



Prevalence of Musculoskeletal Disorders in Primary School Students in Abadan-Iran in 2014

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Abstract

Background

If skeletal system does not have a correct form in childhood, certainly person will face many problems in the later stages of life. This study aimed to evaluate the prevalence of skeletal disorders in primary school students in Abadan, 2015.

Materials and Methods

This cross-sectional study was conducted on 383 primary school students in Abadan, Iran, which were selected by cluster sampling method. Data was collected by checkerboard and a demographic questionnaire. Statistical analysis was performed using SPSS software version 22 with descriptive methods and Chi-square test.

Results

The most common skeletal disorder in female and male students was drooping shoulders (81.7%) and scoliosis (85.4%). The overall prevalence of musculoskeletal disorders was significantly related to gender and age ($P < 0.05$).

Conclusion

Due to high prevalence of musculoskeletal disorders in schoolchildren, screening programs in schools has been recommended for prevention. To reduce the rate of musculoskeletal disorders in students of primary school, identification and follow up of students at early stages of disorders seems a necessary solution.

Key Word: Iran, Prevalence, Primary School, Skeletal disorders, Student.

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1-INTRODUCTION

Physical health and good physical condition are of particular importance. Negative changes in physical condition and appearance of the body can disrupt its structure and function and affect other aspects of human life (1). Health and well-being of the population is one of the most important indicators of development. The future of any society depends on the dynamism and mental and physical health of its adolescents and youth, so that the existence of a healthy and able-bodied population is the largest capital of a nation (2). If the skeletal system, which makes up the column and framework of the body, does not form correctly in the childhood, it will certainly expose individuals to problems later in life. Body framework can be affected by various weakening or strengthening factors in different age groups (3).

Physical deformities progress over time and cause several complications in individuals if not corrected timely. Consequences of incorrect posture are broad, so that they can be evaluated in terms of physical, psychological, social, and economic contemplations. Indeed, a person with poor physical condition does not enjoy a favorable condition in terms of energy consumption and exercise. In addition to an undesirable appearance, incorrect posture can impair other organs of the body such as respiratory, circulatory, and nervous systems (4).

Understanding the prevalence and complications of skeletal system deviations is a necessary measure for preventing the occurrence of these disorders in the community. Many studies have shown that the early detection of such disorders as scoliosis, kyphosis, hyperlordosis, asymmetrical shoulders, hips deviation, and round back, which are prevalent in childhood, can prevent the

progression and emergence of intense deformations (5-8).

Today, the reduced physical activity on the part of students on the one hand and exposure to stressful situations resulting from abundant involvements as well as industrial life on the other hand have significantly increased many physical and psychological effects, including musculoskeletal pain and its complications (9-12).

Several studies have been performed in the field of musculoskeletal disorders in students of different ages in Iran and other countries. Nery *et al.* reported a prevalence of 4.1% for scoliosis in students of Rio de Grand, Brazil (13). According to Bueno *et al.*, the prevalence of kyphosis, lordosis, and scoliosis in Portuguese children was 16.6%, 27.9%, and 33.2%, respectively. They also showed that lordosis was more prevalent at ages 8 to 12 years and scoliosis was more prevalent in boys than girls (14). Brianezi *et al.* reported that the prevalence of kyphosis (63%) and lordosis (80%) was higher in 7-10 year-old elementary school boys in Sao Paulo, Brazil, than girls (25% and 21%) and the prevalence of scoliosis was higher in girls than boys (15).

In Iran, Fathi and Rezaei showed that 49.99% of girls and 67.71% of boys in Lorestan Province-Iran had postural abnormalities. Drooping shoulders, kyphosis, lordosis, genu valgum, genu varum, flat foot, and hallux valgus were more common among girls than boys (16). According to Ghorbani *et al.*, the prevalence of kyphosis and flat back in Bandar Abbas students was 21.4% and 2% in boys and 15% and 4.5% in girls, respectively (17). Rezaei *et al.* reported the prevalence of spine malformations as 2.01% and kyphosis as 0.68% in Kermanshah students [18]. In a study by Astane conducted in Ahvaz, the prevalence of kyphosis in 11 year-old girls was 0.9%

and the prevalence of spinal disorders in boys was 1.36% (19). Safikhani and Fakor reported the prevalence of scoliosis in 11-15 year-old Ahvazi children as 1.4% (20). The prevalence of scoliosis in all 9-16 year-old students of Arak was reported 1.52% by Behruzi *et al.* (21). These studies reveal that musculoskeletal disorders, as a school health concern, are a fundamental problem among students.

School health includes all activities performed to ensure, protect, and promote the health of students. One of the most important goals of school health is the improvement of student health through prevention, early detection, and timely treatment of diseases (22, 23). Understanding postural abnormalities and determining the priorities and scope of each of these disorders among students is one of the most important steps of a systematic planning for students and improvement of school health (24).

In addition to being more convenient and less expensive, prevention is of higher priority than treatment today. Prevention helps cutting exorbitant treatment costs and improves social and mental health. To determine the prevalence and pattern of musculoskeletal disorders is the first step in prevention, diagnosis, and treatment of these disorders. High prevalence of musculoskeletal disorders in children and adolescents can be a warning which will create more complications in later stages of growth in the future if not prevented or further spread (24). Therefore, it is crucial to prevent the occurrence of such problems in these cases through surveillance and paying attention to this issue.

Literature review showed no study regarding the prevalence of these disorders among children in Abadan-Iran. In addition, different statistics have been reported about the prevalence of various musculoskeletal disorders in different areas of Iran. Since the prevalence is

specific for any area and cannot be generalized to other regions, the present study evaluated the prevalence of musculoskeletal disorders in primary school students in Abadan.

2-MATERIALS AND METHODS

2-1. Study design and population

In this descriptive study, the researcher evaluated the prevalence of musculoskeletal disorders in primary school students in Abadan, Central west of Iran in 2014-2015 (Figure.1).

The study population consisted of all elementary school students of Abadan. According to the data used in the paper of Behruzi *et al.* who studied the prevalence of scoliosis in 9-16 year-old students in Arak (21) and the following formula, the sample size was calculated as 300 subjects; however, it was increased to 383 to improve the accuracy of sample size.

[$d = 0.03$; confidence interval (CI): 95%; $P=0.01$; $\alpha=0.05$].

$$n = \frac{Z_{1-\alpha/2} \cdot P(1-P)}{d^2}$$

The subjects were selected through cluster sampling. First, Abadan city was divided into 3 regions (category) based on the municipality zones. Then three primary boy schools (cluster) and three primary girl schools (cluster) were randomly selected from each region (a total of 18 schools). Finally, 20 students from different grades were randomly selected from each school in partnership with school administrators. Inclusion criteria were absence of neurologic, rheumatic, muscular, and articular diseases and lack of fracture or dislocation in the past year.



Fig.1: Abadan locational, Iran

2-2. Measuring tools

The evaluation was performed based on three measures of good, moderate and severe specified as 0, 1, and 2. A checkerboard was used as a data collecting tool in this study to measure and detect skeletal disorders. The checkerboard was a plate of 100×200 cm dimensions which was gridded to 5-centimeter squares with longitudinal and transverse lines. The middle line (with a different color) was considered as the vertical line which was used to evaluate and determine the deformities such as head forward, drooping shoulders, kyphosis, scoliosis, lordosis, and flat back from three views of lateral, anterior, and posterior based on each abnormality.

Age, gender, type of school (public or private), and students grade were recorded using a questionnaire. The data were collected through interview, questionnaire, observation, and examination. The questionnaire was completed by the researcher in the presence of parents.

2-3. Methods

To identify the deformities of knees, students were asked to stand up on two feet while looking forward and straight.

They were then asked to slowly close their lower limbs to where the first contact occurred between the limbs at the inner ankles or at the femoral internal condyles. In genu varum, internal ankles reach together but femoral internal condyles are separated. In contrast, femoral internal condyles reach together in genu valgum while internal ankles are separated.

To diagnose flat foot, the students' feet were smeared with chalk and they were asked to stand up on a flat surface, and the print of their foot was evaluated. A line was drawn on the footprint from the foot front to the heel; if the line width was equal to the foot front, the foot was flat. To diagnose hallux valgus, the angle between the medial border of foot and the medial border of big toe was measured.

Examination of the spine was done by a master of physiotherapy (research assistant) while students wore shorts and their trunk was naked. Assessment and diagnosis of musculoskeletal disorders included evaluation of forward head, drooping shoulders (asymmetrical shoulder), scoliosis, kyphosis (round back), flat back, lordosis (hollow waist), genu valgum, genu varum, flat foot, and hallux valgus.

The families of students who had moderate to severe musculoskeletal disorders were confidentially informed at the end of the evaluation, and were recommended to refer to the respective centers and a specialist for further investigation.

2-4. Data analyses

SPSS version 22 was used in this study. The collected data was analyzed using descriptive-analytic statistics (chi-square test). The significance level was 95%.

2-5. Ethical considerations

This study was approved by the Ethics Committee of Ahvaz Jundishapur

University of Medical Sciences (ID number: 93172). The study objectives were explained to officials, parents, and students and the confidentiality was emphasized. Oral consent and written consent were obtained from students and their parents, respectively. Gymnasium of the Department of Education located at Station 8 was chosen for conducting the project. The reason for this selection was its easy access from all areas of Abadan. In order to facilitate students transport, one or two minibuses were used with planning and coordination. It should be noted that the written consent and the presence of one parent of each student were required for justification of administrative and to answer the questionnaire items.

3-RESULTS

From a total of 383 students, 318 were selected from public schools and 65 from private schools; 195 (50.9%) were female and 188 (49.1%) were male with a mean age of 9.61 ± 1.9 and 9.87 ± 1.82 years, respectively. Regarding the students'

grades, 56, 64, 52, 71, 66, and 74 students were selected from first, second, third, fourth, fifth, and sixth grades, respectively.

The results showed that drooping shoulders (85.4%) and scoliosis (81.7%) were the most common skeletal disorder and flat back (1.6%) was the less common skeletal disorder among the studied students (Table 1).

The prevalence of genu valgum was significantly higher in 6-9 compared with 10-13 years old students ($P=0.04$), but the prevalence of hallux valgus was significantly higher in 10-13 compared with 6-9 years old students ($P=0.01$) (Table 2).

According to the results, drooping shoulders and scoliosis were the most common and flat back was the rarest skeletal deformities in both girls and boys. The prevalence of head forward, genu valgum, and hallux valgus was significantly higher in girls than boys ($P=0.002$) (Table 3).

Table 1: Prevalence of musculoskeletal disorders by the type and severity of the disorder in primary school students of Abadan in 2014

Disorder	Total percentage	Disorder severity		
		Mild	Moderate	Severe
Head forward	26.8	10.4	16.4	-
Drooping shoulders	85.4	17.8	67.4	0.3
Scoliosis	81.7	15.9	64.5	1.3
Kyphosis	13.6	5.2	8.1	0.3
Flat back	1.6	0.6	1	-
Genu valgum	11.5	5	5.5	1
Genu varum	20.9	4.2	16.4	0.3
Flat foot	22.5	3.7	17.8	1
Hallux valgus	18	3.7	14.3	-
Lordosis	24.8	13.8	10.2	0.8

Table 2: The relationship of the prevalence of musculoskeletal disorders with age in primary school students of Abadan in 2014

Disorder	Age range		P-value
	6-9 years (%)	10-13 years (%)	
Head forward	25.4	28.1	0.49
Drooping shoulders	85.3	85.4	0.80
Scoliosis	83.1	80.6	0.52
Kyphosis	15.2	12.2	0.65
Flat back	2.3	0.1	0.50
Genu valgum	8.9	4.5	0.04
Genu varum	18.1	23.3	0.43
Flat foot	25.4	20	0.4
Hallux valgus	11.9	23.3	0.01
Lordosis	20.3	28.6	0.17

Table 3: The relationship of the prevalence of musculoskeletal disorders with gender in primary school students of Abadan in 2014

Disorder	Gender		P-value
	Boy (%)	Girl (%)	
Head forward	32.9	20.7	0.009
Drooping shoulders	85.7	85.1	0.81
Scoliosis	79.5	84	0.2
Kyphosis	11.8	15.4	0.47
Flat back	2.6	0.5	0.14
Genu valgum	15.3	7.5	0.002
Genu varum	19.5	22.3	0.58
Flat foot	24.6	20.3	0.33
Hallux valgus	23.6	12.3	0.002
Lordosis	23.1	26.6	0.17

4-DISCUSSION

This study aimed to determine the prevalence of musculoskeletal disorders in primary school students in Abadan-Iran. The results showed that drooping shoulders and scoliosis were the most common skeletal disorders in primary school students in Abadan, while flat back was the lowest among the studied students. Fathi and Rezaei showed in their study that drooping shoulders was the most common deformity in all students (16). Shamsodini *et al.* also showed that the

highest rate of musculoskeletal disorders in students were in shoulders (37.9%), neck (28.5%), and waist (17.4%) (25). Akbari *et al.* also found that 89.7% of students had shoulder disorders (26). All of these results are in line with the present study.

Regarding the relationship between age and the prevalence of musculoskeletal disorders, it was found that the prevalence of genu valgum was significantly higher in 6-9 compared with 10-13 year-old students, but the prevalence of hallux

valgus was significantly higher in 10-13 compared with 6-9 year-old students. Bueno *et al.* reported that lordosis was more common from 8 to 12 years (14), which is consistent with the results of the present study. Behruzi *et al.* reported the prevalence of scoliosis in Araki 9-16 year-old children as 1.52% (21). According to Astone, the prevalence of kyphosis in 11 year-old Ahvazi girls was 0.9% (19). Safikhani and Fakor reported a prevalence of 1.4% for scoliosis in 11-15 year-old students in Ahvaz (20). These results are inconsistent with those of the present study. This inconsistency may arise from the fact that the above study was conducted on different ages. Of course, disorders have different prevalence at various age groups. Behruzi *et al.* used spine x-rays in addition to observation and examination of deformities, but the present study used only observation and examination.

Regarding the relationship between gender and the prevalence of musculoskeletal disorders, it was found that head forward, genu valgum, and hallux valgus were significantly higher in girls than boys, and the prevalence of scoliosis was more common in boys. According to Fathi and Rezaei, drooping shoulders, kyphosis, lordosis, genu valgum, genu varum, flat foot, and hallux valgus was more common among girls and a significant difference existed in prevalence between girls and boys (16). Bueno *et al.* also reported a higher prevalence of scoliosis in boys than girls (14), which is consistent with the results of this study. Brianezi *et al.* reported that the prevalence of kyphosis and lordosis in 7-10 year-old students was higher in boys than girls in Sao Paulo, Brazil, which is consistent with the results of this study, but they showed that the prevalence of scoliosis was higher in girls than boys (15); this is inconsistent with our results. Since girls have more movement deficiency, the high prevalence of

musculoskeletal disorders in them may be due to lack of movement and muscle weakness that have not been sufficiently strengthened, because powerful muscles are more able to maintain a proper posture. Postural abnormalities can adversely affect body image. This can affect people's confidence.

The results of this study revealed high prevalence of musculoskeletal disorders in schoolchildren in Abadan. The prevalence of certain musculoskeletal disorders was higher in girls than in boys. As a result, schoolchildren, especially girls, are more exposed to skeletal disorders. Therefore, we should pay more attention to these people and screening programs should be done for them with more sensitivity. One of the most important goals of school health is the improvement of student health through prevention, early detection, and timely treatment of diseases.

High prevalence of musculoskeletal disorders in students can be a warning which will create more complications in later stages of growth in the future if not prevented or further spread (24). Therefore, it is crucial to prevent the occurrence of such problems in these cases through surveillance and paying attention to this issue. In addition, it is suggested to teach corrective trainings to students, parents, teachers, and coaches in order to reduce the prevalence of these disorders. Screening programs can also help identify students with these deformities and follow them up to provide early diagnosis and appropriate treatment.

5-CONCLUSION

Given the high prevalence of musculoskeletal disorders in schoolchildren in Abadan, screening programs are recommended in schools. Moreover, those students with musculoskeletal disorders can be identified and followed up to provide early diagnosis

and appropriate treatment, and to ultimately improve the health of students.

6-CONFLICT OF INTEREST: None.

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