



School screening for scoliosis in Sivas, Turkey

Sivas il merkezinde skolyoz için okul taraması

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Amaç: Bu çalışmada, Sivas il merkezindeki ilköğretim öğrencileri arasında skolyoz sıklığı araştırıldı.

Çalışma planı: Öğrenim gören 10-15 yaş aralığındaki öğrencilerde skolyoz sıklığının belirlenmesi amacıyla, Sivas il merkezindeki 11 ilköğretim okulu sistematik örnekleme yöntemiyle seçildi. Bu okullarda 6, 7 ve 8. sınıflarda öğrenim gören 16 103 öğrenciden 3 175'i (1538 kız, 1637 erkek) tabakalı örnekleme yöntemi kullanılarak belirlendi. Skolyoz muayenesi öne eğilme testi ve omurga palpasyonu ile yapıldı.

Sonuçlar: Tarama sonucunda, 10'u kız (%66.7), beşi (%33.3) erkek olan toplam 15 öğrencide (%0.47) skolyoz saptandı. Ortalama eğrilik 6.9° (dağılım 5°-20°; kızlarda 7.9±4.6°, erkeklerde 5.4±0.9°) bulundu. Skolyoz sıklığı kızlarda %0.65, erkeklerde %0.31 idi. Skolyoz sıklığı açısından iki cinsiyet arasında anlamlı fark görüldü (p<0.05). Skolyoz saptanan olguların ortalama yaşı 13.5±1.2 (dağılım 12-15) idi. Skolyoz eğrilik derecesinin cinsiyetle ve yaş grupları ile anlamlı ilişkisi yoktu (p>0.05). Skolyozun görüldüğü omurga seviyelerinin dağılımı şöyleydi: %73.3 (n=11) lomber, %13.3 (n=2) torakal ve %13.3 (n=2) torakolomber. Skolyoz eğriliklerinin 12'si (%80) sağa, üçü (%20) sola yönelimliydi. Skolyozun görüldüğü seviye ve eğriliklerin yönü bakımından iki cinsiyet arasında anlamlı fark yoktu (p>0.05). Skolyoz saptanan olguların iki yıllık takibinde sadece bir çocukta Milwaukee korsesi kullanıldı; bu olgu da dahil hiçbir olguda skolyozda ilerleme görülmüdü.

Çıkarımlar: Okul taramaları prevalans çalışması olarak yapılabilir; ancak, skolyoz için rutin okul taramalarının gerekliliği tartışmalıdır.

Anahtar sözcükler: Çocuk; kitle taraması; prevalans; skolyoz/epidemiyoloji.

Objectives: We investigated the prevalence of scoliosis among primary school students in Sivas, Turkey.

Methods: To determine the prevalence of scoliosis among primary school students in the age bracket of 10 to 15 years, 11 primary schools were selected with systematic sampling. A total of 3,175 students (1,538 girls, 1,637 boys) of grades 6 to 8 were selected from 16,103 students using a stratified sampling method. Examination for scoliosis was made by the forward bend test and palpation of the spine.

Results: Fifteen children (0.47%) were found to have scoliosis, including 10 girls (66.7%) and five boys (33.3%). The prevalence of scoliosis was significantly higher in girls (0.65% vs. 0.31%; p<0.05). The mean lateral curvature of the spine was 6.9° (range 5° to 20°), being 7.9±4.6° in girls, and 5.4±0.9° in boys. The mean age was 13.5±1.2 years (range 12-15 years). The severity of the curvature showed no significant relationship with gender and age groups (p>0.05). The levels of involvement were lumbar vertebrae in 73.3% (n=11), thoracic vertebrae in 13.3% (n=2), and thoracolumbar vertebrae in 13.3% (n=2). Spinal curvature was to the right side in 12 cases (80%), and to the left in three cases (20%). Girls and boys did not differ significantly with respect to the severity and direction of the curvature (p>0.05). During a two-year follow-up of children with scoliosis, no progression of the curvature was observed, including one child who wore a Milwaukee brace.

Conclusion: School screenings may be performed as part of prevalence studies; however, routine school screening for scoliosis is debatable.

Key words: Child; mass screening; prevalence; scoliosis/epidemiology.

Some countries and societies supported school screenings for early diagnosis and treatment of scoliosis. Chronic illness commission describes screening as “examination and other fast procedures for diagnosis or applying tests of unknown diseases”. Scoliosis screening meets these criteria. Affected person can be diagnosed and future procedures can be performed with these findings. [1]

Many orthopaedic societies support school screenings for scoliosis. Scoliosis Research Society (SRS) recommends school screenings in children between 11-13 years of age. Similarly, American Academy of Orthopedics Surgeons (AAOS) recommends school screenings in girls between 11-13 years of age and in boys between 13-14 years of age. [2]

However nowadays, school screenings are criticized for their costs. These criticism focus that radiologic and other hospital costs of screened cases are unnecessary. These cases will have not need to be treated even they are undiagnosed. [3,4]

Tezeren et al.[5] had previous study in Ankara, Turkey for this region's scoliosis prevalence. This aim of this study to find out scoliosis prevalence of other region of central anatolia.

Materials and methods

This study is to determine scoliosis prevalence of students between 10-15 years of age in 2006-2007 in elementary schools of city of Sivas, Turkey. Sivas is a city that placed in far east central anatolia and it is nearby with east and north anatolia.

According the data that was provided from National Board of Education of Sivas, city of Sivas has 69 elementary schools in 2006-2007. There was 42366 students whom 20605 were girls, 21761 were boys in elementary schools. There was 16103 students whom 7804 were girls, 8299 were boys in 6th, 7th, 8th grades of elementary schools which were our study group.

Before starting study, all permissions were provided from Governorship and National Board of Education of Sivas. Also, all details of procedures were explained to the administration of schools. Further, teachers were requested about given all information to the students. Meanwhile, all preparations were completed before the study

Present study included students between 10-15 years of age in elementary schools in city of Sivas. Eleven schools were randomly chosen from 69 elementary schools in the city.

The people of present study is not homogeneous. They are variable according to age and sex. Therefore, number of students in schools was determined according to stratified sampling method. Thus, all students in all classes were stable according to age and sex. Screened number of students was 3175 (1538 girls, 1637 boys) that this data included 19.7% of same grade students.

Two examination methods were used

1- Adam's forward bending test (FBT) [6] : The students extended their arms down to the floor while forwarding their bodies whom hips were bended 90°. Girls had a shirt and boys had naked upper body. Examiner was placed back of the student and examined presence of any imbalance between his/her scapulae or not. Also, they examined presence of rib-hump deformity. All data was noted .

2- Palpation of vertebral column: Examiner palpated spinous process of vertebral column from T1 to sacrum all the way down while the student stand upright and arms on the side. Any curve was noted.

Statistical testing was performed using the chi-square test, Fisher's exact test and Mann-Whitney U test and importance test from the SPSS (10.0) statistical software. A P value of 0.05 was considered significant.

Results

Fifteen children (0.47%) were found to have scoliosis in screening of 6-8th grades of 11 elementary schools. Mean magnitude of curve was 6.9° (range 5°-20°). Ten (66,7%) cases were girls and 5 (33,3%) cases were boys. Scoliosis prevalence was 0.65% in girls, 0.31% in boys. Scoliosis prevalence was statistically significant between the gender ($p < 0.05$).

Mean age was 13,5±1,2 years (range 12-15 years). There was no correlation between age when onset of scoliosis and curve magnitude versus gender ($p > 0.05$; Table 1). Curve magnitude was 5 degrees in 9 cases (60%). There was no correlation between curve magnitude and present age ($p > 0.05$; Table 2).

Level of curves was 73.3% (n=11) in lumbar spi-

ne, 13.3% (n=2) in thoracal spine, and 13.3% (n=2) in thoracolumbar spine. Level of curves in girls was 70% (n=7) in lumbar spine, 20% (n=2) in thoracal spine, and 10% (n=1) in thoracolumbar spine. Level of curves in boys was 80% (n=4) in lumbar spine, and 20% (n=1) in thoracolumbar spine. There was no statistically significance between level of curve and gender.

Twelve cases (80%) had right curve, and 3 cases (20%) had left curve. Nine (90%) cases had right curve, and 1 case (10%) had left curve in girls. Three (60%) cases had right curve, and 2 cases (40%) had left curve in boys. There was no statistically significance between girls and boys ($p > 0.05$).

Discussion

Medical and surgical treatment of idiopathic scoliosis has grown rapidly together with learning of natural history of scoliosis and arising spinal segmental instrumentation in last decade.^[1]

Clinical points of school screening for scoliosis: (i) screening is accurate and reliable method for diagnosis of scoliosis, (ii) early diagnosis may prevent many health problems, (iii) brace treatment is effective way for changing natural history of curve.^[1]

That means: (i) the possibility of changing smaller curve to dangerous curve is high, (ii) scoliosis causes serious health problems, (iii) disadvantages of screening can be ruled out for benefits of early diagnosis.^[7,8] The proponents of school screening program imagine that these predictions can be shown by screening programs. Early diagnosis and brace treatment lower the need of surgery was stated.^[8]

School screening program in Ankara which included 6-9th grades (12-17 years of age) in 7 elementary schools that had same methods with present study found similar prevalence results. [5] FBT was used as well as ours. Eleven thousand and hundredsixteen students were screened and scoliosis prevalence was found 0,4%. Other study was performed by Ozerdem et al [9] in city of Isparta. That study had performed for prevalence of orthopaedic deformities and scoliosis prevalence was found 0,33%.The present study shows 0,47% scoliosis prevalence in Sivas which 3175 students were screened. Thus, similar results were found

Table 1 Age and curve magnitude versus gender

	Girls	Boys	<i>p</i>
Mean age	13.8±1.2	12.8±0.8	0.165
Curve magnitude	7.9±4.6	5.4±0.9	0.129
Number of cases			
5 degrees	5	4	
7 degrees	–	1	
8 degrees	3	–	
10 degrees	1	–	
20 degrees	1	–	

in three cities in Turkey. In the study in Ankara, 266 students were referred to the hospital; of them 54 were consulted. Fourty-four students were followed-up and 2 students wore Milwaukee brace.^[5] No progression was determined at follow-up period. In the present study in Sivas, 15 students were referred to the hospital and only one patient needed brace treatment. No progression was determined at follow-up period.

Scoliosis prevalence varies 0.2% - 4% in different regions according to literature. Because Unsaldi et al^[10] found that scoliosis prevalence in 6-14 years of age group was 0,29% between november 1981 and june 1982 in Sivas, we started the study as that prevalence was 0.2%.

On the contrary, scoliosis screening programs are not generally accepted. Opponents focus their critics on these points: (i) screening does not lower the scoliosis prevalence or incidence who need treatment, (ii) programs are costly, (iii) over-referring of small curves or normal people to the hospital.^[3,11-13] British Orthopaedic Association and British Scoliosis Society in 1983 published an article against scoliosis screening.^[14] In some states in United States, a bill was announced to

Table 2 Distribution of curve magnitude according to age

	12 age	13 age	14 age	15 age
Curve magnitude	7.0±2.4	6.3±1.5	6.0±1.7	8.8±7.5
Number of cases				
5 degrees	2	2	2	3
7 degrees	–	1	–	–
8 degrees	1	1	1	–
10 degrees	1	–	–	–
20 degrees	1	–	–	–

cancel the obligatory laws for screening, because unproductiveness of screening despite of costly programs as much as examiners costs.

Smaller like 5-10 degree curves really need treatment is not obvious, because there is no consensus that they are really scoliosis nowadays.^[3,4] Essentially, 11-19 degree curves in around 19 years of age may be put out of program, because they may not need treatment. Further, smaller curves are more common than larger curves that need treatment.^[3]

In Singapore, 72699 students were screened that scoliosis prevalence was found 0.59% (0.93% in girls, 0.25% in boys).^[15] In Greece, 1436 out of 82901 students were diagnosed that the scoliosis prevalence was 1.7% (2.6% in girls, 0.9% in boys).^[7] In the present study, 3175 students (1538 girls, 1637 boys) were screened. Fifteen students were diagnosed scoliosis whose 10 were girls (66.7%) and 5 were boys (33.3%). The scoliosis prevalence was 0.47% (0.71% in girls, 0.28 in boys). Our results were similar with the studies in Ankara as well as Isparta and Singapore.^[5,9,15]

In Singapore, most of the curves were thoracolumbar whereas, thoracal curves were second frequency.^[15] In Greece, thoracolumbar and thoracal curves were encountered respectively.^[7] However, in the present study, most of the curves were lumbar. After this, thoracolumbar and thoracal curves were encountered respectively. There was a variation on localization of curves in our study. We have no idea about this variation. It may need further studies. Meanwhile, additional orthopedic deformities were not included in this study

FBT was used in many studies in literature and determined that it was successful.^[5,7,15,16,17] Although FBT had 25%-82% false positive results, it was determined that this test fast and easy method in Singapore.^[15] FBT was used in Greece as well and stated that FBT was an effective test.^[7] On the contrary, other tests were used in some studies.^[4,18] Karachalios et al^[4] declared that FBT caused unacceptable false results.

The weakness of this study may be short follow-up. If follow-up would have been long enough, any progression might encounter on small curves and more patient might be treated. Another weakness

is that two examiners screened the students so that inter-observer reliability is questionable. Moreover, a scoliometer would have been used instead of FBT.

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