



Systematic Review of School Scoliosis Screening

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Abstract

Objectives: The aim of this study was to review the literature on school screening and its reported effectiveness.

Summary of Background Data: There is no worldwide consensus concerning the mandating of school screening for scoliosis. This remains a controversial issue.

Methods: The following databases were employed: Medline, Premedline, CINAHL, CENTRAL, AMED, Embase, SCOPUS, Ovid nursing, and Web of Science. These data were generated from the Forward Bend Test, the angle of trunk rotation and Moire topography. The first and second authors each independently screened titles and abstracts for potential studies. Fulltext papers of potential studies were also independently read by the first two authors to identify studies to be included based on strict inclusion/exclusion criteria. A heterogeneity test was performed by testing for the significance of the between-study variance. Publication bias was examined by a funnel plot.

Results: We found 20 studies that met our inclusion criteria. The pooled estimate of prevalence of scoliosis curves in the population was 1.1% for curves greater than 10°, and 0.2% for curves greater than 20°. The pooled referral rate to radiography during the screening process was 6.6%. The pooled positive predictive values for detecting curves >10° and >20° were 32.3% and 6.5% respectively. Analysis of data demonstrated significant heterogeneity between studies but was not suggestive of the presence of publication bias.

Conclusions: We support the implementation of scoliosis screening as a means of detecting curves at an early treatable stage. The current available evidence in the literature for routine scoliosis screening is low to moderate. Challenges exist to the school scoliosis screening including a high referral rate to radiology.

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Keywords: School screening; Scoliosis; Meta-analysis

Introduction

Adolescent idiopathic scoliosis (AIS) is a complex three-dimensional deformity of the spine, characterized by lateral curvature >10° and axial rotation, which affects 2% to 3% of otherwise healthy teenagers [1-3]. The deformity usually progresses with rapid growth of the spine and can affect the health-related quality of life of the individual [4]. Conventional treatment options are bracing and surgery [1-3]. Bracing is *normally recommended* for progressive curves of 20°–40° in immature patients to prevent progression, whereas surgery is considered for curves >40°–50° to stop progression and correct the deformity

[1]. In patients with AIS, only a minority have progressive curves requiring treatment [5], and 90% of those treated are girls [6,7]. Treatment outcomes are usually measured by radiographic changes of the curves, but increasingly also by changes in health-related quality of life.

Screening for scoliosis is controversial, and practices vary worldwide. Opponents cite mainly increased costs and lack of effectiveness of the programs [8-10]. Proponents say early detection by screening allows for monitoring curve progression and timely initiation of bracing [11-13].

The United States Preventive Services Task Force neither supported nor opposed screening in 1993 [14,15], but recommended against routine screening in 2004 [16]. Discontinuation of screening programs has led to late detection and high rates of surgeries in some countries [17-19]. The Scoliosis Research Society's international task force recently reported that screening was effective in technical, clinical, program, and treatment efficacy but

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could not make a statement on cost effectiveness because of lack of studies evaluating costs and health economic analyses [20]. The Canadian Task Force on the Periodic Health examination, the British Orthopaedic Association, and the British Scoliosis Society do not recommend screening [21,22].

A recent randomized study found bracing to reduce curves that progress to the threshold of surgery [5]. The BRAIST study confirms the traditional “standard of care” for adolescent scoliosis with bracing for moderate scoliosis in growing children. The BRAIST study was a randomized clinical trial with a patient preference arm—level I and II in the hierarchy of medical evidence.

In view of the ongoing controversy on the subject of school scoliosis screening, we systematically reviewed the literature on the subject with strict inclusion and exclusion criteria to provide evidence-based guidance.

Materials and Methods

The following databases were employed: Medline, Premedline, CINAHL, CENTRAL, AMED, Embase, SCOPUS, Ovid nursing, and Web of Science. The SIGN filters for observational studies was used for Medline, Embase, and CINAHL databases. The first and second authors each independently screened titles and abstracts for potential studies. Full-text papers of potential studies were

also independently read by the first two authors to identify studies to be included based on the criteria listed below. The reference lists from all identified studies and reviews were also examined for additional studies. Where there was a difference of opinion between the authors during the screening process, discussion was made and agreement reached.

Data were generated from the Forward Bend Test, the angle of trunk rotation, and Moire topography. Studies were included if they

1. Described school children, both boys and girls in age period associated with risk of development of AIS, typically adolescents; however no strict age criteria was defined;
2. Considered a screening program that used either the forward bending test (FBT), angle of trunk rotation (ATR), or Moire topography;
3. Reported the number of referrals for radiography;
4. Reported results of screening tests and radiographic assessments;
5. Reported the incidence of curves with a minimum Cobb angle of 10° or greater; and
6. Reported on treatment (bracing/surgery).

Reviews, comments, case studies, and editorials were excluded. The data extracted included details of the screening tests performed, personnel, and period examined.

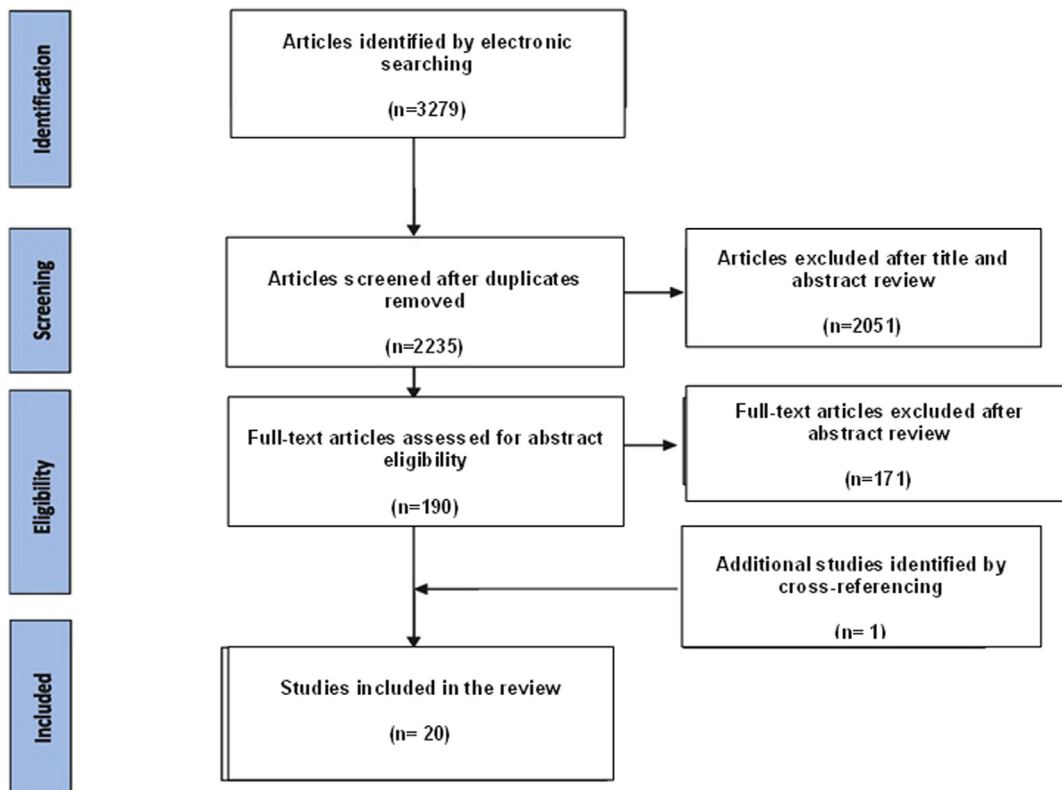


Fig. PRISMA diagram for the search performed for the meta-analysis on school scoliosis screening.

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