

# INPLASY PROTOCOL

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**Conflicts of interest:**  
The authors declare that they have no conflict of interest.

## Effectiveness of Scoliosis-Specific Exercise for Alleviating Adolescent Idiopathic Scoliosis: A Systematic Review

Fan, Y<sup>1</sup>; Ren, Q<sup>2</sup>; To, KT<sup>3</sup>; Cheung, J<sup>4</sup>.

**Review question / Objective:** This review aims to access the most updated scoliosis-specific exercise (SSE) studies that adhered to the Society on Scoliosis Orthopedic and Rehabilitation Treatment exercise principle to evaluate the effect of SSEs on scoliotic deformity improvement. Moreover, to define the effects of age, skeletal maturity, curve magnitude, and exercise compliance on SSEs outcomes. The PICOS principle was applied to set the inclusion criteria, specifically described as (1) P (population): adolescents with idiopathic scoliosis, (2) I (intervention): reported any of the SSE methods in either study or control group, (3) C (comparison): compared with traditional exercise, no treatment, standard care, brace, or any other non-SSEs, (4) O (outcome): Cobb angle was reported as the primary outcome to evaluate effects on curve regression, with or without the secondary outcome defined as the truncal asymmetry (angle of trunk rotation in degrees: ATR) or condition-related function/QoL measured using validated questionnaires (e.g. 22-item or 23-item Scoliosis Research Society questionnaire), and (5) S (study design): prospective studies with controls that were published in or after 2010 were included.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 May 2020 and was last updated on 28 May 2020 (registration number INPLASY202050100).

## INTRODUCTION

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exercise principle to evaluate the effect of SSEs on scoliotic deformity improvement. Moreover, to define the effects of age, skeletal maturity, curve magnitude, and exercise compliance on SSEs outcomes. The PICOS principle was applied to set the inclusion criteria, specifically described as

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**Condition being studied:** Adolescent idiopathic scoliosis (AIS), characterized by lateral deviation, axial rotation, and abnormal sagittal curvature of the spine, is the most common (70%–80%) spinal deformity with unclear etiology. AIS prevalence is approximately 0.47%–5.2% in the general adolescent population. This condition may lead to cosmetic concerns, pain, and respiratory dysfunction. AIS was reported in almost 10% of patients requiring either conservative or surgical treatment. Surgery is reserved for severe curves of 50°, whereas bracing and scoliosis-specific exercise (SSE) are reserved for mild (10°–25°) and moderate (25°–45°) curves to prevent progression to the operative stage.

## METHODS

**Participant or population:** Adolescents with idiopathic scoliosis.

**Intervention:** Scoliosis-specific exercise.

**Comparator:** Observation, standard care, general core muscle training exercise, none scoliosis-specific exercise.

**Study designs to be included:** RCTs and prospective CCTs.

**Eligibility criteria:** This study replicated the search strategy adopted by the Cochrane

Review from January 1, 2010 to February 29, 2020 in the following six databases: Pubmed, MEDLINE, Cochrane Library, Scopus, CINAHL, and Google Scholar. Key search items consisted of “AIS”, or “idiopathic scoliosis”, and “exercise”, or “scoliosis specific exercise”, or “physiotherapy”, or “Schroth”, or “SEAS”, or “DoboMed”, or “Side-shift” or “FITs” or “randomi\*” or “placebo” or “control\*”. The PICOS principle was applied to set the inclusion criteria, specifically described as (1) P (population): adolescents with idiopathic scoliosis, (2) I (intervention): reported any of the SSE methods in either study or control group, (3) C (comparison): compared with traditional exercise, no treatment, standard care, brace, or any other non-SSEs, (4) O (outcome): Cobb angle was reported as the primary outcome to evaluate effects on curve regression, with or without the secondary outcome defined as the truncal asymmetry (angle of trunk rotation in degrees: ATR) or condition-related function/QoL measured using validated questionnaires (e.g. 22-item or 23-item Scoliosis Research Society questionnaire), and (5) S (study design): prospective studies with controls that were published in or after 2010 were included.

**Information sources:** This study replicated the search strategy adopted by the Cochrane Review from January 1, 2010 to February 29, 2020 in the following six databases: Pubmed, MEDLINE, Cochrane Library, Scopus, CINAHL, and Google Scholar.

**Main outcome(s):** Cobb angle was reported as the primary outcome to evaluate effects on curve regression, with or without the secondary outcome defined as the truncal asymmetry (angle of trunk rotation in degrees: ATR) or condition-related function/QoL measured using validated questionnaires (e.g. 22-item or 23-item Scoliosis Research Society questionnaire).

**Quality assessment / Risk of bias analysis:** The NHMRC hierarchy of evidence was adopted to evaluate the evidence level. Level II evidence (RCT) was considered the best methodology to answer intervention-

related questions in a systematic review. However, considering the limited number of RCTs in the most up-to-date reviews, prospective clinical control trials (CCTs; Level III) were also analyzed in this study. Methodological qualities were measured using the PEDro scale. The PEDro scale was proven to have validity and reliability for evaluating the methodological quality of clinical trials. It has been commonly used to evaluate physiotherapy studies. The PEDro scale scores methodology based on 10 items: (1) random allocation, (2) concealed allocation, (3) similarity at baseline, (4) subject blinding, (5) therapist blinding, (6) assessor blinding, (7) >85% follow-up for at least one outcome, (8) intention-to-treat analysis, (9) between-group comparison for at least one outcome, and (10) point and variability measures for at least one outcome (Table 1). Items were scored as either present (1) or absent (0). A score out of 10 ranked the study as having weak (PEDro score: 0–4), moderate (PEDro score: 5–7), and strong (PEDro score: 8–10) quality.

**Strategy of data synthesis:** N/A. This study is a systematic review without meta-analysis.

**Subgroup analysis:** N/A. This study is a systematic review without meta-analysis.

**Sensibility analysis:** N/A. This study is a systematic review without meta-analysis.

**Country(ies) involved:** Hong Kong.

**Keywords:** Adolescent idiopathic scoliosis • Scoliosis specific exercise • Cobb angle • Truncal asymmetry • Quality of life.

**Contributions of each author:**

Author 1 - Yunli FAN - YF searched and reviewed articles, and drafted the manuscript.

Author 2 - Qing REN - QR searched and reviewed articles.

Author 3 - KT TO - KTT edited the manuscript.

Author 4 - Jason PY Cheung - PYC final edited the manuscript.