

The prevalence of musculoskeletal pains among students

Firouz Amani¹, Anahita Zakeri², Vahid Abbasi³, Mohammad Bahadoram⁴, Mohammad Davoodi⁵, Nozar Dorestan^{6*}

¹Department of Community Medicine, Faculty of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

²Department of Internal Medicine, Imam Khomeini Hospital, Ardabil University of Medical Sciences, Ardabil, Iran

³Department of Neurology, Faculty of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

⁴Medical Student Research Committee and Social Determinant of Health Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

⁵Department of Radiology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

⁶Department of Surgery, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Correspondence to:

Nozar Dorestan,

Email:

Dorestan.Nozar@gmail.com

Received: 26 October 2017

Accepted: 10 January 2018

Published: 10 February 2018

Keywords: Musculoskeletal pain, Low back pain, Schoolbag weight, Adolescents, Posture

Abstract

Introduction: Musculoskeletal pain is one of the most important pains among adolescents.

Objectives: This study was carried out to determine the prevalence of musculoskeletal disorders and its related complications among students in Ardebil.

Patients and Methods: This cross-sectional descriptive study was conducted on 158 students selected by random sampling for participation in a study from two male and female schools in Ardebil. After introducing and explaining the study goals and obtaining informed consent, the Nordic questionnaire was completed by interviewing.

Results: of all students participating in the study, 55% had pain in the musculoskeletal system. The most severe pain was reported in the knee zone and the mildest pain in the pelvic zone that overall knee pain was revealed in 29.5% and neck pain in 27.3%. There was a significant relationship between body mass index (BMI) of students and musculoskeletal pain. Additionally, a significant relationship between height and musculoskeletal features was seen. There is also a significant relationship between the type of school bag and musculoskeletal disorders.

Conclusion: Musculoskeletal discomfort is commonly reported among students in Ardabil city with an overall prevalence of 55%. This discomfort is potentially influenced by students' body mass index, type, shape and quality of bags.

Introduction

Musculoskeletal pain is one of the most important pains among adolescents (1). Today, students' low mobility along with their taking on stressful situations caused by industrial life has increasingly led to psychological and physical complications, such as musculoskeletal disorders in this age group (2). The prevalence of musculoskeletal pain among schoolchildren has been reported to be 10% to 20%, and according to statistics, between 20% and 25% of patients admitted to rheumatology clinics are adolescents with these types of pains (3). According to a study conducted at Columbia University, musculoskeletal pain is the second most commonly reported problem in adolescent students that about 5% of these subjects reported such pain with unknown origins (4). According to a study conducted by Trevelyan and colleagues, about 45% of the students aged 13 to 18 years suffered from musculoskeletal pain which was often

Core tip

The incidence of back pain in schoolchildren with no apparent clinical cause has increased over the past decades. This study was carried out to determine the prevalence of musculoskeletal disorders and its related complications among students. In a study on 158 students, musculoskeletal discomfort is commonly reported among students in Ardabil city with an overall prevalence of 55%. This discomfort is potentially influenced by students' body mass index and type, shape and quality of bags.

vague and unrelated (5). In another study, the prevalence of spinal pain in adolescent students was 74% (6). In general, the results of studies confirm the presence of ambiguous musculoskeletal pain among school students. In the study by Whittfield et al, the prevalence of musculoskeletal pain in 140 students aged 11-13 years was reported to be 18.5% (7). In another study by Rodríguez-Oviedo et al,

Citation: Amani F, Zakeri A, Abbasi V, Bahadoram M, Davoodi M, Dorestan N. The prevalence of musculoskeletal pains among students. J Prev Epidemiol. 2018;3(1):e06.



high proportion of musculoskeletal disorders, especially spinal pain, was confirmed in 14-17 years old students (8). Trevelyan et al also reported spinal disorders among 245 students aged 11 to 14 years over the course of two months (5). Mackenzie and colleagues reported spinal pain at least once a month in 31% of students (9). Also, various studies have reported the relationship between adequate immobility, type and duration of sitting, and lack of muscular balance with vague musculoskeletal pain (8-10). Additionally, carrying school supplies and bags by students is a topic that has been considered in several studies in recent years (4). Studies suggest carrying heavy or bad designed bags lead to musculoskeletal pain in about 58% of students and giving rise to severe head and neck pain (11). In a cross-sectional study on five thousands 11 to 14 years old Iranian students, 15% suffered from back pains (6). According to the Canadian educational guidelines, primary school children and high school students should not carry bags with more than 10% and 15% of body weight respectively (12,13).

Objectives

Given that the incidence of back pain in schoolchildren has increased over the past two decades. This study was carried out to determine the prevalence of musculoskeletal disorders and its related complications among students in Ardebil.

Patients and Methods

Study population

This cross-sectional descriptive study was conducted on 158 students selected by random sampling for participation in a study from two male and female schools in Ardebil. The exclusion criteria were the history of musculoskeletal disorders, malformation in the extremities, or development of peripheral nerves involvement. The Nordic questionnaire was used to collect the data that its validity and reliability were previously verified. In order to collect data, after introducing and explaining the study goals and obtaining informed consent, the questionnaire was completed by interviewing by trained interviewers.

Ethical issues

The research followed the tenets of the Declaration of Helsinki, informed consent was obtained. This study was approved by the Ethics Committee of Ardabil University of Medical Sciences, (ethical code: IR.ARUMS.REC.2017.38).

Statistical analysis

For statistical analysis, results were presented as mean \pm standard deviation (SD) for quantitative variables and were summarized by absolute frequencies and percentages for categorical variables. For the statistical analysis, the statistical software SPSS version 16.0 for Windows (SPSS Inc., Chicago, IL) was used and *P* values of 0.05 or less were considered statistically significant.

Results

Of 158 student participated in the study, 70 (43.8%) were male and 90 (56.2%) were female. Moreover, 53.8% had normal body mass index, and 33.8% were overweight or obese. According to the available results, of all students participating in the study, 55% had pain in the musculoskeletal system and others did not report any similar pain. The most severe pain was reported in the knee zone and the mildest pain in the pelvic zone that overall knee pain was revealed in 29.5% and neck pain in 27.3% (Figure 1). One hundred and five children (56.6%) used double-strap bag, 20.0% used handbag, and 14.4% used single-strap bag for carrying school things. Additionally, 33.8% paid attention to the standardization of the bag, 34.4% to model of bag, and 26.9% to convenience of the bag, and others to price of bag. Accordingly, the average number of books carried in students' school bag was equal to 2. Generally, 108 (67.5%) of the participants in the study used sport shoes, 43 (26.9%) used flat form shoes, 3 (1.9%) used pumps shoes and 6 (3.8%) used stilettos shoes. The shape of heel was flat in 131 (81.9%), wedge in 17 (10.6%) and kitten in 12 (7.5%). One hundred and six students (66.2%) used single seat chairs, 47 (29.4%) used single arched chair and 4.4% used bench table for sitting. Also, 56 (35.0%) studied in sitting on the four, 55 (34.4%) behind the desk, 30 (18.8%) in lying down form, and 19 (11.9%) in other forms. Eighty-seven cases (54.4%) slept as left-right side posture, 55 (34.4%) as prone posture and others as supine posture. The pillow height under the head was 10 to 20cm in 100 (62.5%) while it was lower than 10cm in 37.5%. Eighty-two individuals (51.2%) hunched when sitting. In addition, 76 cases (47.5%) did not exercise daily, 42 (26.2%) exercised for 10 to 20 minutes, and 42 (26.2%) had no physical activities. Of all participants, 38 (23.8%) referred to an orthopedic specialist. Moreover, 77 (48.2%) experienced a mild pain, 27 (16.9%) regularly used analgesics and others had no history of using such medications.

Discussion

Determining the prevalence of musculoskeletal disorders is first step in the prevention, diagnosis and treatment of these disorders in adolescents and even adults. The

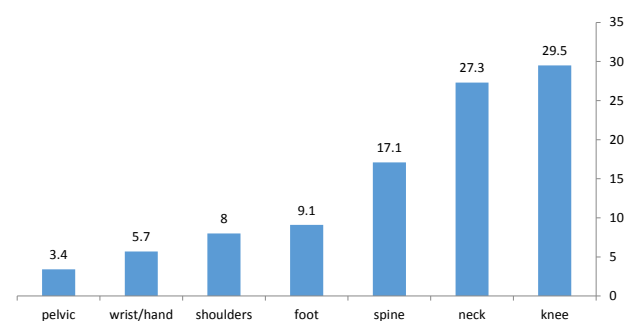


Figure 1. The distribution of musculoskeletal pain in schoolchildren.

purpose of this study was to determine the prevalence of musculoskeletal disorders and its adverse effects on health condition in school children. The results showed that the prevalence of musculoskeletal pain in students was 77.3%. In this study, all students reported the most complaints in the knee zone followed by in lumbar and neck zones. In the study by Lawrence et al (14), the most severe musculoskeletal pain among Finnish students aged 14 to 15 years was reported in the knee area in about 18.5% of patients that was significantly more prevalent in those students aged 7 to 10 years. In a study by Lindstrom-Hazel, more than half of the adolescents participating in the study suffered from knee pain (15). Another study by Lucas and colleagues on girls showed the most common musculoskeletal pain in knee (16) that was consistent with the results of the current research. In most of these studies, the cause of knee pain in adolescents in this age group is muscle weakness and pressure on the knee joint due to inappropriate shoes selection during exercise and also lack of daily activities.

In this study, neck pain and lower back pain were the next priority in musculoskeletal pain. In a study by Bergman et al, the neck and low back pains were the most prevalent musculoskeletal pains in students aged 12 to 18 years old (17). Moreover, in a study by Trevelyan and colleagues, neck pain and lower back pain were reported in 45% of the students, which was very severe in 7% of them (5). In another study conducted by Rodriguez and colleagues, half of the students were at risk for chronic neck and low back pain (8). Additionally, in a study by Smith et al, around 31% of students aged 11 to 14 years suffered from severe pain in low back and 36% had neck pain that was consistent with our observations (18).

According to the results of this study, a significant relationship between body mass index (BMI), and musculoskeletal pain was detected. Furthermore, a significant relationship between height and musculoskeletal features was seen too. In a study by Yue et al, which has examined the association between demographic factors (including age, height, and BMI) with the prevalence of musculoskeletal pain, a significant relationship between the above factors and the incidence of musculoskeletal pain in both genders was observed (19). Likewise, in another study by Azuan and colleagues, a significant correlation of BMI, weight of bag and students' height with musculoskeletal pain was seen too (20). The results of the study by Smith and colleagues also showed a positive relationship between musculoskeletal pain and BMI in girls. Hence, girls with a BMI greater than 25 were more likely to develop musculoskeletal pain and in this regard 46% of patients suffering pain had high BMI and immobility (18) that was consistent with our survey.

There is also a significant relationship between the type of bag used for carrying school appliances and musculoskeletal disorders with more pain intensity by using handbag or single-strap bag. In a study by

Trevelyan et al, a significant relationship between the type of student's bag and the incidence of musculoskeletal pain was detected. There was a milder pain in those who used double-strap bags as compared with other types of bags and also physical factors play an important role in musculoskeletal pain (5).

In this study, a significant relationship between the proportion of books transported in school bags and musculoskeletal pain was seen. In a study by Madan et al, who studied 1146 students aged 11 to 14 years, the results showed no significant relationship between weight of bags and musculoskeletal pain (21). However, in a study by Bongers et al, a relationship between the proportion of books being carried by students' bags and skeletal pains was detected (22). Accordingly, Palou et al showed that carrying a school bag weighing more than 15% of body weight in schoolchildren would disrupt the posture of the body (23). Recently, a study also showed that 65% of non-fracture referral to orthopedic clinics was due to damages caused by heavy bags (11). In this study, a relationship between the height of the sleeping pillow and the type of sitting and the presence of musculoskeletal pain was detected.

Conclusion

Musculoskeletal discomfort is commonly reported among students in Ardabil with an overall prevalence of 55%. In most cases, this pain does not come from any particular illness or discomfort. Accordingly, more and comprehensive studies in this field are needed for the future. Adolescents, especially in puberty, should be helped by programing regular exercises and also choosing suitable shoes for exercise and walking to help strengthen their muscles. It should not be positioned additional books and notes in the student bags. It is better to put up to two books and two booklets with a decent number of pen and pencils. The binders are not suitable for carrying school tools. Because it needs to have a paw function, while the bag can be carried from the palm of the hand, shoulder, or neck. Handbags and backpacks should be made of cashmere or leather so that they cannot easily be deformed. Also their shape should be appropriate to their content. It should be used more double-strap bags than other types of bags.

Limitations of our study

Limitations of our study include its short term, lack of randomization and small sample size.

Authors' contribution

FA and MB conducted the research and contributed to the conception and design of the research. ND and MD prepared the primary draft. AZ and AH contributed to the acquisition of data. FA performed the analysis of data. AZ, FA and MB contributed to the drafting of the manuscript and final approval of the manuscript.

Competing interests

The authors declare that they have no competing interest.

Ethical considerations

Ethical issues (including plagiarism, misconduct, data fabrication, falsification, double publication or submission, redundancy) have been completely observed by the authors.

Acknowledgements

We should thank the Vice-Chancellor of the University for approving this project as well as school administrators and teachers who have contributed to the collection of information.

Funding/Support

This study supported and funded by the Research Deputy of Ardabil University of Medical Science, Ardabil, Iran.

References

- Andersen JH, Kaergaard A, Mikkelsen S, Jensen UF, Frost P, Bonde JP, et al. Risk factors in the onset of neck/shoulder pain in a prospective study of workers in industrial and service companies. *Occup Environ Med*. 2003;60:649-54.
- Ndetan HT, Rupert RL, Bae S, Singh KP. Epidemiology of musculoskeletal injuries among students entering a chiropractic college. *J Manipulative Physiol Ther*. 2009;32:134-9. doi: 10.1016/j.jmpt.2008.12.011.
- Friedrichsdorf SJ, Giordano J, Desai Dakoji K, Warmuth A, Daughtry C, Schulz CA. Chronic pain in children and adolescents: diagnosis and treatment of primary pain disorders in head, abdomen, muscles and joints. *Children (Basel)*. 2016 Dec;3: 42. doi: 10.3390/children3040042.
- Skoffler B, Foldspang A. Physical activity and low-back pain in schoolchildren. *Eur Spine J*. 2008;17:373-379. doi: 10.1007/s00586-007-0583-8.
- Trevelyan FC, Legg SJ. Risk factors associated with back pain in New Zealand school children. *Ergonomics*. 2011;54:257-62. doi: 10.1080/00140139.2010.547608.
- Dianat I, Alipour A, Asghari Jafarabadi M. Prevalence and risk factors of low back pain among school age children in Iran. *Health Promot Perspect*. 2017;7:223-229. doi: 10.15171/hpp.2017.39.
- Whittfield JK, Legg SJ, Hedderley DI. The weight and use of schoolbags in New Zealand secondary schools. *Ergonomics*. 2001;44:819-24.
- Rodríguez-Oviedo P, Ruano-Ravina A, Pérez-Ríos M, García FB, Gómez-Fernández D, Fernández-Alonso A, et al. School children's backpacks, back pain and back pathologies. *Arch Dis Child*. 2012;97:730-2. doi: 10.1136/archdischild-2011-301253.
- Mackenzie WG, Sampath JS, Kruse RW, Sheir-Neiss GJ. Backpacks in children. *Clin Orthop Relat Res*. 2003;78-84.
- Gilkey DP, Keefe TJ, Peel JL, Kassab OM, Kennedy CA. Risk factors associated with back pain: a cross-sectional study of 963 college students. *J Manipulative Physiol Ther*. 2010;33:88-95. doi: 10.1016/j.jmpt.2009.12.005.
- Schwebel DC, Pitts DD, Stavrinou D. The influence of carrying a backpack on college student pedestrian safety. *Accid Anal Prev*. 2009;41:352-6. doi: 10.1016/j.aap.2009.01.002.
- Brzęk A, Dworak T, Strauss M, Sanchis-Gomar F, Sabbah I, Dworak B, et al. The weight of pupils' schoolbags in early school age and its influence on body posture. *BMC Musculoskelet Disord*. 2017;18:117. doi: 10.1186/s12891-017-1462-z.
- Kawaguchi M, Matsudaira K, Sawada T, Koga T, Ishizuka A, Isomura T, et al. Assessment of potential risk factors for new onset disabling low back pain in Japanese workers: findings from the CUPID (cultural and psychosocial influences on disability) study. *BMC Musculoskelet Disord*. 2017;18:334. doi: 10.1186/s12891-017-1686-y.
- Schulze L. Ergo Kids: How will Future Generations Deal with Current Exposures. <http://www.iea.cc/ECEE/pdfs/iea2003schultz.pdf>.
- Lindstrom-Hazel D. The backpack problem is evident but the solution is less obvious. *Work*. 2009;32:329-38. doi: 10.3233/WOR-2009-0831.
- Lucas GN. Backpacks in children. *Sri Lanka Journal of Child Health*. 2011;40:1-3. doi: 10.4038/sljch.v40i1.2856
- Bergman B, Carlsson SG, Wright I. Women's work experiences and health in a male-dominated industry. A longitudinal study. *J Occup Environ Med*. 1996;38(7):663-72.
- Smith DR, Sato M, Miyajima T, Mizutani T, Yamagata Z. Musculoskeletal disorders self-reported by female nursing students in central Japan: a complete cross-sectional survey. *Int J Nurs Stud*. 2003;40:725-9.
- Yue P, Liu F, Li L. Neck/shoulder pain and low back pain among school teachers in China, prevalence and risk factors. *BMC Public Health*. 2012;12:789. doi: 10.1186/1471-2458-12-789.
- Azuan M, Zailina H, Shamsul BM, Asyiqin MA, Azhar MN, Aizat IS. Neck, upper back and lower back pain and associated risk factors among primary school children. *J Appl Sci*. 2010;10:431-5.
- Madan I, Reading I, Palmer KT, Coggon D. Cultural differences in musculoskeletal symptoms and disability. *Int J Epidemiol*. 2008;37:1181-9. doi: 10.1093/ije/dyn085.
- Bongers PM, Kremer AM, ter Laak J. Are psychosocial factors, risk factors for symptoms and signs of the shoulder, elbow, or hand/wrist? A review of the epidemiological literature. *Am J Ind Med*. 2002;41:315-42.
- Palou P, Kovacs FM, Vidal J, Gili M, Borràs PA, Gestoso M, Ponseti X. Validation of a questionnaire to determine risk factors for back pain in 10-12 year-old school children. *Gazz Med Ital Arch Sci Med*. 2010;169:199-205.