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The prevalence and factors associated with musculoskeletal pain among medical students at Ibn Sina National College, Jeddah, Saudi Arabia

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ABSTRACT

Background: Musculoskeletal pain (MSP), especially low back pain (LBP); ranked one of the main leading causes of disability particularly among those with significant physical and psychological efforts. *Objectives:* The study aimed to describe the pattern of MSP among medical students and its underlying factors. *Methods:* A cross-sectional survey was conducted online at out institution from April through June 2021. The survey included the demographic and clinical data, lifestyles, psychological conditions and the validated Oswestry low back pain questionnaire to assess the disability index. *Results:* Among 354 students, 51.1% had MSP mainly LBP (82.3%); and of minimal disability (72.9%). Students with MSP showed significantly higher BMI (p=0.000), duration of computer use (p=0.009), both depressive (p<0.001) and psychosomatic (p=0.013) symptoms, with lower smoking (p=0.047), and exercise duration (p=0.001). Moderate disability was reported in 27.1% with functional limitations in lifting, pain severity, and sitting. Only few students with MSP (21%) sought medical consultation. Significant predictors to disability index were age (OR: -0.22, 95% CI -2.21- -0.371, P=0.006), duration of computer use (OR: -0.15, 95% CI: -3.58- -0.06, P=0.043), medical consultation (OR: 0.29, 95% CI: 1.03-12.09, p=0.020), radiological (OR: -0.32, 95% CI: -16.24- -2.99, p=0.005), and laboratory investigation, (OR: 0.20, 95% CI: 0.96-10.40, p=0.019). *Conclusion:* Our study provides an alarming finding of a high prevalence of MSP mainly LBP among medical students of both genders while, the pain significantly affects their daily activities and psychological condition.

Keywords: Musculoskeletal pain, Low back pain, Medical students, Disability, Functional limitations.

1. INTRODUCTION

Musculoskeletal pain (MSP) affects a significant proportion of people from different society, particularly those whose work needs significant physical and

psychological effort (Hartvigsen et al., 2018). Among MSP, low back pain (LBP) ranked one of three leading causes of disability-adjusted life years in the 2017 Global Disability Burden Report (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2017). Therefore, LBP and its resulting functional limitations turn into epidemic health and socioeconomic issue. It is estimated that up to 80% of adults of both gender living in United States would have LBP in their lifetimes with a possible 5 to 10% chronicity and approximately 1% disability (Waxman et al., 2000).

Despite the high frequency, its underlying causes are still unidentifiable in most cases with a possible interaction between different physical, occupational, and psychological factors (Hayes et al., 2009). Risk factors for MSP development have increased over years especially among those who spend prolonged time studying or training as for medical students and health care workers (Harknee et al., 2005; Radcliffe & Lester, 2003). MSP has been reported among health care workers including medical students in many countries (Smith et al., 2003; Smith et al., 2004; Haroon et al., 2018; Dighriri et al., 2019; Algarni et al., 2017).

Chronic MSP is rarely a self-limiting disorder and usually its course is quite variable in severity leading to impaired quality of life and possible academic difficulties (Hestbæk et al., 2003; Roux et al., 2005; Meerding et al., 2005). Therefore, the current study was planned to describe pattern of MSP among medical students, and to determine its underlying factors.

2. METHODS

Subjects and Methods

This is a cross-sectional survey using online questionnaire; the study was collected by using researchers from Ibn Sina National College (ISNC) period between from April 2021 and June 2021. The sample size of at least 242 was calculated using G*power with an alpha of 0.05 and power of 0.95. The sample size separated into two groups regarding to the presence of MSP. The participants were selected using non-probability convenient sample over the study period (3 months). Voluntary response convenient samples of men and women medical students of different academic years were included. Students with rheumatological diseases, under immunosuppressive therapy or chronic analgesics for any cause were excluded. Pregnant students and those not completing all the survey questions were also excluded.

The online google form included the demographic data, family history of joint diseases, life styles, psychological condition and the point prevalence of MSP (the presence of MSP at the moment of filling out the form). BMI data was self-reported. Students with MSP then respond to the validated Oswestry low back pain questionnaire. The questionnaire contained 10 sections; for each section the total possible score was 5. Nine sections were completed (Sexual activity section was not applicable) and the total disability index was calculated based on the total possible score of 45.

Interpretation of disability index: 0%to 20%: minimal disability: The patient can overcome most living activities. 21% to 40%: moderate disability: The patient experiences pain and difficulty with sitting, lifting, and standing. Travel and social life are more difficult and they may be disabled from work. Personal care, sexual activity, and sleeping are not extremely affected.

41% to 60%: severe disability: Pain is still the main problem in this group but interfere with their daily life.

61% to 80%: crippled: Back pain disturbs all aspects of the patient's life.

81%-100%: These patients are either bed-bound or exaggerating their symptoms.

Ethical approval was taken from ISNC Research and Ethics Committee (IEC Ref No: H-21-19102020). The online structured pre-coded survey started with the informed consent after declaring the study objectives and ensuring confidentiality. Participation in the research is voluntary. During the online survey, participants were informed of the purpose of the research and their right to reject to participate. Maintain ethical behavior throughout data collection and the research process.

Data was collected and coded before being entered into the Statistical Package for Social Sciences. The descriptive analysis was conducted for all variables. Comparison between those with and without MSP and between those with minimal and moderate disabilities was done using non-parametric test (Kruskal Wallis test) and univariate analysis Chi-square test.

Multivariate linear regression analysis "Enter" method was conducted to determine the independent predictors of disability index. For each variable, the odds ratio (OR), and the 95% confidence interval (CI) were presented and computed directly from the logistic regression. A two tailed p-value less than 0.05 statistically significant.

3. RESULTS

Completed questionnaires were returned by 354 medical students from different academic years especially the 6th year (41.4%). Respondents were mainly females (80.1%), of a median college age (23 (IQR 2) years) and a high median GPA (4 (IQR 0.62). A half of the participating medical students had MSP (181 (51.1%)). Both students with and without MSP were matched concerning their demographic data except the age as students with MSP were significantly younger than those without (p=0.041), (Table 1).

Table 1 Demographic characteristic of the medical students with and without MSP

		All students N= 354 N (%)	Students with no MSP N=173 N (%)	Students with MSP N=181 N (%)	P
Age: median (IQR): years		23 (3)	24 (3)	23 (2)	0.041*
GPA: median (IQR)		4 (0.62)	4 (0.62)	4 (0.82)	0.413
Gender	Females	263 (74.5%)	118 (68.2%)	145 (80.1%)	0.064
	Males	90 (25.5%)	54 (31.2%)	36 (19.9%)	
Academic year	2nd	38 (10.7%)	15 (8.7%)	23 (12.7%)	0.284
	3rd	69 (19.5%)	34 (19.7%)	35 (19.3%)	
	4th	45 (12.7%)	26 (15.0%)	19 (10.5%)	
	5th	52 (14.7%)	23 (13.3%)	29 (16.0%)	
	6th	150 (42.4%)	75 4(3.4%)	75 (41.4%)	
Family history of spinal diseases		53 (15.0%)	21 (12.1%)	32 (17.7%)	0.140
Family history of gout		78 (22.0%)	34 (19.7%)	44 (24.3%)	0.155

MSP: musculoskeletal pain, *p<0.05: significant.

Lifestyle and psychological condition of the participating medical students were less favorable for medical students with MSP as they had significantly higher BMI (p=0.000), duration of computer use (p=0.009), both depressive (p<0.001) and psychosomatic (p=0.013) symptoms, with lower frequency of smoking (p=0.047), and duration of exercise (p=0.001), (Table 2).

Table 2 Lifestyle and psychological condition of the participating medical students

		All students N= 354 N (%)	Students without MSP N =173 N (%)	Students with MSP N=181 N (%)	P
Smoking		83 (23.4%)	45 (26.0%)	38 (21.0%)	0.047*
BMI: median (IQR)		22 (5.2)	21.2 (4.5)	23.1 (5.5)	<0.001*
Exercise duration weekly	No	95 (26.8%)	37 (21.4%)	58 (32.0%)	0.001*
	<1 h	91 (25.7%)	36 (20.8%)	55 (30.4%)	
	1-2 h	73 (20.6%)	49 (28.3%)	24 (13.3%)	
	2-3 h	42 (11.9%)	23 (13.3%)	19 (10.5%)	
	3-4 h	53 (15.0%)	28 (16.2%)	25 (13.8%)	
Computer duration weekly	No	17 (4.8%)	9 (5.2%)	8 (4.4%)	0.009*
	1-2 h	28 (7.9%)	10 (5.8%)	18 (9.9%)	
	2-4 h	73 (20.6%)	42 (24.3%)	31 (17.1%)	
	>4 h	236 (66.7%)	112 (64.7%)	124 (68.5%)	
Place of study	On bed	71 (20.1%)	32 (18.5%)	39 (21.5%)	0.215
	On table	96 (27.1%)	43 (24.9%)	53 (29.3%)	

	Both	187 (52.8%)	98 (56.6%)	89 (49.2%)	
Feeling depressed		203 (57.3%)	73 (42.3)	131 (72.4%)	<0.001*
Having psychosomatic symptoms		110 (31.1%)	34 (19.6%)	77 (42.5%)	0.013*

MSP: musculoskeletal pain, BMI: body mass index, IQR: interquartile range.*p<0.05: significant.

The overall mean disability score among students with MSP was minimal (16.2±11.6). However, some students (27.1%) had moderate disability. Our results showed the different sections of the Oswestry low back pain disability index. The most affected sections with moderate disability were lifting (24.3±23.3), pain severity (21.3±16.3), and sitting (21±21.11), (Figure 1).

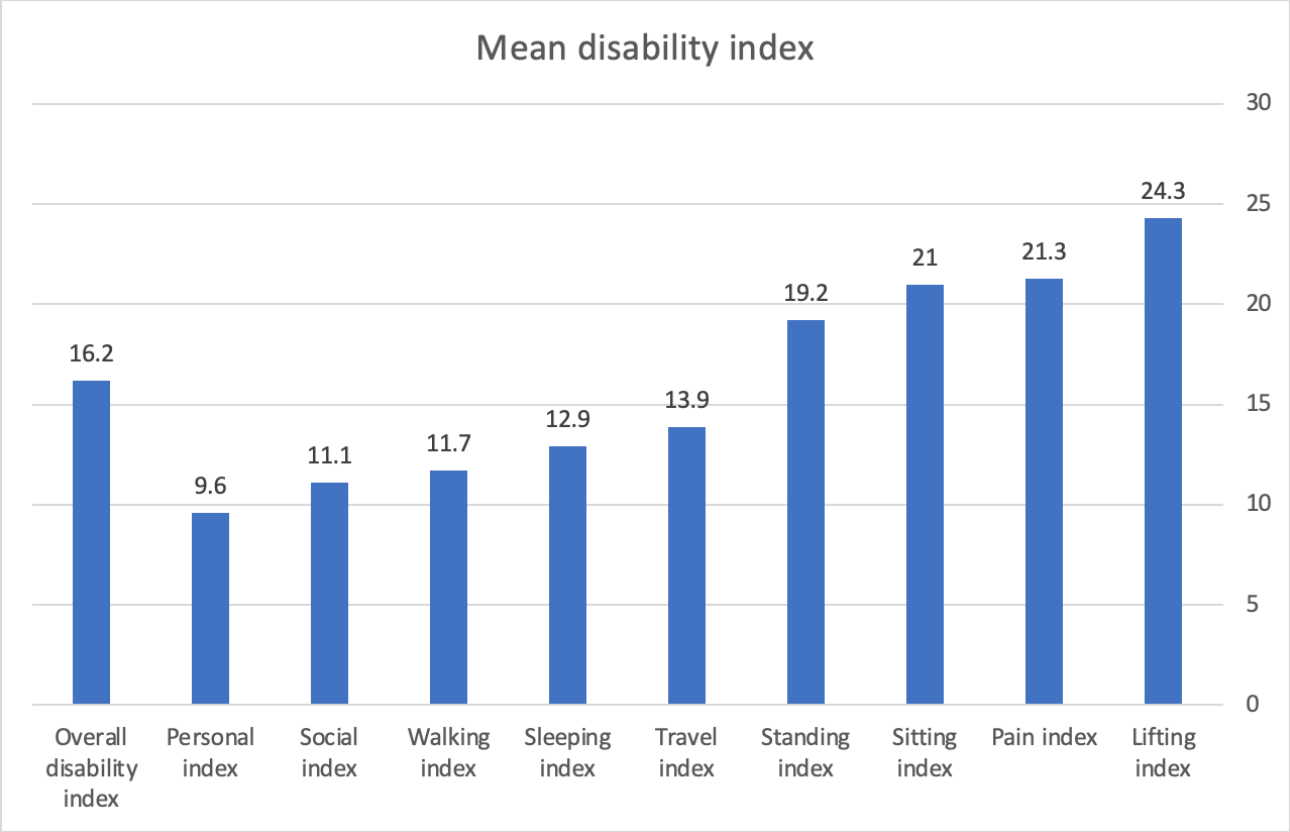

Figure 1 Oswestry low back pain disability index among medical students with musculoskeletal pain.

Table 3 Clinical characteristic data among medical students with MSP

		Students with MSP N=181 N (%)	Students with minimal disability N=132 N (%)	Students with moderate disability N=49 N (%)	P*
Site of pain	Low back pain	149 (82.3%)	118 (89.4%)	31 (63.3%)	0.000**
	Neck pain	15 (8.3%)	8 (6.1%)	7 (14.3%)	
	shoulder pain	17 (9.4%)	6 (4.5%)	11 (22.4%)	
Family history of spinal disease		32 (17.7%)	21 (15.9%)	11 (22.4%)	0.305

Family history of gout	44 (24.3%)	34 (25.8%)	10 (20.4%)	0.411
Disability index: median (IQR)	15.56 (11.11)	11.11 (10.56)	26.67 (10.00)	0.000**
Medical Consultation	38 (21%)	27 (20.5%)	11 (22.4%)	0.770
Radiology workup	24 (13.3%)	21 (15.9%)	3 (6.1%)	0.085
Laboratory workup	30 (16.6%)	19 (13.2%)	11 (29.7%)	0.034**
Chronic analgesic use	35 (19.3%)	27 (20.5%)	8 (16.3%)	0.532

MSP: musculoskeletal pain, * Comparison between medical students with minimal and moderate disability.
** p<0.05: significant.

LBP was the predominant site of pain among medical students affecting 82.3% of them. However, other sites were significantly more involved in students with moderate compared to minimal disability index (p=0.000). Only few students with MSP (21%) sought medical consultation (21%), did radiology (13.1%) or laboratory investigations (16.6%) for their pains. Students with moderate disability index were significantly more frequently performing laboratory investigations compared to those with minimal disability index (p=0.034), (Table 3).

Significant predictors to disability index were age (OR: -0.22, 95% CI -2.21- -0.371, P=0.006), duration of computer use (OR: -0.15, 95% CI: -3.58- -0.06, P=0.043), medical consultation (OR: 0.29, 95% CI: 1.03-12.09, p=0.020), radiological (OR: -0.32, 95% CI: -16.24—2.99, p=0.005), and laboratory investigation, (OR:0.20, 95% CI: 0.96-10.40, p=0.019), (Table 4).

Table 4 Predictors of disability index among medical students with MSP.

	OR	P	95% CI for OR	
(Constant)		0.001	16.95	69.242
Gender	0.07	0.374	-2.30	6.10
Age	-0.22	0.006*	-2.21	-0.37
GPA	-0.04	0.575	-3.21	1.79
Duration of exercise	0.06	0.416	-0.67	1.62
Smoking statues	0.11	0.154	-1.09	6.89
Duration of computer use	-0.15	0.043*	-3.58	-0.06
Usual place of study	0.03	0.676	-1.79	2.76
Depression symptoms	0.01	0.948	-3.77	4.03
Psychosomatic symptoms	0.12	0.156	-0.96	5.97
Chronic use of analgesics	0.14	0.076	-0.39	7.70
Medical consultation	0.29	0.020*	1.03	12.09
Radiological investigation	-0.32	0.005*	-16.24	-2.99
Laboratory investigation	0.20	0.019*	0.96	10.40
BMI	0.04	0.653	-0.25	0.391

OR: odd ratio, CI: confidence interval, *p<0.05: significant, BMI: body mass index.

4. DISCUSSION

Our results showed a high prevalence of MSP among medical students (51.1%) affecting mainly LBP (82.3%) rather than the neck (8.3%) or the shoulder (9.4%). Similar results were reported from Malasia (45.7%%), China (46.9%), and both Jazan (53.5%) and the central region of Saudi Arabia (54.4%), (Dighriri et al., 2019; Algarni et al., 2017; Alshagga et al., 2013; Smith et al., 2005). This point prevalence was much higher compared to other studies which studied students with LBP as they reported rates of 9.2% among Brazilian and 17.2% among Bulgarian medical students (Falavigna et al., 2011; Vujcic et al., 2018). Higher point prevalence in our study may be explained by the unhealthy lifestyle and disturbed psychological condition of our students with MSP (Table 2). Moreover, many of our students were from final clinical years (14.7% 5th & 42.4% 6th years); while in the Brazilian study, for

example, more than half of the medical students were preclinical. Another explanation could be the inclusion of students with MSP not only LBP.

In this study, relatively younger students showed more significant rates of MSP (p=0.041) irrespective to their academic years more or less age also was a negative significant predictor of the disability index (P=0.006) for our students, these findings could represent an alarm for the students' future with possible disabilities. In contrast, other studies reported a significantly higher prevalence among clinical years compared to the preclinical students. The researchers explained their findings by the stress offered by the clinical training (Algarni et al., 2017; Alshagga et al., 2013).

Results showed that the MSP rate was non-significantly higher in female than male students. Moreover, gender was not a significant predictor of disability index among our medical students. Similar to our results was other studies but not the Australian study, where females expressed higher rates of MSP than males (Algarni et al., 2017; Vujcic et al., 2018; Smith & Leggat, 2007). This discrepancy might be due to our point prevalence rather than lifetime reporting. This finding is another warning to our female students that they would be susceptible to more MSP over their lifetime.

In this study, similar to other studies physical, lifestyle, and psychosocial factors might play a trigger role among our student with MSP (Vujcic et al., 2018; Sitthipornvorakul et al., 2011). Our students with MSP showed significantly higher BMI (p<0.001), duration of computer use (p=0.009), and lower exercise duration (p=0.001) than those without. However, the revere situation was reported for smoking (p=0.047). Therefore, important triggers for MSP among our students would be the improper body posture during compute use together with lack of exercise. Nevertheless, among all factors, only the duration of computer use was a significant predictor of disability index (p=0.001).

In our study, the disabilities of pain, lifting and sitting were moderately limited, while other functional activities were minimally restricted. Other studies found limitation in sleeping quality, walking, sitting, standing, or physical activity (Vujcic et al., 2018; Kędra et al., 2016). Therefore, psychosocial functioning in patients with MSP should be seriously addressed and evaluated (Janowski et al., 2010). Unfortunately, our students had a negative attitude towards medical consultation as few of them sought medical advice (21%), performed radiological examination (13.1%), or other laboratory investigations (16.6%) for their MSP. Moreover, this attitude predicted significantly the extent of the disability (Table 4) and may reflect on the important link between the degree of disability and the medical care. This attitude may also point to students' dissatisfaction with the expected medical management. In one review, the physicians' approach to LBP was found to be superficial in providing workup, clear diagnosis, or pain control ending in unmet needs of their patients. Moreover, there was a mismatch between patients' perceived needs and evidence-based practice making unmet needs difficult to meet (Chou et al., 2018). On the other hand, the prevalent LBP was also associated with an increase in opioid dependence, addiction, overdose mortality overutilization of spinal imaging, and an overall increase financial burden (Deyo et al., 2015; Jenkins et al., 2018). Therefore, there is a strong need to enhance clinicians' communication skills to convey the appropriate messages to their patients with LBP to bring medical management to patient expectations.

Medical students should be aware and updated with recent guidelines addressing MSP for their optimal self-management, active rehabilitation, exercise therapy, psychological therapies if needed, short-term use of analgesics and spinal manipulation for pain relief to avoid use of opioids (Pillastrini et al., 2012). This study has certain limitations. First, since the study population was from one medical college, the findings may not be generalized to other students in the kingdom. Next, the study design was cross-sectional, so the causal association of these factors with MSP cannot be established. Data were based on self-reports with subjectivity, and information bias is probably present. The study included only the point prevalence of MSP and did not include 12-month or the lifetime history of MSP which could provide a broader view of the problem.

5. CONCLUSION

Our study give an alarming finding of a high prevalence of MSP mainly LBP among medical students of both genders at ISNC. While the pain actually disturbs their daily activities and psychological Condition, the students expressed a negative attitude towards medical care. Given the associations of MSP with younger age, prolonged computer use, lack of exercise, psychological symptoms, and higher BMI allowed the attention of all stakeholders including educators, policymakers, medical professionals, and parents. This also indicates the benefit of preventative care programs, such as supporting an active lifestyle and modifying ergonomics for college students.

Authors' contributions

Intessar Sultan: Primary author read and approved the final manuscript. Rania M Algouzi, Mozoon A Alasmari, Ruya A Abdullah: This work carried out in collaboration among all authors. All authors read and approved the final manuscript.

Ethical Approval and Patient consent

Ethical approval for the study was obtained from Ibn Sina National College (ISNC) Research and Ethics Committee (IEC Ref No: H-21-19102020). Consent was obtained by all participants in this study.

Abbreviations

MSP: Musculoskeletal pain
LBP: low back pain
BMI: body mass index
ISNC: Ibn Sina National College.

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Conflict of interest

The authors declare that there are no conflicts of interest.

Data and materials availability

All data associated with this study are present in the paper.

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