteachers in Saudi Arabia, revealing a prevalence that is substantial and noteworthy in both local and global contexts. We found that 14.4% of participating schoolteachers met the survey criteria for fibromyalgia, a figure that underscores the potential occupational impact of this condition. This prevalence is comparably high: it approaches the recently reported overall FMS prevalence of ~13% in the Saudi general population[10] and far exceeds the prevalence typically reported in general populations worldwide.[5]

The elevated rate among Eastern Province teachers aligns with observations from other countries that certain educator populations are at increased risk. For example, an Israeli study reported a 9.3% fibromyalgia prevalence in schoolteachers – a much higher than the rate in the general Israeli populace – plausibly linked to the chronic stress of the teaching profession.[12] In an even more striking example, Buskila et al documented a 25.6% prevalence of fibromyalgia symptoms among Israeli kindergarten teachers, a cohort comprised almost entirely of women and subject to intense occupational stressors.[9] Our findings are consistent with previous studies reporting elevated FMS prevalence among educators. Workplace-related physical demands, together with ongoing psychological stressors — such as intensive workloads, multiple administrative requirements, interactions with parents, and demands from the educational system — may serve as triggers for the nociplastic pain processes characteristic of FMS.[9] Moreover, the high prevalence observed in our study suggests that FMS may contribute to the musculoskeletal pain and fatigue complaints reported in this population. This has important implications for occupational health: if unrecognized, fibromyalgia in educators might lead to reduced work performance and increased sick leave, affecting not only the individuals but also student outcomes and institutional productivity. The elevated fibromyalgia prevalence among teachers appears to be part of a broader pattern linking high-stress caregiving or "helping" professions to FMS. A parallel study in Israel examined hospital nursing staff, who also experience chronic workplace stress, and found a similarly high prevalence: about 9.7% of nurses were diagnosed with fibromyalgia.[13]

A striking finding in our study was the discrepancy between fibromyalgia *symptoms* and *diagnoses* in this population. While 14.4% met the fibromyalgia survey criteria, only 4.5% of all participants reported having a confirmed medical diagnosis of FMS. In other words, nearly two-thirds of those who screened positive for fibromyalgia were previously undiagnosed. This gap highlights a classic issue in fibromyalgia care – underdiagnosis – and suggests that many teachers in our cohort have been silently suffering from chronic pain and fatigue without proper recognition or treatment. Fibromyalgia's diagnostic complexity is well documented: patients often experience delays of several years before receiving a diagnosis, and misdiagnosis with other conditions (such as rheumatoid arthritis, depression, or chronic fatigue syndrome) is common.[4] One possible reason is that teachers (and even healthcare providers evaluating them) might attribute symptoms to work stress or minor rheumatic issues, thus not pursuing a fibromyalgia evaluation. Additionally, because fibromyalgia lacks objective tests, it may be dismissed as non-specific complaints. The use of the Fibromyalgia Survey Diagnostic Criteria (FSDC) questionnaire in our study likely captured milder or undiagnosed cases that had not come to medical attention. This finding underscores the importance of proactive screening and awareness. Regular health check-ups for teachers could include brief fibromyalgia questionnaires, enabling early identification of those meeting criteria for further evaluation. Such an approach could substantially reduce the proportion of "missed" fibromyalgia cases and facilitate timely management.

Our analysis of risk factors and correlations provides further context by linking the study's findings with known fibromyalgia determinants. Female gender was strongly associated with fibromyalgia in our teacher sample. This is consistent with the extensive body of evidence that FMS disproportionately affects women.[14–17] Notably, women constituted about 64% of our respondents but an even higher percentage of those meeting FMS criteria, reinforcing that female teachers bear a particularly high burden of fibromyalgia. This mirrors national data; the Saudi meta-analysis found fibromyalgia to be more common in women,[5] in line with international trends.[14–17] We also found marital status to be a significant factor: teachers who were divorced or widowed had higher odds of fibromyalgia compared to their married peers. Although marital status per se is not a well-established risk factor in the fibromyalgia literature, this

association may reflect underlying psychosocial stress. Being divorced or widowed can confer increased emotional stress, social isolation, or economic hardship – all of which are known to affect chronic pain conditions. Stressful life events and low social support have been linked to fibromyalgia onset in some studies.[18,19]

Lifestyle factors, notably physical activity level and sleep quality, emerged as important correlates of fibromyalgia in our study – in agreement with existing literature.[6,7,20] Teachers reporting a sedentary lifestyle (little to no regular exercise) were significantly more likely to meet FMS criteria, In fact, physically active individuals in our cohort were less likely to have FMS compared to their inactive counterparts (25.4% vs 38.2%, p = 0.007). This is in line with epidemiological findings that physical inactivity is associated with higher risk of chronic widespread musculoskeletal pain. For example, in a prospective cohort of 75,485 Norwegian women, those reporting a very low physical activity level had a 31% higher risk of self-reported fibromyalgia over a median follow-up of 10 years, compared with those reporting a moderate physical activity level.[6] A recent systematic review further supports this association, showing that aerobic exercise exerts a consistent hypoalgesic effect in individuals with chronic musculoskeletal pain, with all included studies reporting increased pressure pain thresholds or reduced pain ratings following exercise. The authors proposed that these effects may be mediated through activation of descending pain inhibitory pathways, stimulation of endogenous opioid and beta-endorphin release, engagement of the endocannabinoid system, and enhancement of conditioned pain modulation, collectively leading to reduced pain sensitivity.[21] Importantly, evidence also suggests that exercise benefits are not limited to musculoskeletal pain in general, but extend specifically to fibromyalgia.[22] Additionally, being physically inactive could be partly a result of fibromyalgia; individuals with chronic pain often avoid exercise for fear of aggravating symptoms[23,24] Thus, causality may run in both directions. Regardless, our findings reinforce the message that encouraging physical activity is vital. In the context of schoolteachers, incorporating workplace wellness programs (such as group exercise sessions or ergonomic training to reduce physical strain) might help reduce fibromyalgia risk and improve general musculoskeletal health.

It is worth noting that other related factors like body mass index (BMI) did not show a significant association with FMS in our data, even though obesity is a known risk factor in some populations.[6] The lack of a BMI effect could be due to limited variability (most of our participants had a BMI in the overweight range) or because physical inactivity and BMI are closely intertwined, making it hard to disentangle their effects. Our results suggest that in this teacher population, fitness level (activity) was a more prominent discriminator than BMI category for fibromyalgia, though we cannot rule out BMI as a contributor entirely.

Poor sleep quality was also significantly associated with fibromyalgia in our cohort, consistent with prior research. Sleep disturbance is recognized as one of the most prevalent and disabling symptoms in FMS, affecting up to 90% of patients and contributing to daytime fatigue, cognitive impairment, and reduced quality of life.[25] A systematic review of 16 quantitative studies found that greater pain intensity in FMS was consistently linked to poorer sleep quality, reduced efficiency and duration, longer sleep onset latency, and increased total wake time. Importantly, the relationship between pain and sleep in FMS appears bidirectional, with sleep disturbance not only resulting from pain but also exacerbating pain sensitivity.[25] These findings underscore the clinical importance of addressing sleep disturbance as part of a comprehensive management strategy for FMS.

Fibromyalgia's impact on work performance and daily functioning is a critical concern, especially in an occupation responsible for education quality. Although the primary focus of our study was prevalence and risk factors, the implications of our findings suggest that fibromyalgia could be affecting teachers' ability to work effectively.

Prior studies outside Saudi Arabia have documented these consequences. For instance, a study on Israeli educators found that teachers with fibromyalgia had lower motivation to work, significantly higher rates of work absenteeism and were more likely to leave work early due to symptoms, compared to teachers without fibromyalgia.[9] Compared to the Israeli cohort described by Buskila et al,[12] which showed higher absenteeism and early departure among teachers with FMS, our data revealed no significant differences in punctuality, absenteeism, or early leaving between FMS and non-FM teachers—findings that are consistent with a presenteeism pattern, whereby individuals remain at work despite symptoms, potentially at the cost of well-being and on-task performance. Notably, this concealed burden was evident in our motivation and concentration outcomes: teachers with FMS reported lower motivation to come to work and reduced work concentration. In our context, cultural norms around duty fulfillment, job-security considerations, and economic

pressures likely encourage attendance despite pain and fatigue, thereby attenuating differences on attendance-based metrics while amplifying subtler decrements in engagement and cognitive efficiency. Interpersonal domains were also preserved—there were no significant differences in relationships with colleagues, students, or managers (all $p > 0.19$)—suggesting that professional rapport and school culture may buffer social functioning even as internal load increases. Together, these findings argue that conventional attendance indicators understate the occupational impact of FMS. Effective workplace strategies should address multiple areas of worklife, including workload, control, reward, community, fairness, and values,[26] rather than relying solely on absenteeism as a proxy for disease burden. Targeted interventions such as symptom-responsive scheduling, workload pacing, and quiet work periods may help support cognitive function and overall wellbeing in affected teachers.

Conclusion

Understanding the study's constraints is essential for interpreting the findings. The cross-sectional design limits causal inference; we cannot determine whether poor sleep or inactivity caused fibromyalgia or resulted from it. Case identification relied on the validated Fibromyalgia Survey Diagnostic Criteria, which, while robust for surveys, cannot replace clinical assessment and may misclassify cases. Selection bias is possible, as recruitment through online channels may have attracted those with pain symptoms, potentially overestimating FMS prevalence. Additionally, work performance was assessed through self-reported measures, which may be subject to recall bias or social desirability bias. The small number of divorced/widowed participants (n=43) limits the generalizability of the marital status association. The sample was predominantly Saudi, female, and from the Eastern Province, which may limit generalizability. Unmeasured factors such as depression, anxiety, and workplace stressors could confound associations. Recall bias is also possible, as fibromyalgia status and lifestyle factors were reported simultaneously. Despite these limitations, the large sample and standardized tool strengthen the findings.

Looking ahead, several research avenues could strengthen the evidence base. Longitudinal studies in educators could clarify causal pathways between risk factors and fibromyalgia. Interventional trials—focusing on sleep, stress management, and physical activity—may test prevention and symptom reduction. Qualitative research could uncover workplace triggers overlooked by surveys. Expanding research to other Saudi regions and high-risk occupations would improve representativeness. Increasing awareness among healthcare providers and incorporating chronic pain screening into school health checks may enhance early detection and care.

This study found that FMS affects approximately one in seven schoolteachers in the Eastern Province of Saudi Arabia, with the majority of cases remaining undiagnosed. Female gender, physical inactivity, and poor sleep were significantly associated with FMS. Teachers with FMS reported reduced work motivation and concentration. These findings highlight the need for increased awareness of FMS among educators and healthcare providers. Future longitudinal studies are needed to better understand the relationship between occupational factors and FMS in this population. This research may inform strategies for early detection and targeted interventions to support affected teachers and prevent fibromyalgia-related disability in the education sector.

Institutional Review Board Statement

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Imam Abdulrahman Bin Faisal University (IRB No.: IRB-2022,01-529).

Data Sharing Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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