



Original Article

Prevalence of Musculoskeletal Disorders Risk Factors and Ergonomic Assessment of Posture among Senior Students of Rehabilitation School of Shiraz University: A Cross-sectional Study

Mostafa Mehraban Jahromi¹, MSc; Sara Abolahrari-Shirazi^{2,3*}, PhD; Sahar Safari¹, MSc; Farzaneh Moslemi Haghighi^{2,3}, PhD

¹Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

²Physical Therapy Department, School of Rehabilitation Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

³Rehabilitation Sciences Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

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ABSTRACT

Background: The current study aimed to estimate the prevalence of musculoskeletal disorders and evaluate the risk of work-related musculoskeletal disorders (WMSDs) in senior students at the Rehabilitation School of Shiraz University.

Methods: Fifty-three senior physical and occupational therapy students with an average age of 22-42 years participated in this cross-sectional study. The Nordic Musculoskeletal Questionnaire was used to evaluate work-related musculoskeletal disorders, and postural analysis was performed using Rapid Entire Body Assessment (REBA).

Results: In this study, a high prevalence of musculoskeletal pain in the lower back, hand, neck, and shoulder regions was observed. Approximately 47% of the students reported having experienced lower back pain in the past 12 months, and this disability was the most common disorder (23%) among the study population. The results of sub-group analysis based on sex showed the lower back to be the body region with the highest prevalence of pain. Based on the body mass index (BMI), the neck was highly reported as a site of pain. In addition, the REBA results revealed that 36% and 49% of the senior students in this study had a high and medium risk level for developing musculoskeletal disorders, respectively.

Conclusion: The current results indicate that lower back pain is the most common musculoskeletal disorder among senior physiotherapy and occupational therapy students. This research also shows that based on the REBA tool, 36% of the senior students were at high risk for developing musculoskeletal disorders.

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Introduction

Musculoskeletal disorders are quite common among people, especially among healthcare professionals [1-3]. Work-related musculoskeletal disorders (WMSDs) are

described as physical injuries and disorders that are related mainly to the work environment [4]. WMSDs include a wide range of different types of disorders that excite pain and disability and limit normal functions. Such disorders can result from repetitive micro-trauma or sudden trauma. Evidence suggests several risk factors for developing these disorders, including external factors, i.e. repetitive movements, prolonged abnormal postures, repetitive direct pressure, micro-trauma, and also internal factors, i.e. age, weight, fitness, and malposture [5, 6].

*Corresponding author: Sara Abolahrari-Shirazi, Department of Physical Therapy, School of Rehabilitation Sciences, Abiverdi 1, Chamran Blvd, P.O. Box: 71345-1733, Shiraz, Iran. Tel: +98 71 36271551; Fax: +98 71 36272495

Email: sahrari@sums.ac.ir

Neck pain and lower back pain have also been reported as the most common musculoskeletal disabilities.

Musculoskeletal disorders can bring about work absenteeism or a decrease in working hours [3]. About 33% of total work absenteeism has been related to musculoskeletal disorders in the United States [7], and it has been reported that in Germany, musculoskeletal symptoms are one of the most significant disabilities among construction workers [7].

Several studies have reported the prevalence of various musculoskeletal disorders among healthcare professionals. A high prevalence of musculoskeletal disorders in these groups has also been observed. The estimated prevalence of musculoskeletal pain was 91% among sonographers [8], and 62% of the dentists in Greece reported at least one musculoskeletal disorder [9]. In their study, Reilly et al. [10], reported the incidence of musculoskeletal disorders in nurses and physiotherapists as 49%. In addition, Munabi et al. [11] reported that the prevalence of lower back pain in nurses was 61.9%.

Yu Chan et al. [12] showed that 22% of undergraduate students had neck pain, and this condition was more prevalent in physiotherapy and nursing students than in business students. Cromie et al. [13] showed that musculoskeletal disorders were more prevalent in younger physiotherapists. They reported several possible explanations for this result, such as patient lifting and transferring, prolonged static posture, and manual therapy.

The information on prevalence rates of musculoskeletal disorders and problems among healthcare professionals is vast, yet there is little information about the prevalence of musculoskeletal disorders in younger rehabilitation healthcare individuals, such as occupational therapists and physiotherapists. The current cross-sectional study was designed to estimate the prevalence of various musculoskeletal disorders among senior physiotherapy students as well as occupational therapy students.

Methods

Participants and Setting

This cross-sectional study was performed at the Rehabilitation School of Shiraz University of Medical Sciences, and all participants were senior students of physical and occupational therapy (n=53) that were recruited through convenient sampling.

The initial sample for this study consisted of 65 students. Considering lower back pain prevalence=40% [14], $\alpha=0.05$, $d=4\%$, and counting a finite population correction (FPC) and using the following equation, the sample size was calculated to be 53 students.

$$N = z^2 \frac{p(1-p)}{d^2} \text{ and}$$

$$FPC = \frac{N}{1 + (N-1/n)}$$

The inclusion criterion was performing more than 4 hours of work in a day for two consecutive years. Subjects were excluded if they had one week or more absenteeism from work during the last year. This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1393.4450), and all participants signed a written

informed consent form before participating in this study. Demographic information on age, gender, height, weight, and the field of study was recorded. All data was handled without revealing the participants' personal information (Table 1).

Procedure

Participants were instructed to complete the Nordic Musculoskeletal Questionnaire (NMQ) [15], a reliable tool used worldwide to evaluate work-related musculoskeletal disorders. It is a simple and standardized questionnaire for the detection of musculoskeletal symptoms in various parts of the body, and its validity and reliability for the Iranian population have been demonstrated [16]. The NMQ consists of two parts, the general part and the specific part. The general part covers symptoms experienced in nine regions of the body, namely the neck, shoulders, elbows, wrists/hands, upper back, lower back, hip/thighs, knees, and ankles/feet. The specific part includes symptoms in three regions of the body, i.e. the neck, shoulders, and lower back. Participants were asked to answer the first question of the questionnaire, i.e., "Have you had any trouble (pain or discomfort) during the past 12 months in any parts of the body (neck, shoulder, upper back, elbow, wrist/hand, low back, hip/thigh, knee, and ankle/feet)," with yes or no. If the answer was yes, the participants were instructed to answer the next questions: "Have you at any time during the last 12 months been prevented from doing your normal work (at home or away from home) because of the trouble?" and "Have you had any trouble at any time during the last 7 days?"

Postural Assessment

Postural analysis was performed using the Rapid Entire Body Assessment (REBA), a promising tool for ergonomic body assessment which also facilitates the measurement and evaluation of risk factors associated with working posture. Several other postural assessment techniques, such as OWAS and NIOSH, are not adequately sensitive and/or require detailed information about specific parameters of the posture [17, 18]. REBA, however, evaluates the posture of the whole body and the risk of work-related musculoskeletal disorders. In REBA, the whole body is categorized into two parts for analysis. Part A includes the neck, trunk, and legs, and part B includes the arms, forearms, and wrists. All body regions are then evaluated based on the collected scores, the level of the musculoskeletal risk factors, and the level of actions determined as: risk is negligible (score 1) and "corrective action including further assessment is not necessary;" risk is low (score 2-3) and "corrective action including further assessment may be necessary;" risk is medium (score 4-7) and "corrective action including further assessment is necessary;" risk is high (score 8-10) and "corrective action including further assessment is necessary as soon as possible;" and risk is very high (score 11-15) and "corrective action including further assessment is necessary immediately."

A score greater than or equal to 8 is considered as high risk for work-related musculoskeletal disorders.

Table 1: Demographic characteristics of participants

Demographic variables (unit)		Mean (SD)
Age (year)		22.42 (0.80)
Weight (kg)		61.25 (14.38)
Height (cm)		167.96 (9.68)
BMI (kg/m ²)		21.48 (2.89)
		Number (%)
Sex	Male	17 (17.4%)
	Female	36 (58.1%)
Field of study	Physiotherapy	30 (56.6%)
	Occupational therapy	23 (43.4%)
BMI	Underweight	5 (9.43%)
	Normal	38 (74.82%)
	Overweight	8 (15.75%)

BMI: body mass index; SD: standard deviation; Underweight: BMI<18.5, normal: 18.5≤BMI≤25, over-weight: BMI>25

Table 2: Prevalence rates of musculoskeletal pain and problems

Musculoskeletal problem	Pain during the last 12 months Prevalence (%) (95% CI)	Disability during the last 12 months Prevalence (95% CI)
Neck	30.18% (18.34 to 44.34)	7.5% (2.1 to 18)
Shoulder	30.18% (18.34 to 44.34)	9.4% (3.1 to 21)
Elbow	17% (8 to 30)	7.5% (2.1 to 18)
Wrist/Hand/Fingers	34% (21 to 48)	9.4% (3.1 to 21)
Upper back	28% (17 to 42)	3.8% (0.4 to 13)
Lower back	47% (33 to 61)	23% (12 to 36)
Hip/Thigh	11% (4 to 23)	3.8% (0.4 to 13)
knee	24% (14 to 38)	7.5% (2.1 to 18)
Ankle/Feet	15% (7 to 27)	7.5% (2.1 to 18)

In pursuance of minimizing information bias, subjects were assured their privacy and confidentiality were preserved during all research phases.

Data Analysis

All statistical analyses were performed using SPSS, version 19.0. Descriptive statistical analysis was used to summarize the demographic variables and the prevalence of musculoskeletal disorders. In this study, the prevalence of each musculoskeletal problem was reported as having 95% confidence interval using binomial exact distribution. The significance level was considered $P < 0.05$.

Results

Fifty-three senior physical and occupational therapy students participated in this cross-sectional study. Table 1, which presents the demographic characteristics of all participants, shows the mean age of participants was 22.42 years. BMI scores showed that out of 53 participants, 5 (9.43%) were underweight (under 18.5 kg/m²), 38 (74.82%) had normal weight (18.5 to 25 kg/m²), and 8 (15.75%) were overweight (25 to 30 kg/m²). Moreover, 36 (67.92%) of all participants were female. Respondents in this cross-sectional study consisted of physiotherapists (56.6%) and occupational therapists (43.4%).

The prevalence rates of various musculoskeletal disorders are shown in Table 2. The most common anatomical region of reported pain was the lower back [47% (95% CI: 33% to 61%)]. Participants reported a higher prevalence of pain in four regions, i.e. the lower back (47%), hand complex (34%), neck (30.18%), and shoulder (30.18%).

From the data in Table 2, it can be seen that disability in the lower back [23% (95% CI: 12% to 26%)] was the most common disorder in senior physical and occupational therapy students.

Female students reported a higher prevalence of pain in the lower back (41.7%), hand/wrist/fingers (38.9%), and shoulder (36.1%) regions, while male students experienced more pain in the lower back (58.8%), neck (29.4%), and ankle (29.4) regions. The most common regions of disability in females were the lower back (19.4%), shoulder (13.9%), and knee (11.8%). In males, they were in the ankle (76.5%), lower back (29.4%), elbow, hand/wrist/fingers, and knee (11.8%) regions.

Overall, 60% of participants who were underweight reported pain in the neck region, and 40% of this group had pain in the upper and lower back regions as well as in the hand complex. In individuals with normal weight, the most painful regions of the body were the lower back (47.4%), shoulder and hand complex (34.2%), and in the overweight group, a higher prevalence of pain was seen in the lower back (50%) and knee (26.3%) regions. In addition, underweight subjects showed greater disability in the elbow and hand complex (20%) regions. Individuals with normal weight experienced the highest disability in the lower back (23.3%) and shoulder (13.2%) regions, and overweight individuals had more disability in the lower back and ankle (37.5%) and knee (25%) regions compared to other parts of the body.

The results of postural evaluation according to the REBA tool are presented in Table 3. As can be seen, no case was without risk for developing musculoskeletal disorders; in this prevalence study, the most common risk level in the participants based on the REBA tool was medium.

Table 3: Rapid Entire Body Assessment (REBA) scores

Action levels	REBA score	Prevalence (%) (95% CI)	Risk level	Action
0	0-1	0	Negligible	Not necessary
1	2-3	13.2% (5 to 25)	Low	May be necessary
2	4-7	49% (35 to 61)	Medium	Necessary
3	8-10	36% (23 to 51)	High	Necessary soon
4	11-15	1.9% (0.04 to 10)	Very high	Necessary NOW

Discussion

The present cross-sectional study investigated the occurrence of pain and musculoskeletal disorders among senior students of physiotherapy and occupational therapy at the Rehabilitation School of Shiraz University of Medical Sciences. Other important objectives of this study were to evaluate posture and to determine risk levels for developing work-related musculoskeletal disorders among these senior students.

This study revealed a high prevalence of musculoskeletal pain in the lower back, hand, neck, and shoulder regions of the participants. Approximately 47% [95% CI: 33% to 61%] of respondents reported lower back pain in the past 12 months, and the prevalence rates of pain during the last 12 months in the hand, neck, and shoulder regions were 34%, 30.18%, and 30.18%, respectively.

In accordance with the most prevalent site of the body for reported pain, the present results showed that among responders, disability in the lower back [23% (95% CI: 12% to 26%)] was the most common disorder in senior physical and occupational therapy students. This finding is consistent with previous studies which have reported lower back pain as a common disability among physiotherapists. Nyland et al. [19] reported a prevalence range for lower back pain from 30% to 40% for physiotherapists. Bork et al. [6] showed that the prevalence rate of lower back pain in physiotherapists was approximately 45%. Warren Glover et al. [5] reported an overall prevalence of 44% for lower back pain among physiotherapists. A cross-sectional study found that lower back pain among ICU nurses was the most prevalent musculoskeletal disorder [20].

In addition to lower back pain, the reported prevalence of neck pain in the current study was [30.18% (18.34 to 44.34)], which is in line with the study of Yu Chan et al. [12], who reported a prevalence rate of 26.5% in physiotherapy students. Compared to business students, the prevalence of neck pain was higher in undergraduate students [12]. In the literature [14, 21, 22], the prevalence of neck pain in healthcare professionals ranged from 45.8% to 54.7%, while the current study found a lower rate of neck pain.

In the present study, the results of sub-group analysis based on sex showed that the lower back was the body region with the highest prevalence of pain among both male and female students. In agreement with Warren Glover's findings [5], the female students in the current study reported more disability in the lower back, while the most common region for reporting disability in male students was the ankle/feet. This finding is contrary to that of Warren Glover et al. [5], who reported male physiotherapists had more disability in the upper back.

Results of sub-group analysis based on BMI showed that the most common region for reported pain was the neck region, and for disability the most common regions were the elbow and hand complex in underweight students. In both normal and overweight groups, however, the lower back was the most prevalent region for the existence of pain and disability.

In addition to evaluating the prevalence of musculoskeletal disorders, postural analysis was performed using REBA to detect the level of risk in work-related musculoskeletal disorders. The current findings showed that risk levels for work-related musculoskeletal disorders ranged from low to very high, and 36% of the responders (based on the REBA tool) were at high risk for developing musculoskeletal disorders; the prevalence of medium risk level was 49%. In accordance with the present results, previous studies have shown that healthcare professionals are susceptible to developing risk of musculoskeletal disorders. Jahanimoghadam et al. [23] found that the risk levels for work-related musculoskeletal disorders among dental professionals ranged from moderate to high. Mahmoudifar et al. [7] reported that based on REBA results, the nursing staff of an intensive care unit had a very high risk level.

The current findings indicate that it is necessary for undergraduate students of physiotherapy and occupational therapy to be trained for optimal posture during clinical work.

A limitation of the present study is the sampling method employed. The results cannot be generalized to all students of physiotherapy and occupational therapy, as this study was conducted in the Shiraz University of Medical Sciences, which contributes a limited number of physiotherapy and occupational therapy students to the country.

Conclusion

The results of the present study indicate that lower back pain is the most common musculoskeletal disorder among senior physiotherapy and occupational therapy students. In addition to back pain, a higher prevalence of pain and disability was observed in the shoulder and hand complex regions compared to other regions. This research also shows that based on the REBA findings, 36% of the senior students had a high risk level for developing musculoskeletal disorders. Overall, the findings show that while postural training could be effective in reducing musculoskeletal disorders in rehabilitation professionals for their future career prospects, the manufacture and design of devices used in physiotherapy and occupational clinics should be ergonomic. Based on the relationship between posture and BMI, it is better to have a regular

fitness program in their educational curriculum.

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Conflict of Interest: None declared.

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