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.[1] Physical activity (PA) is defined as any bodily movement via skeletal muscle, which results in low to high energy expenditure.[2] 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.[3,4] PA also improves musculoskeletal fitness, overall health, and quality of life, and decreases morbidity, mortality, and risk of developing MSDs.[3,5] 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.[6,7] This affects many people’s quality of life, including people of various ages, occupations, and nationalities.[7] Among dentists, 62% reported at least one musculoskeletal complaint,[8] while 34% of computer users had neck pain and 31% had shoulder pain.[9] Also, 77% of music students were suffering from MSDs, with the neck mostly affected.[10] 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.[11] Forty-one percent of adults had low back pain that was shown to be associated with low level of PA.[12] Many studies have found that lower level of PA is associated with a higher prevalence of MSDs.[13-15] 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.[16-18] Among university students, the PA levels were higher in males and females,[19,20] except for medical students, of which 41% were physically inactive.[21]

Address for correspondence:
Dr. Obadah M. Hendi,
College of Medicine, Taif
University, Taif City, 21944,
Saudi Arabia.
E-mail: Obh.m@hotmail.com;
Obh.muh@gmail.com

Access this article online
Website:
www.iypvmjornal.net/www.iypm.ir
DOI:
10.4103/iypvm.IJPVM_436_18
Quick Response Code:

How to cite this article: Hendi OM, Abdulaziz AA, Althaqafi AM, Hindi AM, Khan SA, Atalla AA. Prevalence of musculoskeletal disorders and its correlation to physical activity among health specialty students. Int J Prev Med 2019;10:48.
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 spatially 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;[22] 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%.[23]

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 ± 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 ± 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
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 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.[24] 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%).[10] 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.[6,10,24] In our study, MSDs were found to be more frequent among females, which was found to be significant in many studies,[10,24] 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
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.\[6,7,25\] 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;\[22\] 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.

**Acknowledgments**

The author would like to acknowledge the following students for their participation in the data collection: Lujain Hussain B Alturkistani, Rawan Ibrahim Alqurashi, Gehan Ahmed Abdulaziz, and Reham Ahmed Abdulaziz.

**Financial support and sponsorship**

Nil.

### 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     | 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   | 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

| Gender          | Pain during the last 12 months | Chi-square | \(P\) |
|-----------------|-------------------------------|------------|-----|
| Male            | 110 (43.3%)                   | 73 (52.9%) | 3.305 | 0.069 |
| Female          | 144 (56.7%)                   | 65 (47.1%) |     |

| Collage         | Pain during the last 12 months | Chi-square | \(P\) |
|-----------------|-------------------------------|------------|-----|
| 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   | Pain during the last 12 months | Chi-square | \(P\) |
|-----------------|-------------------------------|------------|-----|
| 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 | Pain during the last 12 months | Chi-square | \(P\) |
|-----------------|-------------------------------|------------|-----|
| 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         | Chi-square | P      |
| 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         | Chi-square | P      |
| 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.

Received: 24 Sep 18 Accepted: 21 Jan 19
Published: 26 Apr 19

References
1. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sorensen F, Andersson G, et al. Standardised Nordic Questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon 1987;18:233-7.
2. Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. Public Health Rep 1985;100:126.
3. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: The evidence. CMAJ 2006;174:801-9.
4. Nelson ME, Rejeski WJ, Blair SN, Duncan PW, Judge JO, King AC, et al. Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. Circulation 2007;116:1094-105.
5. Garber CE, Blissmer B, Deschenes MR, Franklin BA, Lamonte MJ, Lee IM, et al. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. Med Sci Sports Exerc 2011;43:1334-59.
6. Hauke A, Flintrop J, Brun E, Rugulies R. The impact of work-related psychosocial stressors on the onset of musculoskeletal disorders in specific body regions: A review and meta-analysis of 54 longitudinal studies. Work Stress 2011;25:243-56.
7. Andersen JH, Haahr JP, Frost P. Risk factors for more severe regional musculoskeletal symptoms: A two-year prospective study of a general working population. Arthritis Rheum 2007;56:1355-64.
8. Alexopoulos EC, Charizani F, Stathi IC. Prevalence of musculoskeletal disorders in dentists. BMC Musculoskelet Disord 2004;5:16.
9. Korhan O, Mackie A. A model for occupational injury risk assessment of musculoskeletal discomfort and their frequencies in computer users. Saf Sci 2010;48:668-77.
10. Rodríguez-Romo B, Pérez-Valiño C, Ageitos-Alonso B, Pértiga-Díaz S. Prevalence and associated factors for musculoskeletal pain and disability among Spanish music conservatory students. Med Probl Perform Art 2016;31:193-200.
11. Harcombe H, McBride D, Derrett S, Gray A. Prevalence and impact of musculoskeletal disorders in New Zealand nurses, postal workers and office workers. Aust N Z J Public Health 2009;33:437-41.
12. Dijken CB, Fjellman-Wiklund A, Hildingsson C. Low back pain, lifestyle factors and physical activity: A population-based study. J Rehabil Med 2008;40:864-9.
13. Morken T, Magerøy N, Moen BE. Physical activity is associated with a low prevalence of musculoskeletal disorders in the Royal Norwegian Navy: A cross sectional study. BMC Musculoskel Disord 2007;8:56.
14. Ratzlaff CR, Gillies JH, Koehoorn MW. Work-related repetitive strain injury and leisure-time physical activity. Arthritis Care Res 2007;57:495-500.
15. Scarabottolo CC, Pinto RZ, Oliveira CB, Zanuto EF, Cardoso JR, Christofaro DG. Back and neck pain prevalence and their association with physical inactivity domains in adolescents. Eur Spine J 2017;1-7.
16. Sisson SB, Katzmarzyk PT. International prevalence of physical activity in youth and adults. Obes Rev 2008;9:606-14.
17. Al-Hazzaa HM. The public health burden of physical inactivity in Saudi Arabia. J Family Community Med 2004;11:45-51.
18. Al-Hazzaa HM, Abahussain NA, Al-Sobayel HI, Qahwaji DM, Musaiger AO. Physical activity, sedentary behaviors and dietary habits among Saudi adolescents relative to age, gender and region. Int J Behav Nutr Phys Act 2011;8:140.
19. Khalaf A, Ekblom Ö, Kowalski J, Berggren V, Westergren A, Al-Hazzaa H. Female university students' physical activity levels and associated factors—a cross-sectional study in southwestern Saudi Arabia. Int J Environ Res Public Health 2013;10:3502-17.
20. Abdelbaky A, Abozaid H, Alsahafi AA, Hendi OM, Amin OA, Abdulaziz AA, et al. Physical activity profile among taif university students at taif governorate, Saudi Arabia. Medicine 2017;117:21-1.
21. El-Gilany A, El-Masry R. Physical inactivity among Egyptian and Saudi medical students. TAF Prev Med Bull 2011;10:35-44.
22. Lee PH, Macfarlane DJ, Lam TH, Stewart SM. Validity of the International Physical Activity Questionnaire Short Form (IPAQ-SF): A systematic review. Int J Behav Nutr Phys Act 2011;8:115.

International Journal of Preventive Medicine 2019, 10: 48
23. Crawford JO. The Nordic musculoskeletal questionnaire. Occup Med 2007;57:300-1.
24. Ng A, Hayes MJ, Polster A. Musculoskeletal disorders and working posture among dental and oral health students. Healthcare 2016;4 pii: E13. doi: 10.3390/healthcare4010013.
25. Abdulghani HM, AlKanhal AA, Mahmoud ES, Ponnampemura GG, Alfaris EA. Stress and its effects on medical students: A cross-sectional study at a college of medicine in Saudi Arabia. J Health Popul Nutr 2011;29:516-22.
26. Abdulghani HM. Stress and depression among medical students: A cross sectional study at a medical college in Saudi Arabia. Pak J Med Sci 2008;24:12.