

**Clinical Question:** Among children with AIS, does combination of traditional scoliotic treatment and the Schroth method improve the abnormal lateral curvature compared to observation and bracing alone?

**Background:** AIS is one of the most common pediatric spinal deformities. Traditional treatments in the US include observation for curves under 25°, bracing for curves between 25° to 45°, and surgical intervention for curves over 45°<sup>2,4</sup>. Bracing interventions typically focus on the patient's curve during the growth phase, but post-bracing curves can have continual worsening progression. The Schroth method, developed by Christa Lehnert-Schroth, and other scoliosis-based exercise techniques are becoming more popular in conjunction with traditional scoliosis treatments pre, during, and post-bracing<sup>2</sup>. The Schroth Method claims to teach the patient how to consciously correct their spinal rotation, increase lung capacity, improve spinal position, and posture through breathing and stretching techniques<sup>3</sup>. Each patient's exercise program is different as each patient requires different attention<sup>1</sup>. This conscious correction involves sensorimotor feedback and rotational breathing<sup>1,2</sup>. The goal of this CAT is to compare traditional forms of scoliotic treatment without the Schroth method to the combination of traditional scoliotic treatment with the Schroth method for AIS.

### Search Strategy

**Databases Searched:** PubMed, CINAHL, JPO, Google Scholar

**Search Terms:** (idiopathic scoliosis, scoliosis, adolescent scoliosis) AND (Schroth, Schroth method, Schroth exercises) AND (Scoliosis bracing, bracing, orthotics)

**Inclusion/Exclusion Criteria:** date range in the last five years, English, specific to the search topic.

**Synthesis of Results:** Three original research studies<sup>1,2,4</sup> were reviewed that investigated the Schroth method and traditional forms of scoliotic treatment for AIS. The three studies evaluated the physical effects on the intervention and control groups, as well as the psychological aspects of scoliosis. There was a total of 103 participants evaluated across studies: 75 females and 28 males. Participants had Cobb angles measuring from 10° to 60° and Risser signs from 0 to 5. Two of the trials were randomized control studies<sup>1,4</sup> and one was a prospective historical cohort matched study<sup>2</sup>. All three studies used a version of the Scoliosis Research Society (SRS) questionnaire to assess the health-related quality of life related to scoliosis. The only difference between the SRS-23 and SRS-22 is the inclusion of one body image question. Two studies<sup>1,4</sup> found significant differences between the groups for the SRS questionnaire but one study found no significant differences between groups with and without the Schroth method<sup>2</sup>. When measuring for angle of trunk rotation (ATR) two studies<sup>1,2</sup> found the Schroth method to significantly improve the ATR when measured with a scoliometer. Limitations across studies included length of time each study was conducted and compliance. Only two of the studies<sup>1,2</sup> measured the baseline Cobb angles and took subsequent measurements throughout the study. Only one study<sup>1</sup> found the Cobb angles to have a significant difference between the experimental and control group. The other study<sup>2</sup> that looked at Cobb angle had insignificant results that could be related to the low compliance rate. A common limitation amongst two of the studies<sup>1,2</sup> was patient compliance. One study<sup>2</sup> had a lower compliance rate in their experimental group than the control group and another study<sup>1</sup> did not even report the final compliance rate of the participants. Another limitation of all three studies is their short time spans. Two studies<sup>1,4</sup> only checked in with their participants for 6 months and the third<sup>2</sup> required a minimum of a year. Considering that most traditional forms of scoliosis treatment take years to complete, six months may be insufficient to determine whether or not there is significant correction as a result of the intervention.

**Clinical Message:** Patients with AIS may benefit from a combination of traditional scoliotic care and the Schroth method compared to traditional scoliotic treatments. The implementation of the Schroth method can help improve the body image and health-related quality of life of the participant. It can also improve ATR and Cobb angles when compliance is met. Further investigation of the Schroth method in conjunction with traditional bracing options, more participants, and longer periods of participant check ins need to be conducted. Future research should try to eliminate these limitations in order to see if the Schroth method has a positive effect of the participants scoliotic curve pre, during, and post-bracing.

**Evidence Table**

	Sanja Schreiber, 2015 <sup>4</sup>	Kenny Yat Hong Kwan, 2017 <sup>2</sup>	Tugba Kuru, 2015 <sup>1</sup>
<b>Population</b>	50 adolescents with idiopathic scoliosis between 10-18 years old. Treated or not with brace (17 males and 17 females braced). Curves between 10 -45°. Risser Sign 0-5. Cannot have had surgery, planning to have surgery, or previously weaned from brace.	24 participants: 5 male and 19 females. 10-15 years old. Risser scale 0-2. Cobb angle 25° to 40°. Exclusion other comorbidities.	45 patients with adolescent idiopathic scoliosis. 10-18 years old. 39 females and 6 males. Cobb angle 10°-60°. Riser sign 0-3. Under no other treatment that could affect scoliosis.
<b>Study Design</b>	Randomized Control Trial	Prospective, historical cohort matched study	Randomized Control Study
<b>Intervention</b>	Supervised Schroth intervention (5 1hr group classes and 30-45 min at home program) combined with traditional scoliotic care (observation or bracing).	All patients received rigid underarm orthosis to be worn 18 hours a day. Schroth intervention 8-week outpatient program.	Two interventions: 1. Schroth exercises in clinic 2. Schroth exercises at home
<b>Comparison</b>	Traditional scoliotic care (observation or bracing)	Patients who received traditional scoliotic care of underarm spinal bracing.	Curve under observation.
<b>Methodology</b>	Intervention was 6 months supervised Schroth exercise intervention. Patients given all the information about their curve, what exercises are best for them, level of passive support involved, static or dynamic challenge, dosages recommended, etc. Schroth curve type classification algorithm standardized. Patients also received bracing. Compliance monitored through exercise logbooks, verified by parents and therapist.	Schroth intervention 8-week outpatient program with 4 private training sessions every two weeks. A home exercise program was given to them and patients would return every two months for follow up sessions. Compliance monitored by caregivers and therapists. Compliance defined as >80% attendance of therapy and completion of home therapy at least 5/7 weeks. Age, gender, skeletal maturity, and curve magnitude were matched with the intervention group.	Participant x-rayed anteroposterior. Determined Cobb angle and Risser sign. Trunk rotation, rib hump, and waist asymmetry assessed. Treatment last six weeks (18 sessions) as outpatient or home program. Clinic setting with therapist 3 days/week for 1.5 hr. After six weeks would continue treatments at home. Compliance checked by therapists/parents. Check in every six weeks for six months.

<b>Outcome Measures</b>	<p>Outcome measures were taken at baseline, 3 mo., and 6 mo.</p> <ul style="list-style-type: none"> <li>- Biering-Sorensen to test the isometric endurance of the trunk extensor muscles.</li> <li>- SRS-22r questionnaire assesses function, pain, self-image, mental health, and satisfaction of care.</li> <li>- SAQ measures the patients perception of their deformity.</li> <li>- Self-efficacy questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>- Cobb angles were taken for all major structural curves.</li> <li>- X-rays taken posterior to anterior.</li> <li>- Bunnell scoliometer used to measure the angle of trunk rotation during forward flexion test (rib hump).</li> <li>- SRS-22 questionnaire assess pain, self-image, mental health, and satisfaction of care. 1-5, 5 is the best.</li> </ul>	<ul style="list-style-type: none"> <li>- Scoliosis Research Society-23 (SRS-23) questionnaire assess the health-related quality of life specific to scoliosis.</li> <li>- Baseline Cobb angle was compared to 24<sup>th</sup> week Cobb angle using Wilcoxon signed rank test.</li> <li>- Differences amongst the groups analyzed with Kruskal Wallis test.</li> </ul>
<b>Key Findings</b>	<p>Schroth exercises added to standard scoliotic care improved pain scores and back muscle endurance after 3 months of care. Self-image scores improved after 6 months of intervention. Schroth did not have a significant effect on other outcomes. High compliance rate of 80%.</p>	<p>Changes in experimental ATR were not significant. Significant results were found in the function domain for experimental group. 76.9% of patients who were compliant to the exercises had good bracing compliance and 63.6% for those who were non-complaint with exercises had good bracing. Compliance associated with improved truncal shift.</p>	<p>Statistically significant differences in the comparison of angle trunk rotation, waist asymmetry, SRS-23 score, and Cobb angle between the intervention and control groups. The exercise group showed decrease of trunk rotation and rib hump.</p>
<b>Study Limitations</b>	<p>6 months is not a long period of time for an adolescent with scoliosis. Checking in with the patient's years after they started their Schroth and traditional methods would be good to validate that the exercises positively impacted the patients. This study also did not consider whether or not the scoliotic curve was actually improved.</p>	<p>One limitation of this study is that the historical group had already completed their treatment, whereas, the experimental group had a "minimum of 12 months of follow up." Compliance was also a big issue for this study. The participants that were compliant did show an improvement in their Cobb angles as well as angle truncal rotation.</p>	<p>One limitation of the study is that it does not mention the compliance of the participants. In the beginning they discuss how compliance would be measured but did not report on the results. The check in time with the participants is quite short. 6 months is not long enough to make a definitive determination in whether or not the treatment is working.</p>

## References

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