Original Article :

Awareness of Scoliosis Among Schoolteachers in Saudi Arabia: A Cross-Sectional Study.

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Abstract

Background and Aims:

Early detection of scoliosis is important for achieving a favorable outcome in the disease process. This study was performed to assess the awareness of scoliosis among school teachers for timely detection of scoliosis..

Methods:

This was a questionnaire-based cross-sectional study. Online questionnaires were distributed among school teachers across Saudi Arabia.

Results:

A total of 401 teachers comprising of 78 (19.5%) males and 323 (80.5%) females responded to the questionnaires. Among the responders, 215 (53%) teachers had a good knowledge whereas 186 (46.74%) had poor knowledge of scoliosis. Comparative analysis revealed that in the group of teachers with good knowledge of scoliosis 80 (61.8%) were from the science group as opposed to 135 (49.8%) teachers involved in teaching literature and other subjects ($p = 0.018$). No gender or regional differences were observed in the awareness of scoliosis. Analysis showed that overall 35 % of respondents answered correctly how to recognize scoliosis, 196 (56%) thought that the body tilts to one side; 18 (8%) suggested that one leg seem shorter than the other whilst 50 (14.2%) were unsure the criteria for diagnosis.

Conclusion:

Lack of awareness about scoliosis among a considerable proportion of school teachers prompts a need for promoting scoliosis awareness programs among school teachers for timely detection of scoliosis.

Keywords:

Scoliosis, Level of Awareness, Schoolteachers, Cross-sectional study, Musculoskeletal

Introduction

Scoliosis is a three-dimensional deformation of the spine defined as a spinal lateral curvature of greater than 10° in the coronal plane.[1] The global prevalence of scoliosis varies across different regions. About 2-3% of the American population is affected by scoliosis. Similar prevalence rates have been reported from Canada (2-3%)[2] and Saudi Arabia (3.46%).[3] Prevalence rates as high as 9.1% have also been reported in Singapore.[4] Scoliosis is generally of two types; postural and structural with the latter exhibiting bony changes and muscle weakness.[5] Scoliosis can also be classified based upon the etiology as idiopathic, congenital, and neuromuscular scoliosis – the commonest type being idiopathic.1-6 Furthermore, scoliosis can also be classified based on onset age as Infantile idiopathic scoliosis (between 0 and 3 years), juvenile (between 3 and 10 years), adolescent (between 10 and 18 years), and adult-type (>18 years).[7]

Detection of scoliosis among schoolchildren has gained popularity in the last 20 years.[8]Early detection of scoliosis is beneficial as it can alter the course of the disease.[9] Scoliosis generally appears before the age of skeletal maturity and from there on the symptoms worsen. Evidence suggests that untreated scoliosis cases of an estimated 60% of primary school children and 20% of children in middle school can lead to adverse long-term health outcomes. Scoliosis must be detected at an early stage to prevent any serious implications later. This is because spinal curvature continues to worsen if not detected early and given appropriate treatment.[10]

In the literature, there is a paucity of reported research on the awareness of scoliosis. In Saudi Arabia, there is a scarcity of data on scoliosis awareness among school teachers. The school has been regarded as a place where teachers can observe the student in multiple activities and compare them to other students. Early detection of scoliosis by school teachers can be an effective approach in preventing the worsening of symptoms among scoliosis patients and the initiation of early treatment.[11] Therefore, this study aimed to measure the awareness of scoliosis among school teachers in Saudi Arabia to highlight the issue at a government level and encourage the government to legislate a national screening program for scoliosis.

Materials and methods

This questionnaire-based cross-sectional study was performed in August 2021. A questionnaire was designed to assess the knowledge of participants regarding scoliosis. To ensure content validations, the

questionnaire was circulated among specialists within the hospital to suggest any changes. The questionnaire was modified in light of any recommendations suggested. Then, the questionnaire was distributed among school teachers across Saudi Arabia using Google forms. Both Saudi and non-Saudi school teachers were included in this study. Raosoftware was used for sample size estimation. Considering a 95% confidence interval with a 5% margin error and assuming a 50% response rate, a sample size of 385 was estimated to be sufficient.

The questionnaire was divided into two sections. Section A included demographic questions while the second section B assessed the knowledge of the participants on scoliosis. The second section was comprised of 4 questions. The questions had one best response and assessed different aspects of the presentation of scoliosis, how to define scoliosis, while students performing different physical activities at school, how you will detect scoliosis. It is difficult to spot minor changes of posture but sometimes uneven clothes provide some visible indication of the change of curvature. These four questions were used to assess the participants' knowledge regarding scoliosis. The participants were awarded a score of '1' for each correct answer. Thus, the maximum knowledge score was four. Participants scoring 4 were categorized as having 'good knowledge', while those scoring < were placed in the 'poor knowledge' group.

Data was entered and analyzed using SPSS v 21.0 (SPSS, version 21, SPSS, Chicago, IL, U.S.A.). Frequencies and percentages were described for categorical variables, such as gender, place of residence, work sector, level of education, and specialty. The Chi-square test was applied to compare the frequency distribution of participants with good and poor knowledge between the two genders: workplace and specialty. In cases where at least one expected case had a count of less than five, Fisher's exact test was applied. A p-value of < 0.05 was considered significant.

Results

A total of 401 school teachers submitted their responses. Out of these 401 teachers, there were 78 (19.5%) males and 323 (80.5%) female teachers. The majority of the respondents were from the Central Region of the Kingdom (n = 344, 85.8%). There was no difference in the frequency of good responses between teachers from different regions (p = 0.249) Moreover, the majority of the respondents were from government schools (n = 356, 88.8%), Table 1.

Table 1 Demographic Characteristics (n=401)

Variable		Frequency
Gender	Male	78 (19.5%)
	Female	323 (80.5%)
Place of Residence	Central Region	344 (85.8%)
	Western Region	8 (2%)
	Eastern Region	15 (3.7%)
	Southern Region	17 (4.2%)
	Northern Region	17 (4.2)%
Work Sector	Private	45 (11.2%)
	Government	356 (88.8%)
Level of Education	Undergraduate	389 (97%)
	Postgraduate	12 (3%)

Table 2 Frequency Comparison of Knowledge between Different Genders, Region and Specialty (n = 401; * = Fisher's exact test applied)

		Good Knowledge	Poor Knowledge	Total	P
Gender	Male	36 (46.2%)	42 (53.8%)	78	0.089
	Female	179 (55.4%)	144 (44.6%)	323	
Region	Central Region	188 (54.7%)	156 (45.3%)	344	0.249*
	Western Region	4 (50%)	4 (50%)	8	
	Eastern Region	7 (46.7%)	8 (53.3%)	15	
	Southern Region	11 (64.7%)	6 (35.3%)	17	
	Northern Region	5 (29.4%)	12 (70.6%)	17	
Specialty	Science	80 (61.5%)	50 (38.5%)	130	***0.018***
	Literature & Others	135 (49.8%)	136 (50.2%)	271	

Table 2 illustrates the knowledge levels of the responders. Interestingly, more than half of the participants had 'good knowledge' of scoliosis (n = 215, 53.6%), while 186 (46.4%) teachers had 'poor knowledge' of scoliosis. Although there were more females (n = 179;55.4%) as compared to males (n = 36, 46.2%) having good knowledge, the difference was not significant (p = 0.089). There was no difference in the frequency distribution of scoliosis knowledge between respondents from different regions (p = 0.249). A greater proportion of respondents who were teaching 'science' had 'good knowledge' of scoliosis (n = 80, 61.5%) as compared to those teaching 'literature' and 'other subjects' (n = 135, 62.8%; p = 0.018) (Fig.

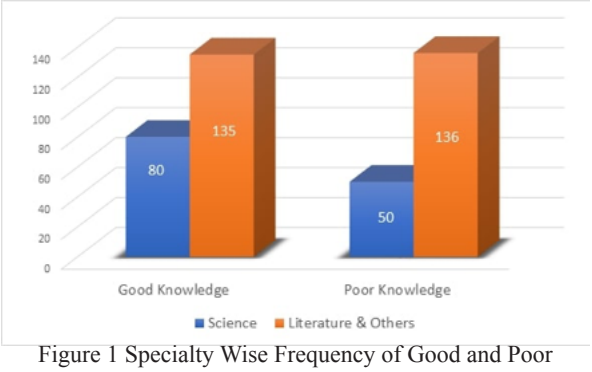


Figure 1 Specialty Wise Frequency of Good and Poor Knowledge of Teachers (n = 401)

How scoliosis is defined?

The teachers were asked to define scoliosis. All teachers attempted the question. Our analysis showed that overall 35 % of respondents answered correctly how to recognize scoliosis (Fig.2).

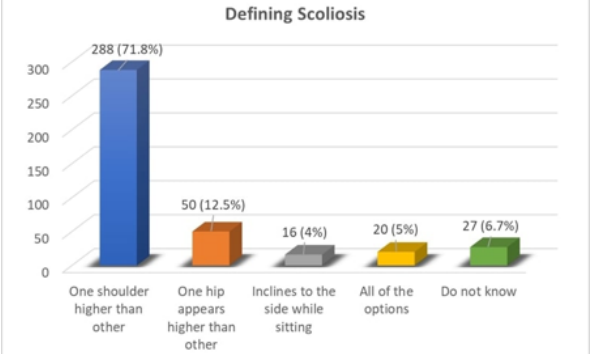


Figure 2. How scoliosis is defined?

While performing physical activities, how you will detect scoliosis?

Teachers can observe the students in multiple activities, the question whether the teacher was aware of how to detect scoliosis while students performing physical activities. A total of 39 (11%) answered the question correctly with all options and 196 (56%) thought that the body tilts to one side; 18 (8%) suggested that one leg seem shorter than the other whilst 50 (11%) were unsure (Fig.3).

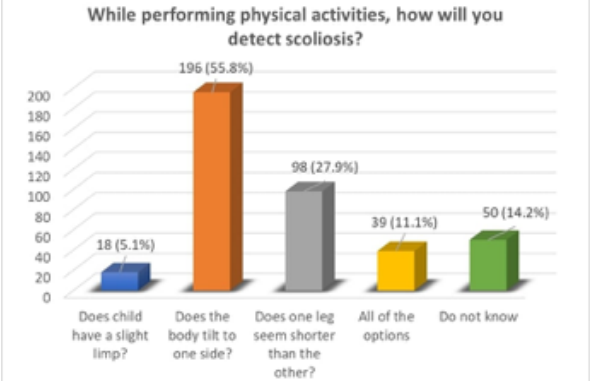


Figure 3. While performing physical activities, how you will detect scoliosis?

How scoliosis is detected by ill-fitting clothing?

Minor changes in the posture are difficult to spot, but sometimes child's clothing provides a visual indication of the changes in the curvature of the spine. During activities at school, a teacher can detect uneven clothing. The majority, 234 (63.3%), indicated that hemline was uneven (Fig.4).

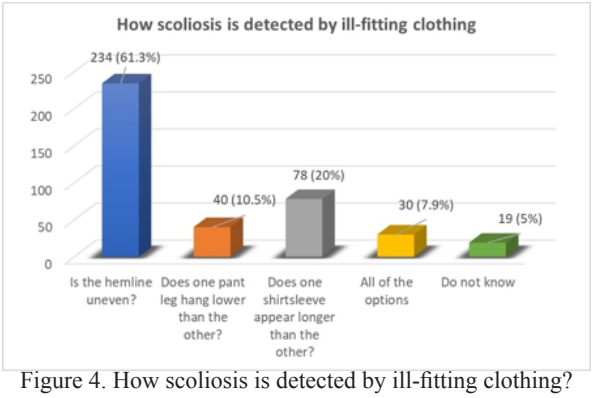


Figure 4. How scoliosis is detected by ill-fitting clothing?

Scoliosis is most likely to affect?

A total of 14 (4.3 %) were able to answer the question that scoliosis is more likely to affect other family members. Although 59% replied that age most likely afflicts from eight to fourteen (Fig.5).

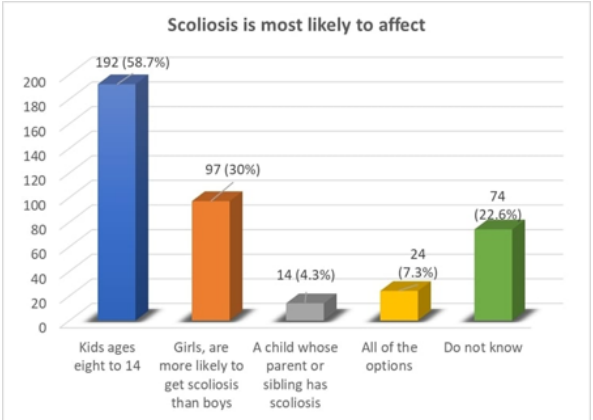


Figure 5. Scoliosis is most likely to affect?

Discussion

Our data shows that the majority of teachers (n = 215, 53.6%) had 'good knowledge' of scoliosis. Teachers from the central region of the country were more aware of scoliosis (87.4%, n=188). However, we can infer that scoliosis knowledge among school teachers is still lacking. This deficiency of knowledge varies by region and the variability of the sample of the study. Our results are encouraging and most respondents were able to answer the definition of scoliosis, 35 % of respondents answered correctly how to recognize scoliosis. The results of the survey were particularly poor about recognition of scoliosis during physical activity, the participants were capable of recognizing the patient by tilting body on one side; however, their ability to take this a step further detect by limp or ill-fitting clothing was very limited. One area well recognized by the teachers was the period within which scoliosis most commonly develops and is diagnosed.

When comparing our results to previous studies on this topic, our study included qualified teachers but there is no study on awareness of scoliosis among schoolteachers. A direct comparison with school students'[12] level and physiotherapy students'[13] level of knowledge may not be appropriate. Low levels of knowledge were reported in a study of the physiotherapy student in the United Kingdom but good knowledge 65% as in the study which involved Korean school students. The finding of our study suggests that the teachers in Saudi Arabia need regular training opportunities to enhance their knowledge and ensure that students with scoliosis receive appropriate action and outcomes are optimized.

Children presenting to our outpatient department of pediatric spine surgery often have severe spinal curvatures detected on the primary radiograph. These children were frequently from underprivileged backgrounds who did not have their regular examinations by their general physician or a pediatrician. Scoliosis is a musculoskeletal condition that progresses slowly from the onset but accelerates at a considerably quicker rate once adolescence starts.[8] Therefore, it is important that these patients are kept under close monitoring to prevent the occurrence of severe deformities once the condition starts accelerating. To do so, guidelines recommend scoliosis screening for school children, specifically during the accelerated phase of skeletal development, which is estimated to be around 11 years for females and 13 years for males which continued for 2 years. This method not only detects the problem early but also helps to prevent severe skeletal deformities, minimizing the economic

burden of treatment.[11,14] No school screening programs for scoliosis have been conducted officially in Saudi Arabia so far.[15] To detect scoliosis at an early stage and to refer the patients for further care, we investigated the knowledge of scoliosis among school teachers.

Scoliosis can be identified by Adam's [7] forward bend test(Fig.6). Teachers can observe the students in multiple activities. The test aims to identify school children who are at an increased risk for scoliosis. Awareness programs should be arranged for school teachers to proactively detect scoliosis at an early stage.

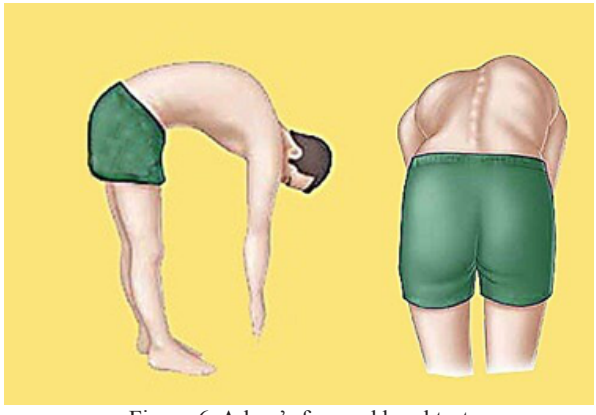


Figure 6. Adam's forward bend test

A study by Weistein et al.,[16] strongly supported the efficacy of brace in treating scoliosis. This study also emphasizes the importance of detecting scoliosis at an early stage. Several researchers and authors suggest that although scoliosis screening should be conducted for school children, it does have an additional economic burden.[11,14] Currently, the Saudi Ministry of Health provides two national screening programs: the National Newborn screening program and the premarital screening program, in addition to other government facilities.[16] Both these programs are carried out all over the kingdom with a clear description of the process and targeted subjects. Scoliosis is one of the most prevalent diseases in the country.[3] The government should therefore be encouraged to establish a national screening program and utilize the currently available infrastructure for as early diagnosis as possible and avoid future complications. The American Academy of Orthopedic Surgeon, the Pediatric Orthopedic Society of North America, and the Scoliosis Research Society support school screening as a tool to identify patients with scoliosis at an early stage.[17,18] A program for increasing school teachers' awareness can make this feasible and cost-effective until the governing bodies make policies on school screening of scoliosis in the country.

Limitations of this study include that the survey was conducted by selecting respondents online and was not conducted uniformly in the whole kingdom of Saudi Arabia. A further limitation of the study was the lack of validation of the questions included in the survey.

Conclusion

The present study is an assessment proce-

dure to test the knowledge of schoolteachers by questionnaire. These findings suggest a potential need for a school teacher awareness program that can facilitate parents particularly in underserved regions of the country.

Recommendations

Since Scoliosis is a treatable disease in its early stages with better results,[14] we strongly recommend that scoliosis awareness should be included in the teachers' training curriculum, just as other diseases are already present. If teachers can detect early signs of scoliosis in children, this would help the patients and their families with the identification of the problem. Referring the students for medical investigations will also facilitate an early diagnosis. The general population will benefit from additional awareness programs on scoliosis and training school teachers in scoliosis screening. We propose a scoliosis awareness program among school teachers till the implementation of school screening for children particularly in underserved regions of the country. To identify the magnitude of the problem nationwide studies are needed.

Ethical Approval

The Institutional Review Board at the College of Medicine, King Saud University approved this study. Project No. E-21-6176.

Financial Support Statement:

This study was not funded.

Conflicts of interest

None

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