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# AN EFFECTIVE ACTIVE SELF-CORRECTION IN STANDING WITHOUT EXTERNAL AIDS IS POSSIBLE IN ADOLESCENTS WITH IDIOPATHIC SCOLIOSIS: A CROSS-SECTIONAL RADIOGRAPHIC STUDY

Francesco Negrini[1,2,3], Sara Rossi Raccagni[3], Giulia Fregna[4], Alessandra Negrini[3], Stefano Negrini[5,6,3]
[1]Università degli studi dell'Insubria, Varese, Italy. [2]Istituti Clinici Scientifici Maugeri IRCCS, Tradate, Italy. [3]ISICO - Italian Scientific Spine Insititute, Milan, Italy. [4]Ferrara University Hospital, Ferrara, Italy. [5]Università degli studi di Milano, Milan, Italy. [6]IRCCS Galeazzi – Sant'Ambrogio Hospital, Milan, Italy

## Background

Physiotherapeutic scoliosis-specific exercises (PSSE) are recommended in the conservative management of adolescent idiopathic scoliosis (AIS) and are based on three-dimensional self-correction, stabilization, and integration into daily life. Self-correction is considered a key therapeutic component across PSSE schools; however, most available evidence concerns corrective positions performed with external aids, manual facilitation, or specific postures. Whether an active, unaided self-correction performed in standing is achievable and radiographically effective remains unclear. The Scientific Exercise Approach to Scoliosis (SEAS) uniquely emphasizes an active self-correction (ASC) executed without external supports, directly counteracting spinal misalignment. Radiographic evidence supporting the feasibility and effectiveness of such an approach is currently lacking.

## Study Design

Cross-sectional radiographic study nested within a prospective clinical database.

## Objective (s)

To evaluate whether an active, unaided standing self-correction according to the SEAS approach produces measurable radiographic changes in Cobb angle and apical vertebral rotation compared with habitual standing in adolescents with idiopathic scoliosis.

## Methods

Adolescents aged 10–18 years with AIS (Cobb angle ≥10°) who underwent full-spine standing radiographs both in habitual standing and during SEAS active self-correction were included (Figure 1). Cobb angle and apical vertebral rotation (Raimondi method) were independently and blindly measured by three raters. Curves were classified as single primary or double primary. Primary outcomes were changes in Cobb angle and Raimondi degrees between habitual standing and ASC. Descriptive statistics with means and 95% confidence intervals were calculated. Pearson or Spearman correlation analyses were used to explore associations between changes in coronal and rotational measures.

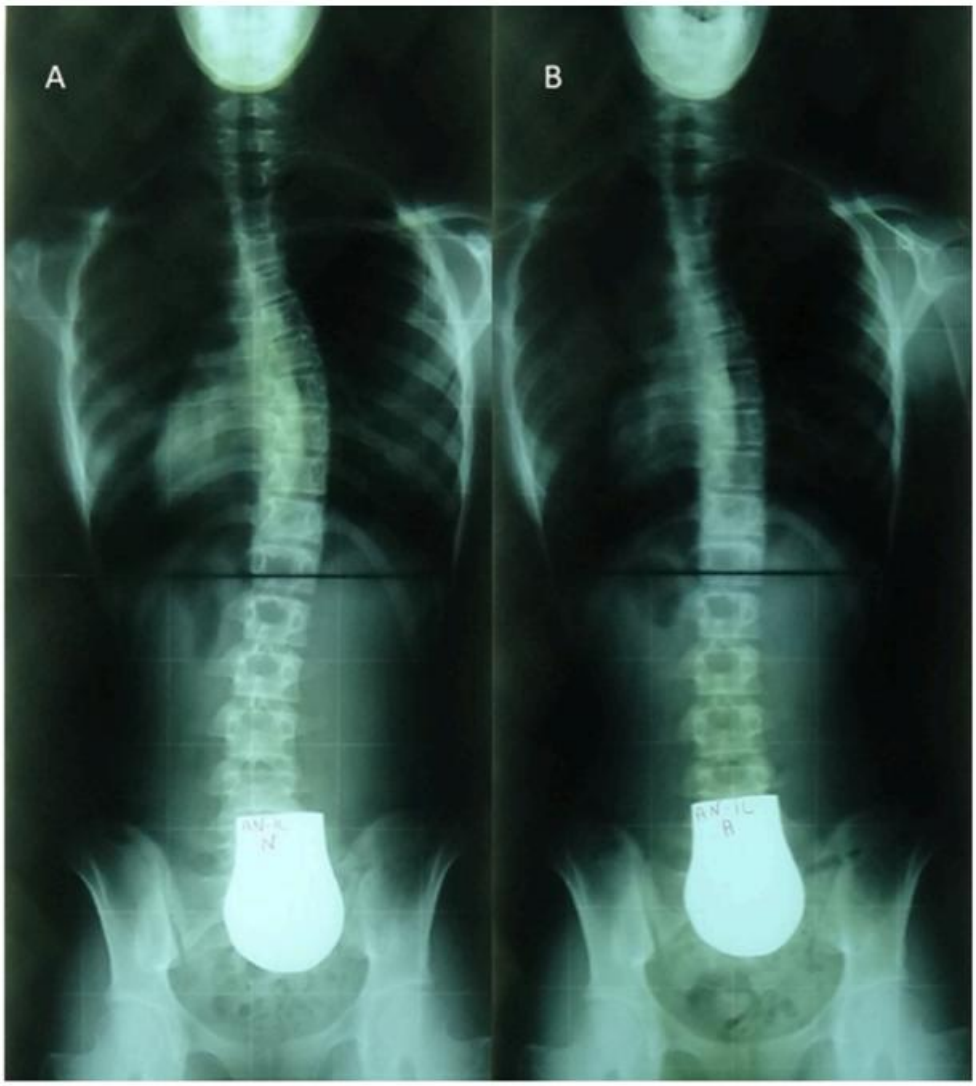


**Fig. 1** Coronal full-spine x-rays in habitual standing (Fig 1a) and performing Active Self Correction (Fig 1b) of a patient. In habitual standing and in Active Self Correction Cobb angle was 27° and 20°, and apical vertebral rotation was 20° and 13°, respectively.

## Results

Twenty-six adolescents (mean age 13.9 ± 1.6 years; 88% female) were included, with a mean largest Cobb angle of 32 ± 11°. Sixteen patients had single primary curves and ten had double primary curves. In single primary curves, ASC produced a mean Cobb angle reduction of 5.8° (95% CI 4.2–7.4) and a mean apical rotation reduction of 1.7° (95% CI −1.0 to 4.4), both exceeding measurement error. In double primary curves, ASC resulted in a significant reduction in apical vertebral rotation (mean 1.8°, 95% CI 0.4–3.2) but not in Cobb angle. Very weak correlations were observed between changes in Cobb angle and apical rotation (r = 0.1).

## Conclusion(s)

Active self-correction performed in standing without external aids is feasible and produces immediate radiographic improvements in adolescents with idiopathic scoliosis. The effect is more pronounced for coronal correction in single primary curves, while rotational control and double-curve management appear less consistent.

## Clinical significance

These findings provide radiographic evidence that unaided active self-correction, as applied in the SEAS approach, can meaningfully influence spinal alignment. This supports the clinical rationale for integrating autonomous self-correction into PSSE programs and highlights the need for further research to optimize rotational control and assess the relationship between immediate correction and long-term clinical outcomes.