

PREVALENCE OF MUSCULOSKELETAL DISORDERS IN PRIMARY SCHOOL CHILDREN

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(Original scientific paper)

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Abstract

Introduction: Early detection and understanding the musculoskeletal disorders of in children and young people is very important for understanding the etiology, development of musculoskeletal disorders and what is very important for creating nationally effective preventive strategies. The aim of this study is to evaluate the prevalence of skeletal disorders in all primary schools on the territory of the municipality Kisela voda, Skopje. Materials and Methods: The material for the investigation comprised 4609 school children. The data were collected through interview, questionnaire, observation, and examination. Data analyses was performed by SPSS version 22, using descriptive analytic statistics. The significance level was 95%. Results: The results showed that drooping shoulders (53%), scoliosis (25.3%) and kyphosis (7.4%) were the most common skeletal disorders. Conclusion: Prevention of the musculoskeletal system is very important to detect early-stage deformity. It is very important for the individual, the family and the whole society. With the help of prevention, there is an early cure, the possibility of treatment with less invasive methods or there is a possibility of reduction or complete non-surgical treatment.

Key words: school children, musculoskeletal disorders, prevalence.

Introduction

Important problems of any society, which concern young people and school children are musculoskeletal disorders. For their early detection and proper management, the primary care settings are of particular importance. There is scant data on these conditions in children who are closely related to primary care. Reduction of physical activity, poor posture, inappropriate school furniture, heavy school bag, are basic etiological factors for musculoskeletal disorders (Caine, 2008). For the good development of the society, the health of the children and the young population is of great importance. The most important measures to combat musculoskeletal deviations of the locomotor system in the young population are knowledge of their complications as well as constant nurturing and promotion of prevalence in society (Brianezi, 2011; Bueno, 2013).

Improper formation of the musculoskeletal system in childhood leads to problems further during the life of an individual (Lafond, 2007; Legg, 2008). Many studies have shown that the early detection of such disorders as kyphosis, scoliosis, hyperlordosis, drooping shoulders, DDH, which are prevalent in childhood, can prevent the progression and emergence of intense deformations (Ghorbani, 2009; Labelle, 2013; McEvoy, 2005; Patton, 2007). Different statistics have been reported about the prevalence of various musculoskeletal disorders in different areas of North Macedonia. 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 Skopje. The aim of this study was to evaluate the prevalence of musculoskeletal disorders in all primary schools on the territory of the municipality Kisela voda, Skopje, in 2016.

Material and methods

In this descriptive study, the Clinic for orthopedic surgery in cooperation with the Center for public health – Skopje evaluated the prevalence of musculoskeletal disorders in all primary schools on the territory

of the municipality Kisela voda, Skopje, in 2016. The material for the investigation comprised 4609 school children. The patients were grouped according to their sex and age (in 2 groups: from 6 to 9 and 10 to 14 years of age). Exclusion criteria were presence of neurologic, rheumatic, muscular, and articular diseases and lack of fracture or dislocation in the past year.

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 ink and they were asked to stand up on a flat surface, and the print of their foot was evaluated. If the foot width was equal to the foot front, the foot was flat. Examination of the spine was done while students wore shorts and their trunk was naked. Certainly, Adams forward bend test was used for deformity of the spine. Assessment and diagnosis of musculoskeletal disorders included evaluation of drooping shoulders, scoliosis, kyphosis, lordosis, genu valgum, genu varum and flat foot.

The data were collected through interview, questionnaire, observation, and examination. 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. Data analyses was performed by SPSS version 22, using descriptive analytic statistics. The significance level was 95%.

Results

From a total 4609 school children included in our study, 3038 (65.9%) were girls and 1571 (34.1%) were boys with mean age 9.71 ± 1.8 and 9.88 ± 1.9 years. The results showed that drooping shoulders (53%), scoliosis (25.3%) and kyphosis (7.4%) were the most common skeletal disorders. Flat foot (49.4%) was the most common disorder on the lower extremities. Lordosis and Genu varum were the less common skeletal disorders among the studied school children (Table 1).

Table 1. Prevalence of musculoskeletal disorders in primary school students, municipality Kisela voda, Skopje, 2016.

DISORDER	Total percentage %
Drooping shoulders	53
Scoliosis	25.3
Kyphosis	7.4
Lordosis	0.1
Pectus carinatum	1.6
Pectus excavatum	2.5
Genu valgum	1.1
Genu varum	0.2
Flat foot	49.4

Between groups the prevalence of scoliosis and kyphosis was significantly higher in first group 6-9 compared with second group 10-14 years old students ($P=0.04$). The prevalence of Pectus excavatum was significantly higher in second group 10-14 compared with first group 6-9 years old students ($P=0.01$) (Table 2).

Table 2. The relationship of the prevalence of musculoskeletal disorders with age in primary school students, Kisela voda, Skopje, 2016.

DISORDER	Age 6-9 years (%)	Age 10-14 years (%)	P-value
	First group	Second group	
Drooping shoulders	53.7	54.1	0.78
Scoliosis	31.4	21.28	<0.001
Kyphosis	9.7	4.94	<0.0001
Lordosis	0.08	0.1	0.25
Pectus carinatum	1.6	1.5	0.78
Pectus excavatum	2.0	3.34	<0.005
Genu valgum	1.05	1.4	0.28
Genu varum	0.17	0.14	0.79
Flat foot	52.62	57.38	<0.001

Regarding the relationship between gender and the prevalence of musculoskeletal disorders, it was found that drooping shoulders, kyphosis, pectus carinatum, pectus excavatum, genu valgum and genu varum were significantly higher in boys, and the prevalence of scoliosis and lordosis was more common in girls.

Table 3. The relationship of the prevalence of musculoskeletal disorders with gender in primary school students, Kisela voda, Skopje, 2016.

DISORDER	BOY	GIRL	P-VALUE
Drooping shoulders	27.5%	25.5%	0.14
Scoliosis	21.1%	27.5%	<0.0001
Kyphosis	10.1%	6%	<0.0001
Lordosis	0.04%	0.06%	0.78
Pectus carinatum	2.5%	1.2%	<0.001
Pectus excavatum	2.7%	2.3%	0.40
Genu valgum	1.4%	0.9%	0.11
Genu varum	0.2%	0.1%	0.37
Flat foot	50.5%	48.8%	0.27

Discussion

The results in our study showed that drooping shoulders (53%), flat foot (49.4) and scoliosis (25.3%) were the most common musculoskeletal disorders in primary school students in Kisela voda, one of the municipalities in Skopje.

Akbari et al., refers results (56.2%) shoulder disorders which is almost identical to our study. The prevalence among gender in our study for scoliosis ($p < 0.0001$) was statistically higher in girls. The prevalence for kyphosis ($p < 0.0001$) and pectus carinatum ($p < 0.001$) were statistically higher in boys. Genu valgum and genu varum were higher prevalence in boys than girls but not representative. Bueno et al., reported a higher prevalence of scoliosis and kyphosis in boys than girls, which is not consistent with the results of our study. Since boys in our study have high prevalence of musculoskeletal disorder in them, it may be due to lack of movement and muscle weakness.

The prevalence of musculoskeletal disorder between groups for scoliosis ($p < 0.0001$) and kyphosis ($p < 0.0006$) were significantly higher in the first group 6-9, compared to the second group, 10-14 years old

students. In the study of Bueno et al., there is no reference for significant differences between the groups. These results are inconsistent with those in our study. Our findings indicate that the prevalence of flat foot among girls and boys is 48.8% and 50.5%, respectively, with no significant difference. Our results also showed that there was no significant difference in prevalence of flat foot between both group 6-9 and 10-14 years. We also found that flat foot occurred bilaterally in most cases and that the flexible form was more common. Ezema et al., from Hong Kong found that male children were twice more affected by flat foot than female. Gould found that flat foot was present in 78% of 5 year olds. Echarri and Forriol reported a prevalence of flat foot of 40% in children aged 5-8 years, but in our study it was 25.49% in students aged 6-9 years.

The results of this study revealed high prevalence of musculoskeletal disorders in school children in community Kisela voda, Skopje. From our study, school children, especially boys, are more exposed to skeletal disorders.

The high prevalence of musculoskeletal disorders in school children should be a warning to pay more attention to this population. Effective screening programs need to be developed that will allow early detection of changes in the musculoskeletal system and reduction of complications in the later stages of growth (Legg, 2008; Nicholas, 2014). Prevention of school children should be a priority for both the health structures in society and the schools themselves, which would improve children's health, early detection and timely treatment of diseases (Loud, 2006; Mackie, 2008; Talbott, 2009). In order to reduce the prevalence of these musculoskeletal deformities, it is proposed to provide adequate health training for school children, parents, and school teachers.

Conclusion

Due to the high prevalence of musculoskeletal disorders in school children in Skopje, programs for effective screening in schools are recommended. With the help of these programs, students can identify and follow up to ensure early diagnosis and appropriate treatment. Prevention has a higher priority than treatment, reducing unnecessary costs and improving the social and mental health of children and the young population.

References

- Asghar Akbari and Razieh Gannad. Prevalence of Shoulder Postural Impairments in 10-12 Years Old Primary Students of Zahedan. *Journal of Medical Sciences*, 2006; 6: 332-337.
- Brianezi L et al. Prevalence of postural deviation in school of education and professional practice of physical education. *J Morphol Sci* 2011; 28(1):35-6
- Bueno C et al. Postural deviations of students in Southern Brazil. *Rev Paul Pediatr* 2013;31(2):237-42.
- Caine D., et al. Epidemiology of injury in child and adolescent sport; injury rates, risk factors, and prevention. *Clin Sports Med*. 2008; 27:19-50.
- Echarri J.J., F. Forriol. The development in footprint morphology in 1851 Congolese children from urban and rural areas, and the relationship between this and wearing shoes. *J Pediatr Orthop* 2003; 12(2):141-146.
- Ezema C.I., U.O. Abaraogu, G.O.Okafor. Flat foot and associated factors among primary schoolchildren: A cross-sectional study. *Hong Kong Physiotherapy Journal* 2014; 32(1):13-20.
- Ghorbani L, Daneshjo H, Nazarian A. Assess the prevalence of kyphosis disorders in girls and boys. *J of Res in Reh Sci* 2009; 4(2):145-52.
- Gould S John. *The Handbook of Foot and Ankle Surgery. An intellectual approach to Complex Problems*. Jaypee Brothers, 2006.
- Labelle H, Richards SB, De Kleuver M. Screening for adolescent idiopathic scoliosis: an information statement by the scoliosis research society international task force. *Scoliosis* 2013; 8(1): 17-21.
- Lafond D et al. Postural development in school children: a cross sectional study. *Chiropractic & Osteopathy*, 2007; 15(1):1-6.
- Legg S, et al. *Ergonomics for schools*. *Work* 2008;31(4):489-92.
- Loud KJ, Gordon CM. Adolescent bone health. *Arch Pediatr Adolesc Med*. 2006;160:1026-1032.
- Mackie HW et al. Postural and subjective responses to realistic schoolbag raggage. *Ergonomics*, 2008; 51(2):217-31.
- McEvoy MP, Grimmer K. Reliability of upright posture measurements in primary school children. *BMC Musculoscelet Disort*. 2005;6(35):1-10.
- Nicholas Henschke et al. Musculoskeletal conditions in children and adolescents managed in Australian primary care. *BMC Musculosceletal disord*. 2014; 15-164.
- Patton GC, Viner R. Pubertal transitions in health. *Lancet*. 2007;369:1130-1139.
- Talbott NR, Brattacharya A, Davis KG, Shukla R, Levin L. School Backpacks: it's more than just a weight problem. *Work*. 2009;34(4):481-94.