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The relationship between musculoskeletal disorders and physical activity among nursing students

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Abstract

To determine the correlation between musculoskeletal system disorders and the physical activity levels of nursing students. A total of 489 nursing students included in this cross-sectional study. Self-administered questionnaire included Nordic musculoskeletal questionnaire and International physical activity questionnaire short form (IPAQ-SF). The standardized Nordic musculoskeletal questionnaire showed that 358 students (%73.2) reported having musculoskeletal disorders in one or more body parts, while 131 students (26.8%) had no complaints. The mean weekly energy consumption as linked to the physical activity of the participants was found to be 1542.96±1949.35 MET-min/wk. 51.5% of the individuals exhibited low levels of activity. Statistically significant correlation was found between experiencing upper back pain during the last year and the participants' physical activity levels. The current study has shown that the prevalence of MSDs was high among nursing students, with a correlation being found between low physical activity and upper back pain. Physical activity levels should hence be considered when evaluating young adults with musculoskeletal disorders.

Keywords: Musculoskeletal pain, physical activity, nursing students.

Introduction

Musculoskeletal system diseases (MSDs) are among the major health issues in working populations worldwide [1,2]. As they cause pain and loss of function significantly, they result in a low quality of life (QoL) (3).

Nurse education consists of skills and abilities as well as necessary information to equip the future nurses to meet the requirements of a life-long occupation. The education should also cover the risk factors of health, which student nurses might encounter while executing the demands of clinical work. Nurses are well-recognized being at risk of occupational musculoskeletal symptoms (MSSs) [4]. The information on the impact of MSSs on the daily life of a student nurse is quite limited in the literature.

Any movement of the body demanding energy expenditure is defined as a physical activity [5]. Several studies in the literature have reported inconsistent results on the relationship between physical activity and MSDs. A consensus on this issue has not been achieved yet [2,6,7].

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We aimed to assign the relationship between physical activity levels of student nurses and musculoskeletal system disorders the in this study.

Materials and Methods

This descriptive and cross-sectional study was ruled in the Faculty of Health Sciences of Inonu University during June 2017. The study participants comprised 489 student nurses. Presence of spinal deformities, a history of any injury of body parts, any surgical operation history or severe physical disabilities causing pain were the exclusion criteria. It was approved by the Scientific Research and Ethical Committee of Inonu University with the number 2017/13-9. An informed consent with the signature of each eligible study participant was obtained.

A self-administered questionnaire was administered to the individual students in their lunch break time. One of the authors explained the instructions for the questionnaire to the students. The questionnaire comprised three sections.

In the first section of the questionnaire; the participants'

demographic characteristics were asked, including age, gender, height, weight, and the year of the education.

In the second section, the standardised Nordic musculoskeletal questionnaire, containing a view of the human body imaged from the back, separated into the nine anatomical localizations, which are generally affected by musculoskeletal disorders [8]. This questionnaire was previously validated in Turkish [9]. The replies to the questions can be either 'yes' or 'no' indicating the presence or absence of musculoskeletal disorders, respectively. The individuals were requested to mark the respective body regions on the figure in the questionnaire whether they had experienced any pain/discomfort in the last 12 months (period prevalence) and in the last seven days (point prevalence). Data on the severity of the MSSs experimented during the last 12 months was also collected.

The questionnaire's third section included the international physical activity questionnaire short form (IPAQ-SF) to detect the individuals' grade of physical activity [10]. IPAQ-SF has four questions asking individuals to reclaim the condition of their physical activity over the previous seven days. The reliability and validity study of the IPAQ-SF in the Turkish language was performed previously [11]. The data acquired from IPAQ-SF were outlined according to the type and intensity of the physical activity (walking, moderate or intense activities) and the predicted the time spent in the sitting position per week. To obtain an estimated quantity of the weekly physical activity, the following formula is used: MET-min per week: MET (metabolic equivalent task) level x minutes of activity x events per week.

Statistical Analysis

The statistical analyses were performed by using the version 17.0 of SPSS for Windows. The results are shown as mean ± standard deviation (SD). To compare the physical activity levels of the participants with MSSs to those without such symptoms, the chi-square test and the independent samples t-test were used for the categorical and quantitative variables, respectively. To examine the agents that might influenced MSSs, a logistic regression analysis was administered. A statistically significant p-value was defined to be ≤ 0.05.

Results

A total of 489 individuals out of 500 eligible students were enrolled in this study. The students were excluded if they did not complete the questionnaire form or if they had a history of surgery or deformity. The mean age of participants was 21.40 ± 2.4 years. The majority of the participants were female (67.9%). The demographic characteristics of the individuals are shown in Table 1.

Table 1. Demographic characteristics

Characteristics	n	%	Mean±SD
Age			21.40±2.4
BMI			22.20±3.3
Gender			
Female	332	67.9	
Male	157	32.1	
Academic year			
First	88	18	
Second	179	36.6	
Third	118	24.1	
Fourth	104	21.3	
Physical activity level			
Sufficient	180	36.8	
Low	252	51.5	
Least	57	11.7	
Weekly energy expenditure estimate (MET-mn/week)			1542.96±1949.35

The rate of neck pain experienced any time during the lifespan was 43.4% and the rates for upper back pain and lower back pain were 41.5% and 39.5%, respectively. An investigation on the 12-month prevalence of MSSs revealed that the neck was the most common site for those symptoms to occur (33.5%), followed by the upper back (30.7%), the lower back (28.2%), and the shoulders (21.5%) (Table 2).

Table 2. Prevalence, duration and location of musculoskeletal symptoms

	Lifetime (%)	12months (%)	1month (%)	Point (%)
Neck	43.4	33.5	31.5	18.8
Shoulder	29.9	21.5	20.0	11.7
Upper back	41.5	30.7	27.0	16.4
Elbow	4.9	3.3	2.7	1.8
Wrist/hand	14.5	9.2	8.2	4.5
Lower back	39.5	28.2	26.6	14.9
Hip/leg	11.2	7.8	7.0	4.9
Knee	21.5	15.7	14.3	8.4
Ankle/foot	20.2	13.5	13.3	9.8

Point: The day the assessment was performed.

The mean weekly energy consumption in relation to the physical activity of the individuals was worked out to be 1542.96±1949.35 MET-min/wk. When the participants were classified according to their physical activity level, 36.8% of individuals were observed to perform adequate activity levels while 51.5% reported low grades of activity and 11.7% were engaged in the minimum value of possible physical activity (i.e. inactive) (Table 1).

There was a statistically significant correlation between upper back and foot/ankle pain during the last year and the students' activity levels (p=0.001). On the other hand, no correlations were found between experimenting pain during the last month and on the day of evaluation and the physical activity. No significant correlation was found between pain in the other parts of the body and activity levels either (Table 3).

Table 3. Impact of physical activity on symptoms, 12 months or 1 month previously and point

Physical activity	Least n	%	Low n	%	Sufficient n	%	p
Neck[1]							0.64
Yes	61	37.2	87	53.0	16	9.8	
No	119	36.6	165	50.8	41	12.6	
Neck[2]							0.75
Yes	31	33.7	49	53.3	12	13.0	
No	149	37.5	203	51.1	45	11.3	
Shoulder[1]							0.67
Yes	35	33.3	58	55.2	12	11.4	
No	145	37.8	194	50.5	45	11.7	
Shoulder[2]							0.34
Yes	16	28.1	33	57.9	8	14.0	
No	164	38.0	219	50.7	49	11.3	
Upper back[1]							0.001
Yes	39	26.0	93	62.0	18	12.0	
No	141	41.6	159	46.9	39	11.5	
Upper back[2]							0.001
Yes	17	21.3	51	63.8	12	15.0	
No	163	39.9	201	49.1	45	11.0	
Elbow[1]							0.13
Yes	3	18.8	9	56.3	4	25.0	
No	177	37.4	243	51.4	53	11.2	
Elbow[2]							0.57
Yes	2	22.2	5	55.6	2	22.2	
No	178	37.1	247	51.5	55	11.5	
Lower back[1]							0.06
Yes	40	29	82	59.4	16	11.6	
No	140	39.9	170	48.4	41	11.7	
Lower back[2]							0.43
Yes	22	30.1	42	57.5	9	12.3	
No	158	38	210	50.5	48	11.5	
Hip/leg[1]							0.95
Yes	14	36.8	19	50	5	13.2	
No	166	36.8	233	51.7	52	11.5	
Hip/leg[2]							0.61
Yes	7	29.2	13	54.2	4	16.7	
No	173	37.2	239	51.4	53	11.4	
Knee[1]							0.51
Yes	24	31.2	44	57.1	9	11.7	
No	156	37.9	208	50.5	48	11.7	
Knee[2]							0.70
Yes	13	31.7	22	53.7	6	14.6	
No	167	37.3	230	51.3	51	11.4	
Ankle/foot[1]							0.001
Yes	16	24.2	44	66.7	6	9.1	
No	164	49.3	208	49.3	50	11.8	
Ankle/foot[2]							0.12
Yes	9	18.8	33	68.8	6	12.5	
No	171	38.8	219	49.7	51	11.6	

1: 12 months previously; 2: The day the assessment was performed

Table 4. Regression analysis of the relationship between upper back pain and other factors

	Wald	p	OR (CI)
Gender	11.8	0.001	2.36 (1.4–3.8)
Age	0.49	0.48	1.05 (0.9–1.2)
BMI (kg/m²)	0.19	0.65	0.98 (0.9–1.0)
Academic year	0.00	0.98	1.00 (0.5–1.8)
Physical activity level	9.72	0.002	1.65 (1.2–2.2)

The comparison of the physical activity levels between those who experienced upper back pain during the last 12 months (1626.23 MET-min/week) and those who did not experience such pain (2078.08 MET-min/week) demonstrated that the physical activity levels were significantly different between the two groups (p=0.001). It was also found out that participants' gender and physical activity levels were correlated with the experience of upper back pain (Table 4). There was not a significant correlation between the BMI of the participants and the rate of upper back pain. When the physical activity levels of individuals with foot pain, experienced in the last 12 months, were compared to those of the participants without such pain, a significant difference was not observed between the two groups (p>0.05). Among the other factors that may affect the foot pain, gender was the factor detected to have an impact (p<0.05).

Discussion

The lifetime, 12-month, and daily prevalence rates of musculoskeletal system disorders among student nurses were found to be quite high in this study. We determined that musculoskeletal system pain was most common in the spine (neck, upper back, and lower back). When the physical activity levels were compared in terms of the musculoskeletal system symptoms experienced in the last year, the last month and on the day of evaluation, a correlation was found between physical inactivity and back pain.

The results of our study are consistent with the findings of Lövgen et al., who reported a prevalence of 51% for neck pain, with upper back pain being the second most common MSS, among student nurses [12]. In another study on student nurses, Backåberg et al. reported that the lower back, neck, and upper back were the most common localisations of pain [13]. Dıraçoğluet al. stated that the neck region was the second most common site for the pain to occur among health personnel following the lower back pain [14]. In our study, in accordance with the literature, 43.4% of the participants reported experiencing neck pain previously (during any period of life), while 33.5% had experienced neck pain within the previous 12 months. The results show that in the general population of student nurses, musculoskeletal system pain in the spine is common and recurrent [15].

High levels of foot/ankle pain were also observed in nurses. In the general population, the prevalence of foot pain varies from 10% to 42% [16]. Dıraçoğlu et al. determined that nurses experienced significantly more knee and ankle pain when compared to other groups of healthcare professionals. Being female and being at an advanced age are the two characteristics correlated with an increased risk of foot pain, reducing the quality of life [14]. In the literature, it has been reported that standing for long periods of time has a negative impact on the lower leg pain [17]. In our study, we identified that the foot pain seen in female students was independent of their physical activity and its rate was higher compared to those of the male students. We believe that this finding may be related to the daily activities performed in standing by women, requiring longer periods of standing compared to men, in addition to working for long periods of time in the standing position during the internship at the hospital.

Regular physical activity plays an important role in improving public health issues as it is associated with the prevention of many chronic diseases primarily and secondarily, as well as reducing the rates of early age mortality. A linear correlation between physical activity and an individual's health condition has been reported [18-20]. Therefore, it is recommended that healthy adults aged between 18 and 65 years must engage in a moderate physical activity performed for half an hour in at least five days of the week in order to improve and maintain a healthy status [5,19,20].

The mean weekly energy consumption addicted to physical activity was 1542.96±1949.35 MET-min/week, calculated according to the IPAQ in our study. It was found that 36.8% of the participants were engaged in sufficient levels of activity, 51.1% were engaged in a low level of activity and 11.7% were inactive. Similarly, a study by Arslan et al. reported that low levels of physical activity were found in 64% of university students [21]. In a study on a population of teachers in Brazil, Brito et al. [22] reported that 46.3% of participants were engaged in a low level of physical activity based on IPAQ calculations. The rates reported in these previous studies are not exactly the same as the rates found in our study; however, they are similar because the majority of participants in all of these studies, including our study, were engaged in low levels of physical activity.

A low level of physical activity may result in numerous musculoskeletal system problems. When combined with working in inappropriate postures for long periods of time, low levels of physical activity are commonly associated with the pain observed in the spinal region. Kocur et al. reported that a 12-week walking exercise helped the study participants have better shoulder mobility and decreased the soreness in their middle trapezius, latissimus dorsi and infraspinatus muscles [23]. Pesco et al. suggested that performing daily exercises actively in order to improve the posture was critical in reducing upper back and neck pain. [24]. Crow et al. reported that isolated muscle training was consistently found to be beneficial in improving the lower back pain [25]. In our study, we observed that upper back pain was correlated with a low level of physical activity. Sufficient levels of physical activity, when performed appropriately, are beneficial in reducing the pain, strengthening muscles, reducing the mechanical load on vertebral structures, and correcting the posture [26]. Furthermore, active

and passive exercises facilitate blood circulation, decrease muscle tension, and preserve joint movements, all of which in turn help reduce the pain. Several studies are available in the literature demonstrating that strengthening and stretching exercises are beneficial in restoring the function of the musculoskeletal system and reducing non-specific spinal pain [27, 28].

Limitations

There are some limitations in this study mainly due to using a self-report questionnaire. The self-reported responses might have been affected by both the subjectivity of the individuals and recall bias. Secondly, the majority of individuals had normal BMI scores and the gender distribution of the participants was not equal. Third, the study did not state the psychosocial and ergonomic status which have been stated to enhace the MSS pain ahead.

Conclusion

The prevalence of MSDs, especially the neck and back pain, is high among student nurses. A correlation between low physical activity and upper back pain was found in our study. Physical activity levels should, therefore, be considered when appreciating young adults with musculoskeletal diseases. To prevent the emergence of upper back pain in healthcare professionals, especially in nurses, it may be beneficial to organise physical activity programs designed to strengthen the muscles in the neck and in the upper and lower back.

Conflict of interest

The authors declare that they have no competing interest.

Financial Disclosure

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Ethical approval

Consent of ethics was approved by the Scientific Research and Ethical Committee of Inonu University with the number 2017/13-9.

References

1. Özcan E, Esmaeilzadeh S, Bölükbaş N. Bilgisayar kullananlarda mesleki kas iskelet sistemi hastalıklarından korunma ve ergonomi. Nobel Med. 2007;3:12-7.

2. 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 Musculoskelet Disord. 2007;8:56.

3. Yılmaz F, Şahin F, Kuran B. İşe başlı kas iskelet hastalıkları ve tedavisi. Nobel Med. 2006;2:15-22.

4. Swedish work environment authority work-related disorders. Arbetsmiljöstatistik 2012;1652:1110.

5. Pate RR, Pratt M, Blair SN, et al. Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA. 1995;273:402-7.

6. Holth HS, Werpen HKB, Zwart JA, et al. Physical inactivity is associated with chronic musculoskeletal complaints 11 years later: Results from the Nord-Trondelag Health Study. BMC Musculoskel Disord. 2008;9:159.

7. Briggs AM, Straker LM, Bear NL, et al. Neck/shoulder pain in adolescents is not related to the level or nature of self-reported physical activity or type of sedentary activity in an Australian pregnancy cohort. BMC Musculoskelet Disord. 2009;10:87.

8. Kuorinka I, Jonsson B, Kilbom A, etal. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. Appl Ergon. 1987;18:233-7.

9. Turhan K, Arzu G & Evrim G. The nordic musculoskeletal questionnaire: crosscultural adaptation into Turkish assessing its psychometric properties. Disabil Rehabil. 2016;38:21.

10. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. Med Sci Sports Exerc. 2003;35:1381-95.

11. Saglam M, Arikan H, Savci S, et al. International physical activity questionnaire: reliability and validity of the Turkish version. Percept Mot Skills. 2010;111:278-84.

12. Lövgren M, Gustavsson P, Melin B, et al. Neck/shoulder and back pain in new graduate nurses: A growth mixture modeling analysis. Int J Nurs Stud. 2014;51:625-39.

13. Backåberg S, Rask M, Brunt D. Impact of musculoskeletal symptoms on general physical activity during nursing education. Nurse Educ Pract. 2014;14:385-90.

14. Dıraçoğlu D. Musculoskeletal pain among medical staff. Turkiye Klinikleri J Med Sci. 2006;26:132-9.

15. Briggs AM, Bragge P, Smith AJ, et al. Prevalence and associated factors for thoracic spine pain in the adult working population: a literature review. J Occup Health. 2009;51:177-92.

16. Wahlström J, Östman C, Leijon O. The effect of flooring on musculoskeletal symptoms in the lower extremities and low back among female nursing assistants. Ergonomics. 2012;55:248-55.

17. H Jui-Yeh, SJ Shu-Chu. Risk Factors for Musculoskeletal Discomfort in Nurses. J Nurs Res. 2006;14:228-36.

18. Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. CMAJ. 2006;174:801-9.

19. O'Donovan G, Blazevich AJ, Boreham C, et al. The abc of physical activity for health: a consensus statement from the British Association of Sport and Exercise Sciences. J Sports Sci. 2010;28:573-91.

20. Haskell WL, Lee IM, Pate RR, et al. Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc. 2007;39:1423-34.

21. Arslan SA, Daşkapan A, Çakır B. Specification of nutritional and physical activity habits of university students. TAF Preventive Medicine Bulletin ;2016.

22. Brito WF, Santos CL, Marcolongo Ado A, et al. Physical activity levels in public school teachers. Rev Saude Publica. 2012;46:104-9.

23. Kocur P, Pospieszna B, Choszczewski D, et al. The effects of Nordic Walking

training on selected upper-body muscle groups in female-office workers: A randomized trial. Work. 2017;56:277-83.

24. Pesco MS1, Chosa E, Tajima N. Comparative study of hands-on therapy with active exercises vs education with active exercises for the management of upper back pain. J Manipulative Physiol Ther. 2006;29:228-35.

25. Crow J, Pizzari T, Buttifant D. Muscle onset can be improved by therapeutic exercise: a systematic review. Phys Ther Sport. 2011;12:199-209.

26. Jackson CP, Brown MD. Is there a role for exercise in the treatment of patients with low back pain? Clin Orthop Relat Res. 1983;179:39-45.

27. Hayden JA, Van Tulder MW, Tomlinson G. Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain. Ann Intern Med. 2005;142:776-85.

28. Ardıç F. Health Benefits of Exercise. Turk J Phys Med Rehab. 2014;60:9-14.