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ORIGINAL ARTICLE

A Screening Program for Early Detection of Idiopathic Scoliosis among Secondary School Girls

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ABSTRACT

Objective: To describe the frequency of adolescent idiopathic scoliosis (AIS) among secondary school girls and to raise awareness about the importance of school screening programs for scoliosis.

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Study Design: Descriptive cross-sectional survey.

Place and Duration of Study: Private schools of Johar Town, Lahore from May 2016 to October 2016.

Material and Methods: A total of 148 secondary school-going girls between the age group 11-16 years were recruited for screening of idiopathic scoliosis from four private schools of Johar Town Lahore. The screening was done by Adams Forward Bend Test (AFBT) and by measuring the angle of Trunk Rotation (ATR) by a Scoliometer. The sampling technique was systematic sampling.

Results: The study findings revealed; among 148 subjects 3 (2.0%) showed positive results on AFBT with thoracic prominence. The measurement of ATR on the Scoliometer showed; 140 (94.6%) subjects less than 5-degree reading, 5 (3.4%) subjects less than and equal to 5 degrees, 2 (1.4%) were between 5 and 6 degrees and 1 (0.7%) were greater and equal to 8 degrees.

Conclusion: Idiopathic scoliosis among secondary school-going girls was 2.0%. School-based screening was an effective method for early detection of scoliosis. In addition, the study also emphasizes the importance of screening and awareness of spinal deformities among society.

Key Words: School screening, Girls, Adolescent idiopathic scoliosis, Adam's forward bend test, Scoliometer.

INTRODUCTION

The term "scoliosis" basically originates from ancient Greek word "skolios" which means; curved or crooked and it was first recognized by Greek physician (130–201 AD).¹ Adolescent Idiopathic Scoliosis (AIS), defined as a three-dimensional deformity of the spine which is accompanied by lateral or sideways curvature of the vertebral column, greater than 10° and goes

along with vertebral rotation.² According to SOSORT Guidelines for Scoliosis in 2011, the AIS prevalence ranges from 0.93% to 12%.³ The gender base female to male ratio is 3.6:1, which makes girls more prone to have scoliosis as compared to boys.^{4,5}

Studies showed that the adolescents who were primarily detected with mild AIS, the likelihood of progression of the curve was 10-15%, although

22-27% improve gradually with conservative or surgical treatment.⁶ Some professional associations including, American Academy of Orthopedic Surgeons (AAOS) and the Scoliosis Research Society (SRS) put forward a formal recommendation of screening program for the early recognition of scoliosis in schools, so that the deformity couldn't go unnoticed.⁷ Screening of scoliosis should be done during the rapid growth years that is; twice at 11 and 13 in girls and boys at the age of 13 or 14 years.² School based scoliosis screening provides an opportunity for early identification of scoliosis and make referrals for further evaluation and medical care.⁴

The aim of the current study was to introduce screening of scoliosis as medical preventive services in schools. This screening enables early identification of scoliosis and permits prompt initiation of treatment that may arrest the progression of the disease ultimately avoiding the complications of surgery for advanced scoliosis. The study further educated students (both boys and girls), parents, school staff, and the community about the essential need for early recognition of idiopathic scoliosis and its prompt referral.

MATERIAL AND METHODS

A descriptive cross-sectional study was carried out at private school of Johar Town including; Beacon house School System, The Punjab School, Unique School System and The Kips School. The study duration was from May 2016 to October 2016. The sample size was calculated by "WHO sample size calculator", the sample size was methodically calculated, which is approximately 148 ($n=148$), with confidence level of 95%, anticipated population proportion of 4.3%⁸ with absolute precision (d) of 0.03.

Out of 148 subjects, 35 were recruited from Beacon house School System, 44 from The Punjab School, 37 from The Unique School System and 32 from The Kips School. The sampling technique used was systematic sampling and every 4th student was selected according to their roll number on class attendance register. Girls with age between 11 and 16 years were included in the study. Subjects with congenital scoliosis, any systemic disease or leg

length discrepancy (LLD) were excluded from the study.

All ethical issues were considered in the study; participant information was taken from the school Principal and Coordinator. The informed consent for participation of girls in the study was given to all two days before for seeking approval from their parents or guardians. Detailed description of the screening program was given to the school authorities and the involved teachers. Awareness seminar was conducted regarding screening program for scoliosis via mode of power point presentation in a main hall of the campus before screening the students individually and brochures was distributed among the audience.

The demographic data of every subject was recorded. Each participant was screened separately maintaining complete privacy in the presence of concerned teacher in a separate room. All participants were requested to remove their shoes as screening was carried out bare-foot. It took 4 to 5 minutes in screening the participant. The subject was screened in an erect posture, any deviation of the trunk or the upper or lower extremities (including lateral deviation of the spine, asymmetry of the waist, shoulders, or scapulae; and limitation in joint motion) would be documented. The forward bending test (of Adam) was duly performed. The subject was asked to bend on his/her knees in forward direction while allowing the upper extremities to hang freely with the palms opposed in a relaxed manner, and the trunk was viewed from posterior and lateral aspect. Scoliometer was used to measure any hump detected during Adams forward bending test; reading 5° or above was considered atypical and referred to further radiographic evaluation.^{9,10} Deviations involving the trunk or spine (shoulder unevenness, scapular prominence, pelvic/hip prominence, space between arm and body, head center over the pelvis) were thoroughly recorded. Children with positive forward bending test and Scoliometer angle of 5° or more were sent for further radiographic evaluation at the nearby hospital. The data was duly analyzed by IBM Social Package for Statistical Sciences version 20. The quantitative variables were represented as mean and standard deviation whereas qualitative variables were calculated as proportions (%) and frequencies.

RESULTS

A total of 148 subjects were recruited and data was collected from four schools of Johar Town, Lahore. The mean age of subjects screened were 12.63 years; ranging from 11 to 16 years. Table 1 outlined that among 148, 3 (2.0 %) subjects showed shoulder and hip (iliac crest) level not same. There was no apparent deviation in any subject while erect, in 3(2.0%) subjects'arms to body space was not equal. Shoulder prominence and shoulder blade prominence was found in 3 (2.0%). Among 3(2.0%) subjects, both scapulae were not equal to each other on observing. Table 2 shows positive Adams Forward Bend Test were positive in 3 out of 148 subjects; all with thoracic prominence as presented in table 3. In fig 1 Scoliometer reading i.e., angle of trunk rotation (ATR) shows that 140 subjects show less than 5 degrees reading, 5 subjects shows less than and equal to 5 degrees, 2 were between 5 and 6 degrees and 1 was greater and equal to 8 degrees.

The number of females, with positive Adams Forward Bend Test were 3 out of 148 subjects; all with thoracic prominence.

TABLE 1: Screening in adams' position (AFBT)

	Frequency	Percentage
Negative	145	98.0
Positive	3	2.0
Total	148	100.0

Scoliometer reading i.e., angle of trunk rotation (ATR) shows that 140 subjects show less than 5 degree reading, 5 subjects shows less than and equal to 5 degrees, 2 were between 5 and 6 degrees and 1 was greater and equal to 8 degrees (fig 1).

TABLE 2: Thoracic and lumbar prominence on AFBT

Variables	Frequency		Percentage	
	Yes	No	Yes	No
Thoracic prominence	3	145	2.0	98.0
Lumbar prominence	0	148	0	100.0

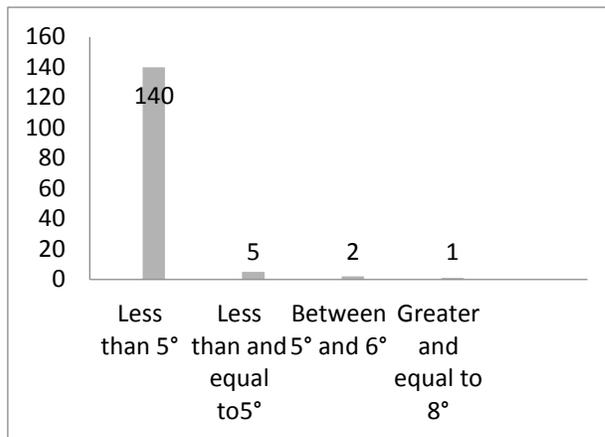


Fig 1: Scoliometer reading (ATR)

DISCUSSION

It was a cross-sectional descriptive study for school-based screening of scoliosis. The screening tests were not intended to be diagnostic. Subjects with positive or suspicious findings must refer to their orthopedics for further evaluation and management. According to the Scoliosis Research Society (SRS) and American Academy of Orthopedic Surgeons (AAOS) recommends screening of scoliosis twice at 11 and 13 in girls and boys at age of 13 or 14 years.^{2,3} The purpose of school-based screening was to identify individuals with unrecognized scoliosis. The literature reveals that the deformity was more prevalent among girls so it is necessary to screen females during their rapid growing years. Increased awareness about this condition will help in the early identification of the curves.¹¹ The frequency that came out in this study could no way represent the real magnitude of this problem. The less sample size was the limitation of this study.

The screening tool of choice in this current study was Adam's Forward bend test along with visual inspection of the back and Scoliometer. One of the striking features of the current study was the utilization of Scoliometer as a screening tool which was chiefly ignored in previous cross-sectional surveys conducted in Pakistan.

Our final results showed that examination of scoliosis with Adam's forward bend test (along

with inspection) and Scoliometer was 2% among secondary school-going girls.

According to a previous cross-sectional an epidemiological study conducted in five schools of Nepal, the estimated prevalence was found to be 1.09% with more common among girls than boys i.e., 3:1. Although the overall prevalence was low but school-based screening was a good means for early identification of deformity of the spine in children.⁴ This study also found the frequency of idiopathic scoliosis less i.e. 2%. In another previous study, the prevalence of idiopathic scoliosis in Korean school children with a male to female ratio of 1.1:1.0. The overall scoliosis prevalence rate found was 3.26% among which girls had a more prevalence (4.65%) than boys (1.97%). The authors concluded that school-based scoliosis screening was effective in early detection and need of awareness of idiopathic scoliosis among society. Some additional findings like kyphosis and lordosis were also addressed in this study.

The measurement of Angle of Trunk Rotation (ATR) by using a Scoliometer; a non-invasive and a cheaper method of screening compared to others, easily implemented and it had been proven to have a good correlation with radiological findings with very good intra-rater reliability.^{12,13}

In 2017, a largest study was conducted in Malaysia on the clinical effectiveness of school screening program for scoliosis, in this prevalence of scoliosis was 2.55% that was much acceptable to suggest that the school scoliosis screening program did play a role in early recognition of scoliosis.¹⁴

The compliance of students and school authorities' representatives' permission was the main hurdle in this screening period. As there was low awareness regarding spinal deformities amongst the population, special efforts should be put forth in order to re-educate the community regarding these deformities and their early treatment.

CONCLUSION

The study concluded that idiopathic scoliosis among secondary school-going girls was 2.0%. School-based screening of scoliosis was an effective means for early detection of scoliosis. In

addition, the study also emphasizes the importance of screening and awareness of spinal deformities among adolescent school children.

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REFERENCES

1. Konieczny MR, Senyurt H, Krauspe R. Epidemiology of adolescent idiopathic scoliosis. *Journal of children's orthopaedics*. 2013;7(1):3-9.
2. Labelle H, Richards SB, De Kleuver M, Grivas TB, Luk KD, Wong HK, et al. Screening for adolescent idiopathic scoliosis: an information statement by the scoliosis research society international task force. *Scoliosis*. 2013;8(1):17.
3. Negrini S, Donzelli S, Aulisa AG, Czaprowski D, Schreiber S, de Mauroy JC, et al. 2016 SOSORT guidelines: orthopaedic and rehabilitation treatment of idiopathic scoliosis during growth. *Scoliosis and spinal disorders*. 2018;13(1):1-48.
4. Pokharel RK, Lakhey RB, Kafle D, Shah LL. Detection of Adolescent Idiopathic Scoliosis among Nepalese Children Through the School Screening Program. *Nepal Orthopaedic Association Journal*. 2014;3(2):14-9.
5. Płazewski M, Grantham W, Jespersen E. Screening for scoliosis-New recommendations, old dilemmas, no straight solutions. *World Journal of Orthopedics*. 2020;11(9):364.
6. Noshchenko A, Hoffecker L, Lindley EM, Burger EL, Cain CM, Patel VV, et al. Predictors of spine deformity progression in adolescent idiopathic scoliosis: A systematic review with meta-analysis. *World journal of orthopedics*. 2015;6(7):537.
7. Richards BS, Vitale M. AAOS-SRS-POSNA-AAP Information Statement. Retrieved April; 2012.
8. Souza Fld, Ferreira RBD, Labres D, Elias R, Sousa APMd, Pereira RE. Epidemiology of adolescent idiopathic scoliosis in students of the public schools in Goiânia-Go. *Acta ortopedica brasileira*. 2013;21(4):223-5.
9. Fong DY, Cheung KM, Wong Y-W, Wan Y-Y, Lee C-F, Lam T-P, et al. A population-based cohort study of 394,401 children followed for 10 years exhibits sustained effectiveness of

- scoliosis screening. *The Spine Journal*. 2015;15(5):825-33.
10. O'Connell J. Standards for Scoliosis Screening in California Public Schools. California Department of Education. 2007.
 11. Kadhim M, Lucak T, Schexnayder S, King A, Terhoeve C, Song B, et al. Current status of scoliosis school screening: targeted screening of underserved populations may be the solution. *Public health*. 2020;178:72-7.
 12. Coelho DM, Bonagamba GH, Oliveira AS. Scoliometer measurements of patients with idiopathic scoliosis. *Brazilian journal of physical therapy*. 2013;17(2):179-84.
 13. Bonagamba GH, Coelho DM, Oliveira ASd. Inter and intra-rater reliability of the scoliometer. *Brazilian Journal of Physical Therapy*. 2010;14(5):432-8.
 14. Deepak A, Ong J, Choon D, Lee C, Chiu C, Chan C, et al. The Clinical Effectiveness of School Screening Programme for Idiopathic Scoliosis in Malaysia. *Malaysian orthopaedic journal*. 2017;11(1):41.