

Original Article

Incidence of radiographic scoliosis in asymptomatic young Pakistani adults

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ABSTRACT

Background: Adolescent idiopathic scoliosis (AIS) is the most common scoliotic deformity of young adults. Screening of AIS is performed as part of the routine preemployment examination for physically demanding positions. We attempted to establish the incidence of clinically overt scoliosis in an adolescent (16 years old) and young adult (21 years old) population.

Methods: We clinically and radiographically (X-rays) evaluated 85 applicants for physically demanding jobs in two age groups: those 16 versus those 21 years of age. Cobb's angles and kyphosis angles were measured for each group. These data were then categorized into three grades based on radiographically documented scoliotic curvatures.

Results: Most 16 years old demonstrated normal Cobb's angles (90.56%), but kyphosis angles of 20–30° (40.27%). For the 21 years old, most participants had normal Cobb's angles (93.75%), but exhibited higher than normal kyphosis angles (50%).

Conclusion: Most young adults ages 16–21 years applying for physically demanding work were “fit.” However, the incidence of kyphosis was higher among the 21 years old population. Such screening for idiopathic scoliosis should be more stringently performed in younger patients applying for physically demanding work.

Keywords: Computed tomography, Scoliosis, Spine, X-ray

INTRODUCTION

Scoliosis is defined as an abnormal lateral angulation of the spine of over 10°, in combination with vertebral rotation.^[5,7] Adolescent idiopathic scoliosis (AIS) is the most common type of idiopathic scoliosis, seen in about 90% of patients between 10 and 18 years of age.^[7] Bending AP radiographs help distinguish between structural versus nonstructural curves.^[4] Alternatively, MR studies are typically not cost effective.^[3,7,8] With scoliosis, physical deformity may eventually lead to respiratory problems, and psychological dysfunction, plus curves progress in approximately two-thirds of cases.^[2,7] Here, we documented the incidence of idiopathic scoliosis in young adults (ages 16 vs. 21) applying for physically demanding jobs using X-rays.

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MATERIALS AND METHODS

The study was carried out as a preemployment check for physically demanding jobs to recruit candidates of 16–21 years of age (2015–2019). Following a clinical evaluation, spinal X-rays (i.e., anteroposterior films) taken standing and in the lateral recumbent positions [Figure 1]. X-rays were also used to: rule out; tuberculosis, rotation (i.e., % displacement of spinous processes from the midline) kyphosis (i.e., lateral films T2-T12), and lumbar lordosis (i.e., L1 and L5).

Scoliosis data

For scoliosis, the X-rays data were divided into three groups; Grade I (curvature 0–10°), Grade II (10–20°), and Grade III (20–30°). Curves were classified into cervicothoracic, thoracic, thoracolumbar, and lumbar curves. For kyphosis, the data were divided into three groups; Grade I (10–20°), Grade II (20–30°), and Grade III (30–40°).

RESULTS

Most 16 years old (90.56%) had normal Cobb's angle (Grade I curvature), whereas 5.66% had Grade II and 3.77% had Grade III scoliosis. Most participants demonstrated kyphosis angles between 20–30° (48.27%) and 30–40° (37.93%), while only 13.79% had kyphosis angles of 10–20°.

The majority of 21 years old had Cobb's angles of 0–10° (93.75%) and exhibited Grade I versus Grade II and Grade III curvatures [Table 1]. Comparable with the 16 years old population, the larger part (51%) of the 21 years old group was found to have a kyphosis angle of 20–30° (Grade II). Grades I and III kyphosis, however, were observed in 18.51% and 29.62%, respectively [Table 2].

DISCUSSION

Luk *et al.*, in a large retrospective cohort of 157,444 students, found school screening programs to be both sensitive and predictive for AIS.^[6] In 2018, Dunn *et al.* supported early screening for detection of AIS, but, long-term outcomes did not clearly indicate that early detection and treatment were effective.^[2]

We found the incidence of scoliosis during preemployment check-up for physically demanding jobs to be well within the range of 0.05–17.7% in asymptomatic individuals as reported by the previous studies [Table 3]. AIS was shown to have a more benign course than other types of idiopathic

scoliosis.^[9] We found that most participants had Grade I or II curves which were considered insignificant; this was in accordance with the previous data where most spinal curvatures were <10° or 20°. Bracing is considered for curves between 25° and 45° or 20° and 30° that progress more than 5° in 6 months.^[1] Weinstein *et al.*, in a multicentric study of 242 AIS patients, observed that 72% of patients treated with bracing reached skeletal maturity without ≥50° curve progression versus 48% who were merely observed.^[10] Surgical correction by means of spinal instrumentation with stabilization is considered in skeletally immature patients with curves of >40° or curves with continuous progression and/or if there are both cosmetic and neurologically protective indications.^[1,9]



Figure 1: Posteroanterior radiograph demonstrating spinal curvature and a Cobb's angle measurement of 9°.

Table 1: Scoliosis angle among different age groups and their fitness for recruitment.

Cobb's angle (n=85)	16 years age group (n=53)	21 years age group (n=32)	Fitness
0–10°	48	30	Fit
10–20°	03	01	Fit
20–30°	02	01	Unfit

Table 2: Kyphosis angle among different age groups.

Kyphosis angle (n=85)	16 years age group (n=53)	21 years age group (n=32)
10–20°	08	05
20–30°	28	14
30–40°	22	08

Table 3: Studies showing incidence of incidental scoliosis in the literature.

Year	Authors	Total n	Positive scoliosis	%	Comments
1929	Cushway <i>et al.</i>	931	81	8.7	
1944	Breck <i>et al.</i>	450	6	1	
1950	Allen <i>et al.</i>	3000	15	0.5	
1954	Runge <i>et al.</i>	4654	108	2.34	
1956	Diveley <i>et al.</i>	6523	326.15 123.93	5.0 1.9	Postural scoliosis Structural scoliosis
1958	Morenton <i>et al.</i>	13000	169	1.3	>10° deviation
1960	Lindem <i>et al.</i>	6748	250	3.7	
1965	Kelly <i>et al.</i>	1087	6.5	0.6	
1969	Kelly <i>et al.</i>	4356	1045.4	24	4356 preemployment examinations (not employees)
1969	Rocca <i>et al.</i>	151 151	32 24	21.1 15.8	With lower back pain Without lower back pain
					Only two people in each group had curves>10°
1983	Gift <i>et al.</i>			7	
1988	Gann <i>et al.</i>	68	6	8.82	Not significant curves
2003	Steinberg <i>et al.</i>	232 232	69 41	29.7 17.7	With lower back pain Without lower back pain
					All curves<20°
2012	Idris <i>et al.</i>	5246	3	0.05	Thoracic scoliosis
2014	Akinola Rachael <i>et al.</i>	667	2	0.3	Preemployment+Preoperative+Preadmission
2018	Karanjanakantorn <i>et al.</i>	1637	8	0.4	
Our study	Junaid <i>et al.</i>	85	7	8.2%	Preemployment

CONCLUSION

When we compared the frequency of idiopathic scoliosis in 16 versus 21 years old applying for physically demanding work, we found that most adolescents and young adults were “fit,” but the incidence of kyphosis was higher among the young adult population.

Declaration of patient consent

Patients’ consent not required as patients’ identities were not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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