

Research Paper: Epidemiology of Musculoskeletal Pains Among Newly Admitted University Students: A Cross-sectional Study



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ABSTRACT

Objectives: This study aimed to examine Musculoskeletal Pains (MPs) among newly admitted university students and investigate the effect of gender differences on the prevalence of MPs.

Methods: This cross-sectional descriptive study was conducted on 2641 university students (1303 men, 1338 women). The study data were collected from the Health Center of the University of Tehran in the fall of 2019. Musculoskeletal pains in students were examined using the Nordic questionnaire. The data were analyzed by descriptive statistics and the Chi-squared test.

Results: The highest prevalence rates of MPs in the past 12 months, past 7 days, and problems that inhibited routine activities in the past 12 months were reported in the neck area (13.4%, 5.8%, and 10.5%, respectively), and the lowest rates in the elbow (1.5%, 0.6%, and 1%, respectively). Findings also indicated a significant difference between men and women regarding MPs in the neck and shoulders in all three items of the Nordic questionnaire ($P < 0.05$).

Discussion: Based on these results, it is necessary to prevent musculoskeletal pains, especially in the neck and back, among the newly admitted students to the university.

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Highlights

- Neck and shoulders had the highest prevalence of MPs anatomic area in girl students.
- The highest prevalence of MPs was in the lower back and knee in boy students.
- The lowest level of MPs prevalence was in the elbow in both genders.

Plain Language Summary

Musculoskeletal Pains (MPs) are among the most prevalent types of pain with numerous consequences for individuals and society. Musculoskeletal disorders are usually associated with constant pain, limitations in movement, skill, performance, and negative effects on the mental health. It has been shown that 20-33% of people worldwide live with one painful musculoskeletal problem. The main cause of many musculoskeletal disorders and their injuries is related to the advancement of technology and excessive use of computers, laptops, and mobile phones. University students stay for long hours in static or infrequent postures due to long study hours and high levels of stress and workload in using laptops. Therefore, they are highly affected by problems resulting from MPs. It is possible that neglecting to study musculoskeletal disorders in students can have negative and perhaps irreversible effects on their body structure. Therefore, it is important and necessary that musculoskeletal pain be examined every year in the student community. The present study reported the prevalence of MPs, especially in the neck, low back, and knees. One of the ways to reduce musculoskeletal disorders is to pay attention to physical activity and ergonomic factors. In addition, college students should be instructed on how to sit and stand properly, how to stand behind a computer, and how to use mobile phones.

1. Introduction

Musculoskeletal pains (MPs) are among the most prevalent types of pain with numerous consequences for individuals and society. These pains result from sustained postures, excessive and repeated movements [1], and job-related musculoskeletal disorders (MDs). They can change the properties of viscoelastic tissues and eventually cause pain in bones, joints, muscles, or surrounding structures [2]. MDs are usually associated with pain (often constant pain), limitations in movement, skill, performance, and adverse effects on mental health. They also decrease people's ability to perform and participate in social activities and, thus, have an extensive impact on the welfare of societies. The most prevalent MDs are osteoarthritis, back and neck pain, fractures related to bone brittleness, systemic inflammation injuries, and conditions like rheumatoid arthritis (WHO, 2018). The prevalent areas affected with pain are the back, neck, knee, and lower back [1, 3, 4].

Global Burden of Disease (GBD) studies indicate the undesirable and considerable burden of the problems resulting from musculoskeletal conditions. In 2016, GBD studies introduced MDs as the second important cause of disability in the world. It has been shown that 20%-33% of people worldwide live with one painful musculoskeletal

problem [5]. Recent reports in the US also indicate that one out of every two American adults is living with the problems resulting from MDs, which equals that of people with cardiovascular or chronic respiratory diseases [6].

University students stay for long hours in static or infrequent postures due to lengthy study hours and high-stress conditions, and workload in using a laptop [7, 8]. Therefore, they are highly affected by problems resulting from MPs [9, 10]. Regarding the prevalence of MDs and their complications, it is essential to consider MDs, specifically MPs, in young and educated people. So, this condition requires special attention in terms of the prevention and alleviation of these problems, which might cause chronic pain and also reduce activity, efficiency, and quality of life [11]. The present study aimed to examine and report the prevalence of MPs in different body parts of the newly admitted students to the University of Tehran, Tehran City, Iran, in 2018.

2. Materials and Methods

Participants and research criteria

This research is a cross-sectional descriptive study, and the statistical population comprised all newly admitted students to the University of Tehran in the 2018-2019 academic year. Of the total 3000 students participating in

this study, 359 students were excluded due to incomplete information and the inclusion and exclusion criteria. The final sample size was 2641, including 1338 women and 1303 men. They voluntarily participated in the study with individual consent.

The inclusion criteria were being newly admitted students entering the 2018-2019 academic year, lacking physical problems or orthopedic diseases, completing the Nordic questionnaire completely, and voluntarily participating in the research. The exclusion criteria were refusing the study continuation, having congenital anomalies such as difference in leg length and scoliosis, having a recent history of burns or injuries, being disabled, having an amputation, being blind and deaf, and delivering incomplete questionnaires.

Study procedure

The present epidemiological study investigates the prevalence of MPs among newly admitted students at the University of Tehran in the fall of 2019. After examining and approving the study's protocol by the University of Tehran Health Center with number 25208/1/02, the study data were collected from the center. It was essential to observe ethical principles in this research. These principles were informing and obtaining consent, keeping the information of the questionnaires, not imposing costs on students. All subjects had the right to withdraw from the study at any time. After giving complete information about the research plan, research process, and possible risks, written consent was obtained from all subjects. The people who participated in this research were informed about the goals, methods, and benefits of the investigation. The University of Tehran Institutional Review Board approved the study and signing the informed consent by the participants. The study data were collected through a demographic questionnaire and Nordic Questionnaire (NQ) from newly admitted students in BA/BS, MA/MS, and PhD.

Demographic information

The study data were collected anonymously while respecting the students' privacy. All students were aware of the nature of the study, and there was no remuneration or punishment. They all signed the consent form. Demographic information included age, gender, weight, height, level of education, hours of using the laptop, mobile phone, and PlayStation. The demographic information of the participants is presented in Table 1.

Assessment of musculoskeletal pain

To examine and report the prevalence of MPs, descriptive statistics were used, and the results were reported in three parts of the NQ. The data were collected using the NQ and in a self-reported manner. This questionnaire has three parts. The first part examines the pain level in the past 12 months, the second focuses on the problems that inhibit routine activities in the past 12 months, and the third part checks the existence of any problem in the previous week. The body areas involved were the neck, shoulders, upper back, elbow, wrist, lower back, thigh, knee, and ankle [12]. It should be noted that Namnik et al., in a study, showed that the Persian version of the NQ has good validity (0.77) and reliability (0.83-1) [13].

Statistical analysis

Descriptive and inferential statistics were used in this study. In descriptive statistics, mean and standard deviation were used to describe and explain the information. The Chi-squared test was run to check the gender difference in inferential statistics. All statistical calculations of this study were performed in SPSS v. 24. P-values less than 0.05 were considered significant.

3. Results

Among the 2641 people participating in this study, there were 1338 women (50.7%) and 1303 (49.3%) men (Table 1). Findings indicated the highest prevalence rates of MPs in the past 7 days among women were reported in the neck and shoulders (15.2%, 14.1%, respectively) and, among men, in the lower back and knee (6.6%, 7.4%, respectively). The lowest rate for both genders was in the elbow (men=0.8%, women=1.3%). A significant difference existed between the two genders in terms of the prevalence of MPs in the past 7 days in the neck, shoulders, upper back, wrists, lower back, thighs, knee, and ankles ($P<0.05$) (Table 2).

Results showed the highest prevalence rates of MPs in the past 12 months among men and women in the neck (11.7%, 15%, respectively) and knee (13.2%, 10.7%, respectively) and the lowest prevalence for men and women in the elbow (1.5%, 1.5%, respectively). Again, a significant difference existed between the two genders in terms of the prevalence of MPs in the past 12 months in the neck, shoulders, wrists, knees, and ankles ($P<0.05$) (Table 3).

Results demonstrated that the MPs with the highest inhibitory effects on doing daily activities in the past 12 months were reported in the neck (8.1%) and shoulder

Table 1. Demographic information of the participants

Variables	Mean±SD/No. (%)			
	Male	Female	Overall	
Participants	1303(49.33)	1338(50.67)	2641(100)	
Height (cm)	177.037±7.81	162.902±6.403	169.876±10.041	
Weight (kg)	75.716±15.29	61.149±16.344	68.336±17.427	
BMI (kg/m ²)	24.303±6.76	23.102±7.208	23.693±7.017	
Age (y)	23.71±5.460	23.10±5.684	23.40±5.582	
Education	Bachelor	482(37)	562(42)	1044(39.5)
	Master	704(54)	655(49)	1359(51.5)
	PhD	117(9)	121(9)	238(9)
Amount of using a laptop (h)	2.54±2.094	2.05±2.011	2.29±2.066	
Amount of using a mobile phone (h)	2.40±1.635	2.64±1.747	2.52±1.696	
Amount of using PlayStation (h)	0.32±0.844	0.17±0.552	0.24±0.713	

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(7.5%) among women as well as lower back (5.4%) and knee (4.3%) among men, with the lowest rates in the elbow for men (0.6%) and women (0.5%). A significant difference existed between the two genders in terms of the prevalence of MPs with preventive effects on performing routine activities in the past 12 months in the neck, shoulders, wrists, thighs, and knee ($P<0.05$) (Table 4).

4. Discussion

The first step is determining MPs prevalence rates to prevent, diagnose, and treat MPs in adolescents and adults. The present epidemiological study aimed to investigate and report the prevalence rates of MPs among newly admitted students to the University of Tehran in

Table 2. Prevalence of musculoskeletal complaints during the last 7 days

Region	No. (%)				Overall (%)	Chi-square Test	
	Male		Female			Statistics	P
	Yes	No	Yes	No			
Neck	73(5.6)	1230(94.4)	203(15.2)	1135(84.8)	10.5	64.595	0.001*
Shoulder	53(4.1)	1250(95.9)	189(14.1)	1149(85.9)	9.2	80.232	0.001*
Upper back	56(4.3)	1247(95.7)	88(6.6)	1250(93.4)	5.5	6.652	0.010*
Elbows	10(0.8)	1293(99.2)	17(1.3)	1321(98.7)	1	1.651	0.199
Wrists/Hand	37(2.8)	1266(97.2)	96(7.2)	1242(92.8)	5	25.943	0.001*
Lower back	86(6.6)	1217(93.4)	147(11)	1191(89)	8.8	15.790	0.001*
Hip/Thighs	19(1.5)	1284(98.5)	65(4.9)	1273(95.1)	3.2	24.778	0.001*
Knees	94(7.2)	1209(92.8)	160(12.5)	1178(87.5)	9.6	17.091	0.001*
Ankles/Feet	37(2.8)	1266(97.2)	65(4.95)	1273(95.1)	3.9	7.243	0.007*

* significant level of $P<0.05$.

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Table 3. Prevalence of musculoskeletal complaints during the last 12 months

Regions	No. (%)				Overall (%)	Chi-square Test	
	Male		Female			Statistics	P
	Yes	No	Yes	No			
Neck	152(11.7)	1151(88.3)	201(15)	1137(85)	13.4	6.426	0.011*
Shoulder	116(8.9)	1187(91.1)	173(12.9)	1165(87.1)	10.9	10.986	0.001*
Upper back	106(8.1)	1197(91.9)	124(9.3)	1214(90.7)	8.7	1.065	0.302
Elbows	19(1.5)	1318(98.5)	20(1.5)	1318(98.5)	1.5	0.006	0.938
Wrists/Hands	67(5.1)	1236(94.9)	114(8.5)	1224(91.5)	6.9	11.801	0.001*
Lower back	144(11.1)	1159(88.9)	128(9.6)	1210(90.4)	10.3	1.576	0.209
Hip/Thighs	46(3.5)	1257(96.5)	46(3.4)	1292(96.6)	3.5	0.017	0.897
Knees	172(13.2)	1131(86.6)	143(10.7)	1195(89.3)	11.9	3.968	0.046*
Ankles/Feet	64(4.9)	1239(95.1)	45(3.4)	1293(96.6)	4.1	4.000	0.045*

*Significant level of $P < 0.05$.

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2018. Based on the results, 70.65% of the students reported MPs in the past 12 months, 37.44% were women, and 33.20% were men, with women reporting pain by about 4% more than men. It is found that this rate of MPs prevalence is similar to that of sophomore Australian university students (75.8%) [14]. However, our reported value is higher than that of Pakistani BA/BS students (64.9%) [15]. MPs in the past 7 days were 56.19%, which is similar to that of non-medical BA/BS Pakistani students (56.82%) [15]. Among these, the share of women

was 38.74%, and that of men was 17.46%. These results showed a higher level of MPs (approximately double) in the past 7 days among women. Finally, the existence of a problem-causing obstacle in the past 12 months in one of the mentioned areas is reported in Table 3. In total, 32.15% of the students reported a problem in the past 12 months that prevented their routine activities at home, work, or university. Of these, 20.67% were women, and 11.47% were men.

Table 4. Disabling problem in the past 12 months

Regions	No.(%)				Overall (%)	Chi-square Test	
	Male		Female			Statistics	P
	Yes	No	Yes	No			
Neck	44(3.4)	1259(96.6)	109(8.1)	1229(91.9)	5.8	27.517	0.001*
Shoulder	23(1.8)	1280(98.2)	101(7.5)	1237(92.5)	4.7	49.344	0.001*
Upper back	43(3.3)	1260(96.7)	47(3.5)	1291(96.5)	3.4	0.091	0.763
Elbows	8(0.6)	1295(99.4)	7(0.5)	1331(99.5)	0.6	0.096	0.756
Wrists/Hands	26(2)	1277(98)	52(3.9)	1286(96.1)	3	8.236	0.004*
Lower back	67(5.1)	1236(94.9)	77(5.8)	1261(94.2)	5.5	0.481	0.488
Hip/Thighs	14(1.1)	1289(98.9)	31(2.3)	1307(97.7)	1.7	6.084	0.014*
Knees	56(4.3)	1247(95.7)	97(7.2)	1241(92.8)	5.8	10.539	0.001*
Ankles/Feet	28(2.1)	1275(97.9)	31(2.3)	1307(97.7)	2.2	0.085	0.770

* significant level of $P < 0.05$.

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Results showed that neck pain was the most prevalent complaint among students (in 12 months: 353; in 7 days: 273; preventing routine activities in 12 months: 152), followed by low back pain (in 12 months: 271; in 7 days: 232; preventing routine activities in 12 months: 143) and knee (in 12 months: 315; in 7 days: 153; and preventing routine activities in 12 months: 254), and finally upper back pain (in 12 months: 230; in 7 days: 90; preventing routine activities in 12 months: 144). In Trevelyan and Legg's study, neck pain and lower back pain were reported by 45% of students, which was very severe in 7% of them [16]. A study on Australian students showed that neck pain was the most prevalent MPs among them [14]. Also, a similar work reported a high prevalence of neck pain (46%) among MA/MS students [17]. Other studies have reported a higher prevalence of lower back pain than neck pain [18, 19]. Overall, previous studies on students have demonstrated the prevalence of pain in the neck and lower back area more than in other body parts [20, 21].

Recent studies indicate that static postures, e.g., using laptops, cell phones, and reading, increase the risk of neck pain among students [22, 23]. In this way, neck pain has become a severe and growing problem for students [24]. A study by Ayanniyi [25] revealed that many people experience neck pain after university admission. Gharib and Hamid [24] also reported that students spent a long time on computers to do their homework. Several studies have reported the incidence of neck pain due to excessive use of computers [26].

In the study by Lawrence JH. [27], the most severe MP (~18.5%) in Finnish students aged 14 to 15 was reported in the knee, with a very high prevalence among students aged 7 to 10 years. In the investigation by Lindstrom Hazel, over half of the adolescents participating in the study suffered from knee pain [28]. In the study by Lucas et al. on girls, the most prevalent MP was reported in the knee [29], which is in line with the present work results. In most of these studies, the reason for knee pain in adolescents of this age range is muscle weakness and pressure on the knee joints due to uncomfortable shoes worn when exercising and lack of routine activities.

Results showed that girls experience MDs more than boys, and a significant difference existed between the two genders in this regard. Another study on Australian nursing students showed a significant difference between men and women regarding the prevalence of MDs; these problems were more prevalent among men [30]. In the US, Katz et al. [31] concluded that female students ran the risk of MDs in the upper body, while Hupert et al. [32] reported that the prevalence of MPs in the neck and

shoulders was high among female university students. Rising et al. [33] showed that, although the number of female dentistry students with neck and shoulder pain was higher than that in men, this difference was not significant. In the mentioned investigation, a lower proportion of male students of dentistry than their female counterparts reported pain in the lower back and lower body areas. Girls were more at risk of MPs than boys due to differences in their musculoskeletal structure (being smaller), compressive fibers and muscle tone, functional capacities, and experiencing menstruation [34].

The cross-sectional studies, like this, can offer practical solutions for large-scale policy-making in the domain of health, especially MPs. Specialists in this domain can examine the prevalence of pains and disorders and compare them with standard norms and the figures reported from other countries to plan specific and scientific programs for enhancing students' health.

The generalizability of the results is acceptable and reliable because of the high number of samples and the use of both sexes. Another strength of the research is the existence of students from different educational levels. Screening for musculoskeletal pain in new students was first performed at the University of Tehran. This research could be a starting point for measuring the musculoskeletal pain of newly admitted students in later years as a screening project. In addition to the strong points, each research has weaknesses that need special attention. The uniqueness of this study is probably the biggest drawback. Failure to assess the extent of musculoskeletal abnormalities, quality of life, level of physical activity, participation in sports programs, and the extent of students' Internet dependence were some of the issues that could be included in the study. With the knowledge of the mentioned cases, in addition to being a report of the research, the cause-and-effect relationship between the amount of musculoskeletal pain could be investigated, so the obtained results could be more valid. It should be noted, however, that due to the limitations of the research, it was not possible to investigate the mentioned cases.

As with all studies, this study had its limitations. Failure to study the issues related to people's daily lives, such as sleep, diet, and lifestyle, and the inability to study the mental and emotional state of students and their motivation were among the limitations of the research. But the most critical issue was time constraints. If the screening time was longer, we could apply more variables in the study. In addition to what was said, a general limitation in cross-sectional studies is that they do not show cause and effect. The possibility of bias in this study, like

other cross-sectional studies because of using questionnaires and interviews, is inevitable. Therefore, there may be bias in recalling the extent of musculoskeletal pain, especially in the last 12 months. However, because the participants in this study were highly educated, the bias in the present study may be less than other studies conducted on participants with low education.

Due to the limitations of the research, in the health screening of newly admitted students in the following years, attention should be paid to evaluate their musculoskeletal abnormalities, level of physical activity, participation in physical activity, and Internet dependence in addition to musculoskeletal pain. Also, examining the relationship between these cases can reveal the weakness of cross-sectional studies on the relationship between cause and effect, and the necessary efforts can be made to eliminate it. In addition to gender, differences in educational levels can also be considered an influential variable. Screening of a larger sample from different cities and different universities is also suggested. In conclusion, the information obtained from the present study can increase the knowledge of students and professionals about the prevalence of musculoskeletal pain and seek to prepare a program to reduce musculoskeletal pain and increase the level of students' physical health.

5. Conclusion

The present study reported the high prevalence of MPs, especially in the neck, lower back, and knees. The high prevalence of MPs, especially in the neck, is alarming and requires preventive strategies. Moreover, guidelines must be given to students on the correct ways to sit and stand. Exercise can also be effective in reducing these pains. Based on the present study, the prevalence of MPs was high among newly admitted students to the University of Tehran; this high level of pain can cause numerous complications during their studies and later in life. Therefore, students need special policy-making and programs to perceive the importance of MPs.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed of the purpose of the research and its implementation stages.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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