

## Prevalence of Musculoskeletal Disorders and its Correlation to Physical Activity Among Health Specialty Students

### Abstract

**Background:** Musculoskeletal disorders is defined as a musculoskeletal strain reported by an individual. Physical activity prevents many disabling diseases and musculoskeletal disorders. Low level of physical activity is associated with a higher prevalence of musculoskeletal disorders. In Saudi Arabia and among medical students, lowest rates of physical activity were found. Our aim is to assess the prevalence of musculoskeletal disorders and its correlation to physical activity. **Methods:** A cross-sectional study of 392 health specialty students in Taif University was carried out from January 1 to March 1, 2018, using a predesigned questionnaire, including demographic characteristics, an International Physical Activity Questionnaires–short form to assess the level of physical activity, and Standardized Nordic Questionnaires for the analysis of musculoskeletal symptoms. **Results:** Our study found that 64.8% of the students had musculoskeletal disorders. The highest prevalence was among medical students; 48.4% of them were having musculoskeletal disorders ( $P < 0.05$ ). The most frequent region was the lower back (33.4%). There is a significant association between the musculoskeletal disorders and the level of physical activity, with 42.9% of the students with a moderate level of physical activity having musculoskeletal disorders ( $P < 0.05$ ). **Conclusions:** The prevalence of musculoskeletal disorders is higher among medical than pharmacy and health science students. Most of the affected students were having a moderate level of physical activity. Psychosocial stress seems to be a major contributor to musculoskeletal disorders, rather than physical activity level.

**Keywords:** Exercise, musculoskeletal pain, prevalence, Saudi Arabia, students, universities

### Introduction

Musculoskeletal disorders (MSDs) is defined as a musculoskeletal strain reported by an individual as a neck, shoulder, lower back, or other skeletal pain or strain.<sup>[1]</sup> Physical activity (PA) is defined as any bodily movement via skeletal muscle, which results in low to high energy expenditure.<sup>[2]</sup> PA has many health benefits and prevents many chronic and disabling diseases. PA also affects multiple organs and systems, including the cardiovascular, endocrine, bone, and musculoskeletal systems.<sup>[3,4]</sup> PA also improves musculoskeletal fitness, overall health, and quality of life, and decreases morbidity, mortality, and risk of developing MSDs.<sup>[3,5]</sup> Low levels of PA have been shown to be more associated with musculoskeletal pain. However, psychological and social factors have been shown to be associated with a more severe form of MSDs.<sup>[6,7]</sup> This affects many

people's quality of life, including people of various ages, occupations, and nationalities.<sup>[7]</sup> Among dentists, 62% reported at least one musculoskeletal complaint,<sup>[8]</sup> while 34% of computer users had neck pain and 31% had shoulder pain.<sup>[9]</sup> Also, 77% of music students were suffering from MSDs, with the neck mostly affected.<sup>[10]</sup> Ninety-one percent of nurses experienced MSDs, of which 57% were in the lower back region, and 88% and 84% of postal and office workers, respectively, suffer from MSDs.<sup>[11]</sup> Forty-one percent of adults had lower back pain that was shown to be associated with low level of PA.<sup>[12]</sup> Many studies have found that lower level of PA is associated with a higher prevalence of MSDs.<sup>[13-15]</sup> However, the prevalence of PA varied worldwide and was found to be the lowest in Saudi Arabia, where up to 90% of the population is physically inactive.<sup>[16-18]</sup> Among university students, the PA levels were higher in males and females,<sup>[19,20]</sup> except for medical students, of which 41% were physically inactive.<sup>[21]</sup>

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This study assesses the prevalence of MSDs among health specialty students (medical, pharmacy, and health science) and the correlation between MSDs and PA.

## Methods

### Study design

A cross-sectional study of 392 individuals among total population of 3,163 students was carried out in Taif University during the period from January 1 to March 1, 2018. Taif University is a large-sized public university consisting of 13 colleges of different specialties, of which only four health specialty colleges (medicine, pharmacy, dentistry, and health science) with 1,116, 695, 112, and 1,243 registered students, respectively. The overall population of Taif City, Makkah Region in Saudi Arabia, is 987,914 (2010 Census).

### Inclusion criteria

All students from the selected colleges, both males and females, were enrolled.

### Exclusion criteria

1. Colleges other than medicine, pharmacy, health science, and dentistry were not included in the selection as they were non-health specialty colleges.
2. Students absent during the survey day.
3. Students who refused to be involved in the study or not completed the questionnaire.

### Methods and procedures

In Taif University, there are 13 colleges; our aim was to study health spatiality colleges.

There are four health specialty colleges (medicine, pharmacy, health science, and dentistry). A multistage cluster sampling technique was used to recruit the participants of this study.

**First stage:** We selected three out of the four colleges randomly: medicine, pharmacy, and health science.

**Second stage:** Each college was divided according to years of study (medicine: 1-6 years, pharmacy: 1-5 years, health science: 1-4 years), and each year contains two subgroups (A and B); we selected A subgroup randomly from all years of all three colleges.

**Third stage:** We selected each fifth student on the list from Subgroup A from all years of three colleges (5, 10, 15, 20, etc.).

### Data collection

The data were collected using a predesigned questionnaire, which includes (1) demographic characteristics (gender, age, marital status, college, grade, weight, height, smoking habits, and chronic diseases); (2) International Physical Activity Questionnaires–Short Form (IPAQ-SF) to assess the level of PA which is a valid and reliable

tool used worldwide; however, there are limitations in studies regarding its validity in Saudi Arabia;<sup>[22]</sup> and (3) Standardized Nordic Questionnaires [NMQ] for the analysis of musculoskeletal symptoms, which is reliable and valid as a screening tool with sensitivity ranging from 66% to 92%.<sup>[23]</sup>

Students were informed that they have the right to leave the study at any moment. Prior to data collection, a pilot study was conducted to test the questionnaire and detect any difficulties.

### Ethical considerations

This study was approved by the Research Ethics Committee of Taif University (39-36-0040).

Verbal consents were obtained from the participating students to be involved in our study.

### Statistical analysis

The data were collected and entered in Microsoft Excel 2016 and were analyzed using a Statistical Package for the Social Science (SPSS) program version 22. The prevalence and categorical variables were reported as frequency and percentage; continuous variables were reported as mean  $\pm$  standard deviation; and body mass index (BMI) was calculated and categorized. Chi-square and *t* tests were used to assess the correlation between MSDs and PA, as well as the association of MSDs to the sociodemographic characteristics of the study population. All statistical tests were considered statistically significant at a  $P < 0.05$ .

## Results

This study included 392 students; most of them were females (53.3%). The mean age of the students was  $21.83 \pm 2.9$  years. Most of the participated students were medical (42.1%). Most of the students had a normal BMI and with a low level of PA (49.5%) [Table 1].

Of all students, 64.8% had pain during the last 12 months. Of these, 35.4% had pain that interferes with work and 33.2% had pain during the last 7 days. The body regions with the most frequently reported pain during the last 12 months were lower back (33.4%), neck (29.3%), and upper back (23.7%), which were reported to interfere with work and were most frequent during the last 7 days [Table 2].

We detected a significant association between MSDs and the level of PA ( $P < 0.05^*$ ); 42.9% of the students with a moderate level of PA had MSDs during the last 12 months. Also, 47.8% of the students with a moderate level of PA had MSDs that interferes with their work or normal daily activity, whereas 56.9% of the students with a moderate level of PA had MSDs during the last 7 days [Table 3].

Table 4 shows associations between general characteristics and MSDs. College, year of study, and BMI shows

**Table 1: General characteristics**

Variable	Number	Percentage
Age mean±SD		21.83±2.9
Gender		
Male	183	46.7
Female	209	53.3
College		
Medicine	165	42.1
Pharmacy	134	34.1
Health science	93	23.7
Year of study		
First	34	8.7
Second	99	25.3
Third	79	20.2
Forth	54	13.8
Fifth	62	15.8
Sixth	64	16.3
Body mass index		
Underweight	69	17.6
Normal	194	49.5
Overweight	85	21.7
Obesity	44	11.2
Marital status		
Single	375	95.7
Married	15	3.8
Divorced	2	0.5
Smoking		
Yes	54	13.8
No	338	86.2
Chronic diseases		
Yes	23	5.9
No	369	94.1
Physical activity level		
Low	194	49.5
Moderate	133	33.9
High	65	16.6

significance, as 48.4% of those suffering from MSDs were medical students, 23.6% were in their second year, and 53.5% had a normal BMI.

Table 5 shows associations between lower back, neck, and upper back pain with PA level. A significant association with moderate level of PA was found with lower back, neck, and upper back pain (*P* values 0.002\*, 0.004\*, and 0.002\*, respectively).

## Discussion

In this study, we found that the prevalence of MSDs was high, with 64.8% of the students having musculoskeletal pain or discomfort at least in one body region. The highest prevalence of MSDs was among medical students (48.4%), which was significantly higher than among pharmacy and health science students (*P* < 0.05\*). The most frequently reported regions were lower back (33.4%), followed by the neck (29.3%) and upper back (23.7%), which was

**Table 2: Prevalence of Musculoskeletal disorders**

Variable	Number	Percentage
Pain during the last 12 months		
Neck	115	29.3
Shoulder	78	19.9
Elbows	27	6.9
Wrists/hands	46	11.7
Upper back	93	23.7
Lower back	131	33.4
Hips/thighs	37	9.4
Knees	82	20.9
Ankles/feet	41	10.5
Pain interferes with work		
Neck	51	36.7
Shoulder	42	30.2
Elbows	12	8.6
Wrists/hands	22	15.8
Upper back	50	36
Lower back	66	47.5
Hips/thighs	20	14.4
Knees	40	28.8
Ankles/feet	22	15.8
Pain during the last 7 days		
Neck	42	32.3
Shoulder	37	28.5
Elbows	10	7.7
Wrists/hands	18	13.8
Upper back	44	33.8
Lower back	60	46.15
Hips/thighs	19	14.6
Knees	35	26.9
Ankles/feet	25	19.2

frequently associated with work prevention and was more frequent during the last days, especially for lower back pain. In another study, a similar result was reported among dental students, with a higher prevalence (84.6%) of them suffering from MSDs, especially among the final year students, for whom the neck and lower back were the most frequently affected regions.<sup>[24]</sup> Among musician students, the most affected regions were the neck (64.6%), followed by the upper back (57.3%), shoulders (53.4%), and the lower back (48.5%).<sup>[10]</sup> This variation of prevalence and body regions is due to different postures during practice for various careers, and a high level of PA was shown to be associated with less MSDs among musician students. Psychosocial stress has been identified as a contributing factor for MSDs among medical and dental students.<sup>[6,10,24]</sup> In our study, MSDs were found to be more frequent among females, which was found to be significant in many studies,<sup>[10,24]</sup> however, it was not statistically significant in our study (*P* = 0.069). Also, we found that MSDs were more frequent among second-year students (23.6%), followed by third-year students (20.1%), and less frequent among clinical year students (fourth, fifth, and sixth

year) ( $P = 0.013^*$ ), which is the opposite of what the dental students experienced.<sup>[24]</sup> Physical inactivity is a contributing factor for developing MSDs.<sup>[7]</sup> Many studies have reported a low level of PA among the Saudi population and medical students.<sup>[16,17,20]</sup> In our study, 49.5% of students had a low level of PA, 33.9% had a moderate level of PA, and only 16.6% had a high level of PA. Unexpectedly, we found that the prevalence of MSDs was higher among students with a moderate level of PA (42.9%), less among students with a low level of PA (38.2%), and only 18.9% among students with a high level of PA. This might indicate that PA level is not the only contributing factor for MSDs among medical students, as other factors (e.g. psychosocial stress) might make a major contribution to MSDs; psychosocial stress is known to be high among medical students.<sup>[25,26]</sup> Stress is a

likely risk factor for MSDs among medical students and is associated with the more severe forms of MSDs. Therefore, we propose that stress is relatively more important than PA level for MSD.<sup>[6,7,25]</sup> We assume this might explain the lower prevalence of MSDs among pharmacy and health science students.

### Limitation

Although this study has achieved its purpose, there were some limitations. Using IPAQ-SF to predict the level of PA is not as accurate as the original form;<sup>[22]</sup> therefore, we recommend using the original form for future studies for greater accuracy of PA estimates.

### Conclusions

The prevalence of MSDs is higher among medical than pharmacy and health science students. The most affected body region was the lower back, followed by the neck and upper back. Most affected students were having a moderate level of PA ( $P < 0.05^*$ ). Psychosocial stress seems to be a major contributor for MSDs among medical students.

We recommend to include lectures and courses about stress management in the curriculum, and to improve the awareness among students and teaching staff. More studies are needed to detect the severity, disability, and significance.

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**Table 3: Associations between musculoskeletal disorders and level of physical activity**

Level of physical activity	Pain during the last 12 months		Chi-square	P
	Yes	No		
Low	97 (38.2%)	97 (70.3%)	38.119	0.000*
Moderate	109 (42.9%)	24 (17.4%)		
High	48 (18.9%)	17 (12.3%)		
Pain interferes with work				
	Yes	No	Chi-square	P
	Yes	No		
Low	47 (33.8%)	147 (58.1%)	22.941	0.000*
Moderate	66 (47.5%)	67 (26.5%)		
High	26 (18.7%)	39 (15.4%)		
Pain during the last 7 days				
	Yes	No	Chi-square	P
	Yes	No		
Low	23 (17.7%)	171 (65.3%)	79.139	0.000*
Moderate	74 (56.9%)	59 (22.5%)		
High	33 (25.4%)	32 (12.2%)		

**Table 4: Association between general characteristics and musculoskeletal disorders**

		Pain during the last 12 months		Chi-square	P
		Yes	No		
Gender	Male	110 (43.3%)	73 (52.9%)	3.305	0.069
	Female	144 (56.7%)	65 (47.1%)		
Collage	Medicine	123 (48.4%)	42 (30.4%)	18.825	0.000*
	Pharmacy	68 (26.8%)	66 (47.8%)		
	Health Science	63 (24.8%)	30 (21.7%)		
Year of study	First	24 (9.4%)	10 (7.2%)	14.436	0.013*
	Second	60 (23.6%)	39 (28.3%)		
	Third	51 (20.1%)	28 (20.3%)		
	Fourth	41 (16.1%)	13 (9.4%)		
	Fifth	30 (11.8%)	32 (23.2%)		
	Sixth	48 (18.9%)	16 (11.6%)		
Body mass index	Underweight	34 (13.4%)	35 (25.4%)	11.384	0.010*
	Normal	136 (53.5%)	58 (42%)		
	Overweight	52 (20.5%)	33 (23.9%)		
	Obese	32 (12.6%)	12 (8.7%)		



**Table 5: Association between lower back, neck, and upper back pain and physical activity level**

Level of physical activity	Pain in the lower back during the last 12 months		Chi-square	P
	Yes	No		
Low	48 (36.6%)	146 (55.9%)	14.079	0.002*
Moderate	59 (45%)	74 (28.4%)		
High	24 (18.3%)	41 (15.7%)		
	Pain in the neck during the last 12 months			
	Yes	No		
Low	43 (37.4%)	151 (54.5%)	10.990	0.004*
Moderate	52 (45.2%)	81 (29.2%)		
High	20 (17.4%)	45 (16.2%)		
	Pain in the upper back during the last 12 months			
	Yes	No		
Low	33 (35.5%)	161 (53.8%)	12.360	0.002*
Moderate	45 (48.4%)	88 (29.4%)		
High	15 (16.1%)	50 (16.7%)		

### Conflicts of interest

There are no conflicts of interest.

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