

RECENT EVIDENCE FOR THE EFFECTIVENESS of PHYSIOTHERAPEUTIC SCOLIOSIS SPECIFIC EXERCISES in SCOLIOSIS TREATMENT

Ari Sudarsono, Ftr, M.Fis

Physiotherapist

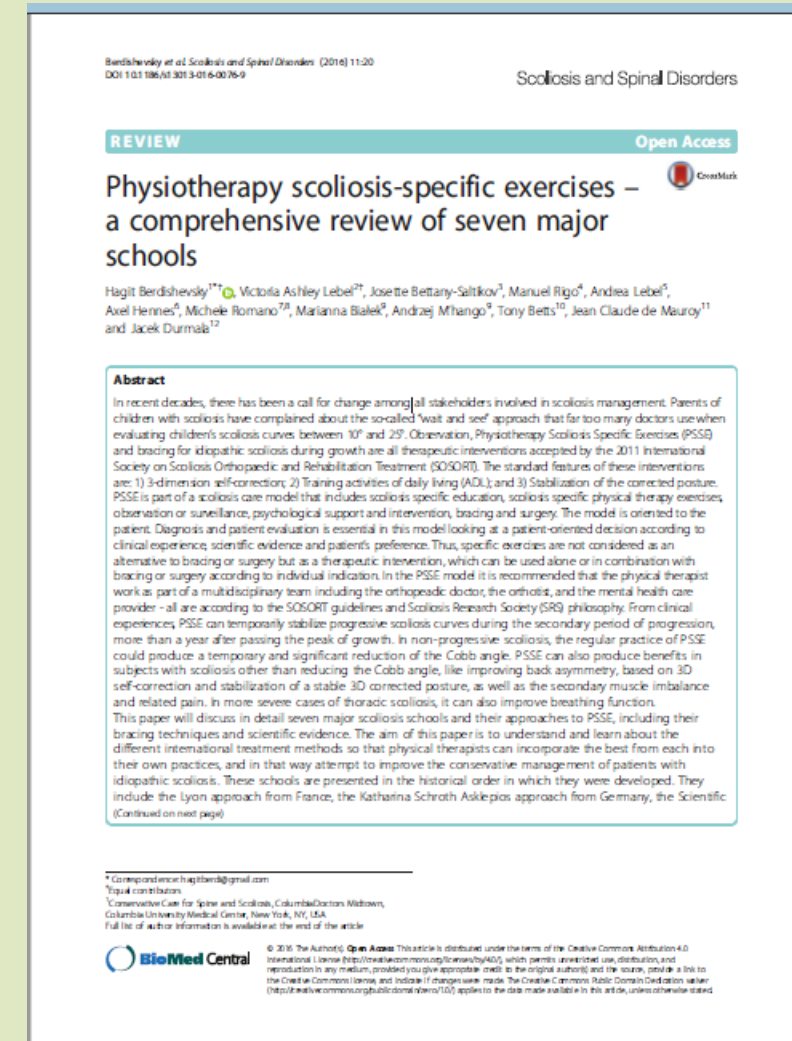
Master in Sports Physiology

Marpe Sling Therapy Int'l Instructor

Certified Schroth Therapist (ISST)

Physiotherapeutic Scoliosis Specific Exercises (PSSE)

- Internationally recognized term, used to differentiate the Scoliosis Specific with the Unspecific or General Exercises
- Individualized program, designed after clinical classification and radiological evaluation of the curvature type (**curve pattern specific exercises**)
- Based on 3D auto-correction, self-elongation and ADL training**
- Many different Schools:
 - Schroth method (Germany – Spain)
 - SEAS method (Italy)
 - FITS method (Poland)
 - Side-Shift method (United Kingdom)
 - Lyon method (France)
 - Dobomed method (Poland)



Physiotherapeutic Scoliosis Specific Exercises (PSSE)

- ▮ PSSE is a part of a scoliosis care model, which also includes Observation, Bracing and Surgery
- ▮ **PSSE are not offered as an alternative of bracing or surgery**
- ▮ Supplementary to bracing, when brace is indicated
- ▮ **PSSE don't expect to prevent progression during the riskiest period of growth (peak of growth) in an otherwise progressive scoliosis with potential to go over 45°**
- ▮ Avoid Undertreatment of scoliosis by physiotherapists, creating false expectations, poor treatment results
- ▮ Avoid Overtreatment of scoliosis by physiotherapists, any kind of treatment in a non-progressive scoliosis is a success
- ▮ A multidisciplinary team (MD, Orthotist, Specialized Physiotherapist) is needed to treat scoliosis (SRS-SOSORT guidelines)

Physiotherapeutic Scoliosis Specific Exercises (PSSE)

- The first step to treat idiopathic scoliosis to prevent progression
- The PSSE programs are designed only by Certified Physiotherapists
- Schroth method is the most established and evidence-based of the PSSE



Aims of PSSE

- ▮ Prevent progression
- ▮ Reduce the deformity (sometimes even improvement of Cobb angle and ATR can be achieved)
- ▮ Improve Quality of Life
- ▮ Aesthetics improvement
- ▮ Pain reduction
- ▮ Improvement of Vital Capacity and chest expansion
- ▮ Training for ADL activities



Schroth Best Practice



Highly corrective exercises, looking for overcorrection dependent on the curvature type

Schroth Best Practice



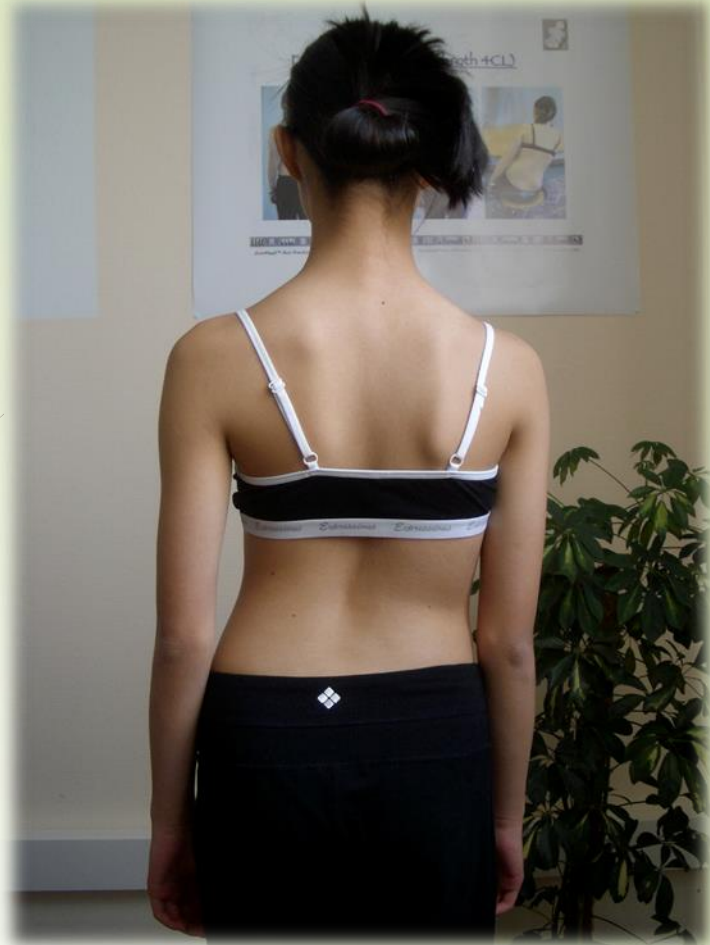
Activities of Daily Living (ADL) training in standing and sitting positions according to curve pattern

Schroth Best Practice



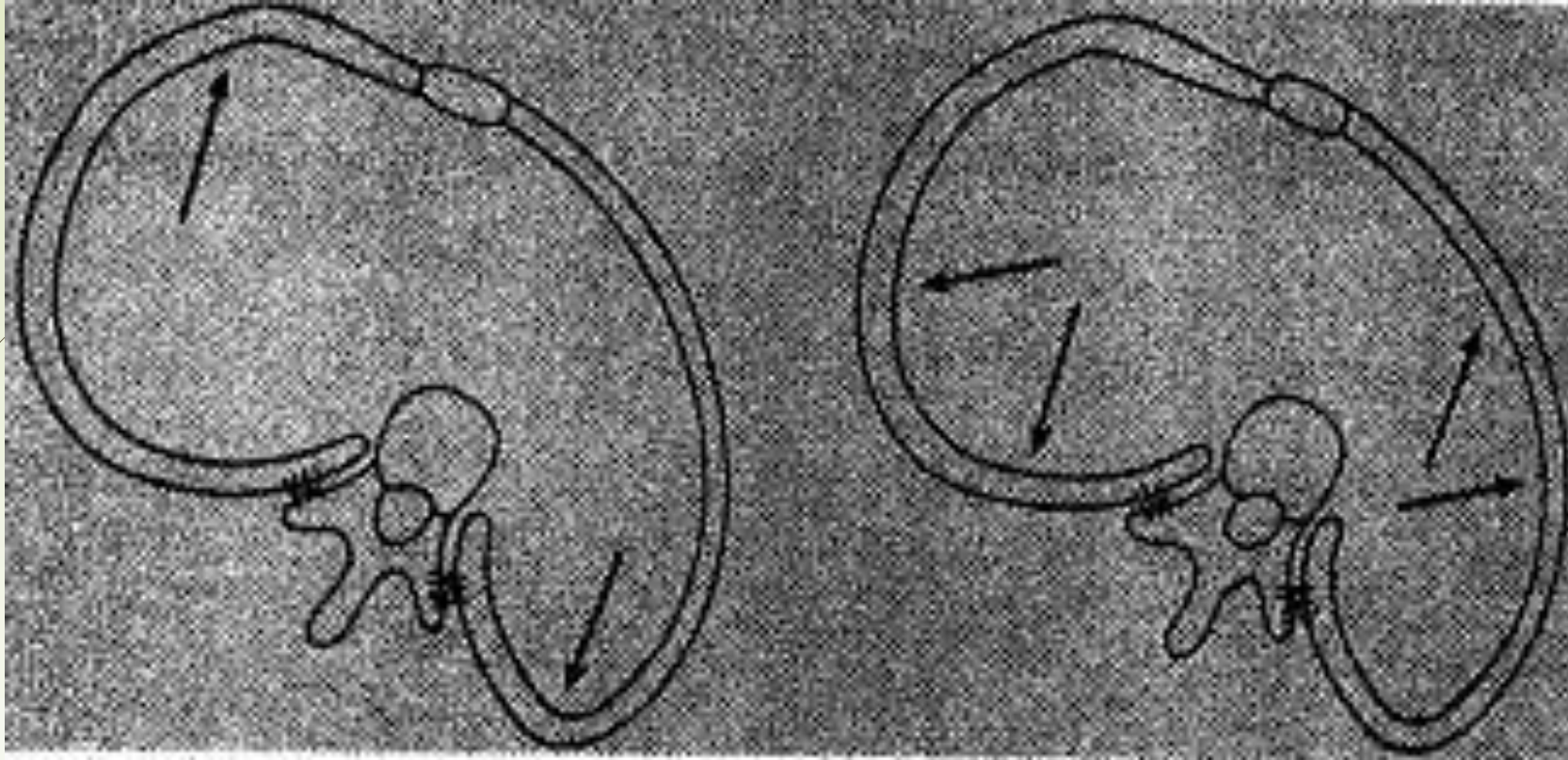
Truly 3-dimensional exercises, sagittal plane correction during Schroth exercises

Schroth Best Practice



Truly 3-dimensional exercises, sagittal plane correction during Schroth exercises

Schroth method



Rotational Angular Breathing (RAB) creates forces to derotate the vertebrae and the rib cage. Expand the collapsed areas during inhalation, stabilize the correction/expansion during exhalation

Schroth method

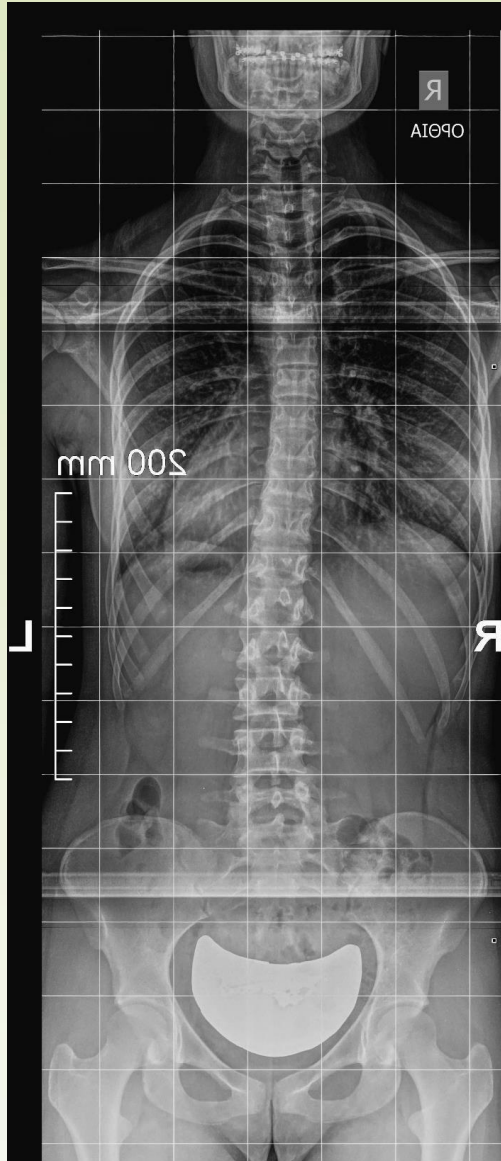


Schroth method for adult scoliosis. Main aims are pain reduction, aesthetics and quality of life improvement

Case study 1 – Schroth method



25°
pre-ex



10°
7 months post-ex



pre-ex



7 months post-ex

Case study 1 – Schroth method



pre-ex



7 months post-ex



pre-ex



7 months post-ex

Case study 2 – Schroth method



29°
pre-ex



24°
6 months post-ex

Case study 2 – Schroth method



pre-ex



6 months post-ex

Case study 2 – Schroth method

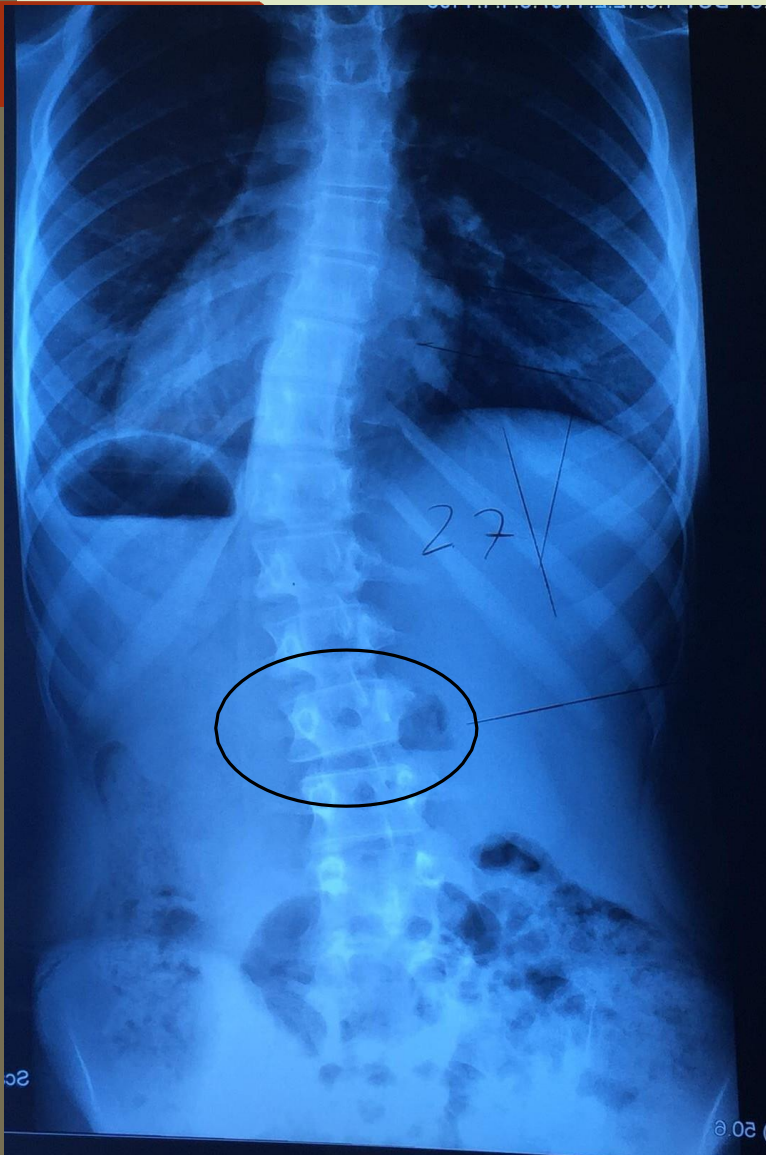


pre-ex

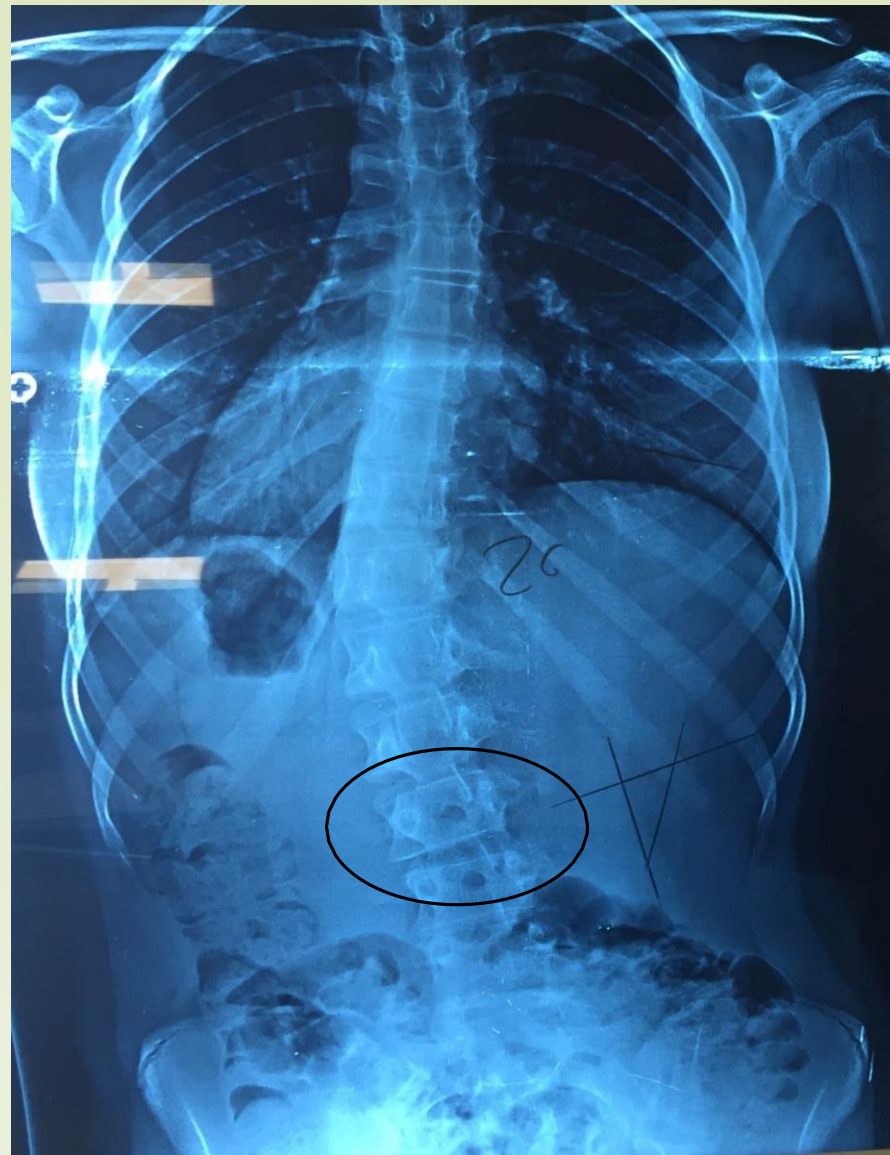


6 months post-ex

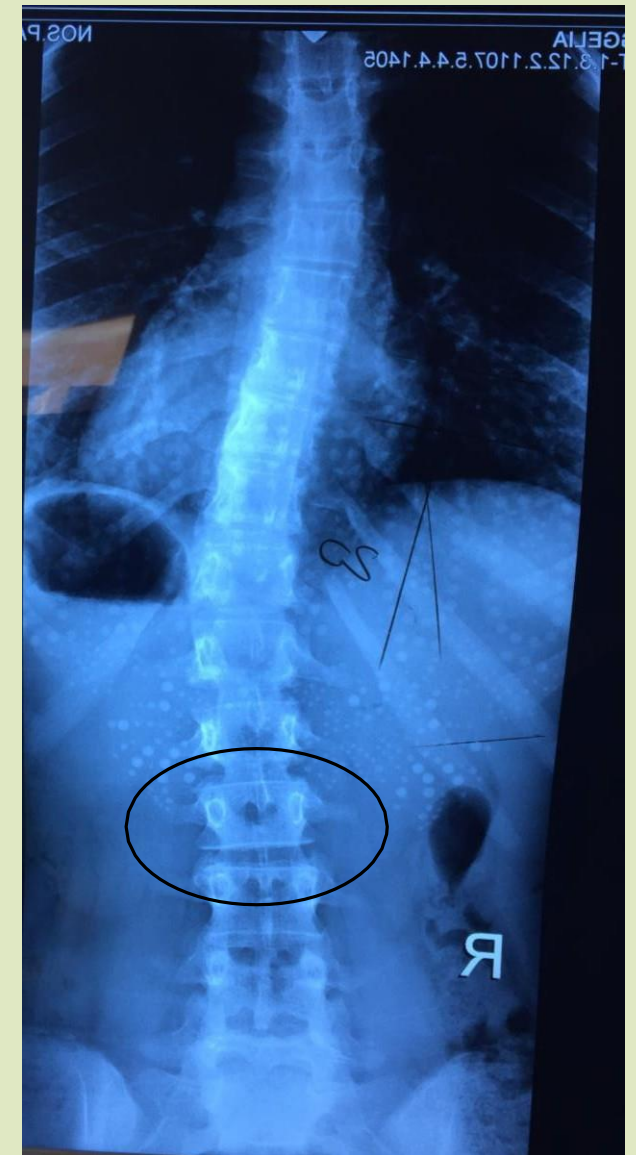
Case study 3 – Schroth method



27°
13/10/2015



30°
07/03/2016



20°
06/10/2016

Case study 3 – Schroth method



03/2016



10/2016



03/2016



10/2016

PSSE indications

Sole treatment

Adolescents with Cobb angle $< 20^\circ$, Risser 0-3

Adolescents with Cobb angle 20° - 29° , Risk of progression 40-60%

(Lonstein formula)

Adolescents with Cobb angle $< 35^\circ$, Risser 4-5

Adults with painful scoliosis

People refused surgery

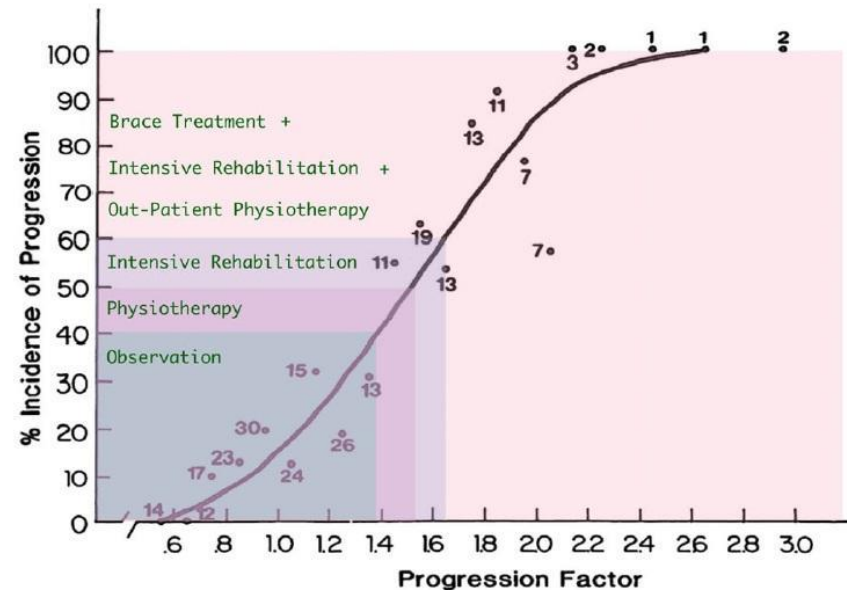
Combined treatment

Brace indication (adolescents with Cobb angle 25° – 40° , Risser 0-3)

After spinal fusion

Cobb Angle - (3 x Risser sign)

Chronological age



Literature review

1 Systematic Review with meta-analysis

(Level of Evidence I)

4 Randomized Controlled Trials (RCT)

(Level of Evidence I)

8 Systematic Reviews

(Level of Evidence II)

10 Prospective studies

(Level of Evidence II)

Many Retrospective studies and Case reports

(Level of Evidence III and IV)

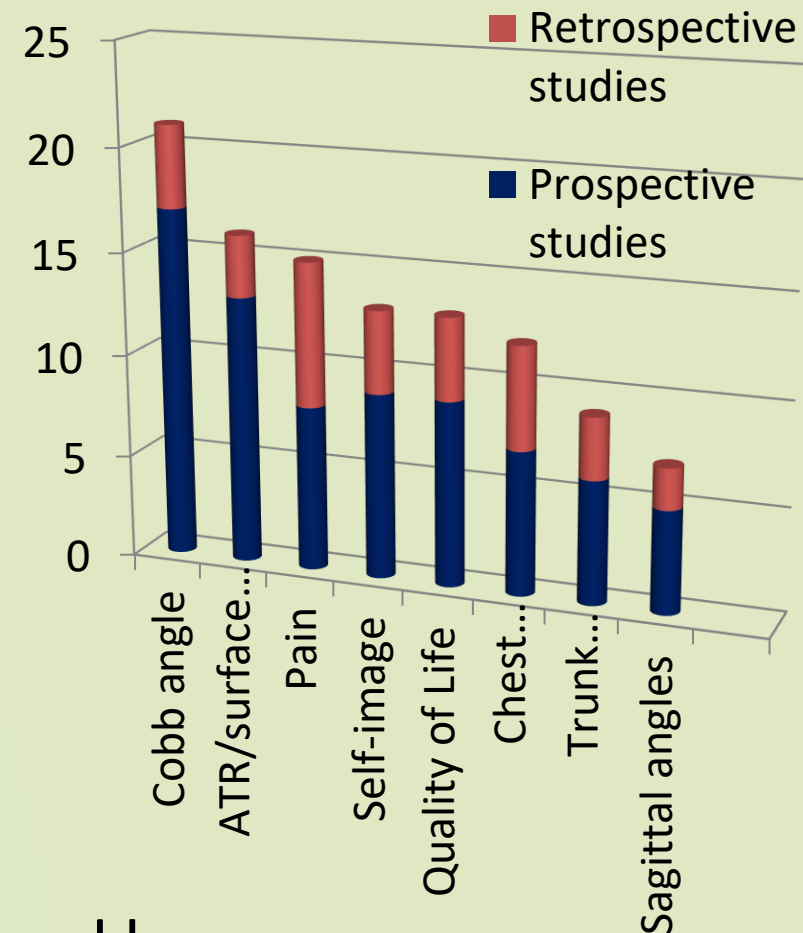


Scientific evidence

All the studies presented some kind of effectiveness of the PSSE in scoliosis treatment

The majority of the results showed improved of Cobb angle, ATR, pain, self-image, QoL, VC

- 3 Systematic Reviews (2012) found low quality of evidence for the use of PSSE in scoliosis treatment



Is there a body of evidence for the PSSE?

- **Cochrane Review** (Romano et al 2012)
Some evidence for PSSE, mostly based on a RCT (Wan et al 2005) with many limitations. Lack of good quality studies.
- **Systematic Review** (Weiss 2012)
No safe conclusions about PSSE, due to inadequate inclusion criteria in most studies
- **Systematic Review** (Mordecai and Dabke 2012)
Previous Systematic Reviews showed some effectiveness of PSSE, but based on poor methodological quality researches

RCT – Monticone et al (2014)

European Spine Journal, (2014) 23:1204–1214

110 subjects, 2 groups (1st PSSE, 2nd general exercise), identical baseline characteristics, 12 months follow-up
Inclusion criteria: Cobb 10°-25°, Risser 0-1, Age > 10 years (SRS criteria)

Results

-Cobb angle: **PSSE** Improvement 69%, Progression 8%, Stable 23%

Control group Improvement 6%, Progression 39%, Stable 55%

- ATR: **PSSE** Improvement by 3.5° , **Control group** stable

-SRS-22 (QoL) : **PSSE** improvement > 0.75 all domains (pain, function, self-image, mental health), **Control group** no significant changes

Conclusions: PSSE can reduce the risk of progression in mild scoliosis (<25°) and have significantly better results than general exercises

Eur Spine J
DOI 10.1007/s00586-014-3248-y

ORIGINAL ARTICLE

Active self-correction and task-oriented exercises reduce spinal deformity and improve quality of life in subjects with mild adolescent idiopathic scoliosis. Results of a randomised controlled trial

Marcio Monticone · Emilia Ambrosini ·
Daniele Cazzaniga · Barbara Rocca ·
Simona Ferrante

Received: 6 September 2013 / Revised: 10 February 2014 / Accepted: 11 February 2014
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Abstract

Purpose: To evaluate the effect of a programme of active self-correction and task-oriented exercises on spinal deformities and health-related quality of life (HRQL) in patients with mild adolescent idiopathic scoliosis (AIS) (Cobb angle <25°).
Methods: This was a parallel-group, randomised, superiority-controlled study in which 110 patients were randomly assigned to a rehabilitation programme consisting of active self-correction, task-oriented spinal exercises and relaxation (experimental group, 55 subjects) or traditional spinal exercises (control group, 55 subjects). Before treatment, at the end of treatment (analysis at skeletal maturity), and 12 months later (follow-up), all of the patients underwent radiological deformity (Cobb angle), surface deformity (angle of trunk rotation) and HRQL evaluations (SRS-22 questionnaire). A linear mixed model for repeated measures was used for each outcome measure.

Results: There were main effects of time ($p < 0.001$), group ($p < 0.001$) and time by group interaction ($p < 0.001$) on radiological deformity: training in the experimental group led to a significant improvement (decrease in Cobb angle of >5°), whereas the control group remained stable. Analysis of all of the secondary outcome

measures revealed significant effects of time, group and time by group interaction in favour of the experimental group.

Conclusions: The programme of active self-correction and task-oriented exercises was superior to traditional exercises in reducing spinal deformities and enhancing the HRQL in patients with mild AIS. The effects lasted for at least 1 year after the intervention ended.

Keywords: Adolescent idiopathic scoliosis · Rehabilitation · Self-correction · Task-oriented exercises · Education

Introduction

Adolescent idiopathic scoliosis (AIS) has been defined as a three-dimensional deformity of the spine and trunk occurring in healthy pubertal children [1]. Although its precise aetiology remains unknown, the main causes seem to be genetic predisposition, connective tissue abnormalities, and skeletal, muscular and neurological disturbances during growth [2]. The prevalence of AIS with a Cobb angle of >10° is approximately 2.5 % in the general population [1, 2].

The risk of the curve progression is higher in the case of females and children aged 10–12 years, in the absence of menarche, in the presence of thoracic curves; with curves site at presentation of more than 25°; Risser sign 0–1; and residual growth potential [3–4]. Cobb angles at presentation of >25° when combined with female gender, an age of <12 years, and pre-pubertal status present the highest risk for curve progression at skeletal maturity, while Cobb angles at presentation of <25° have lower risks for curve progression, especially when combined with male gender,

M. Monticone (✉) · E. Ambrosini · D. Cazzaniga · B. Rocca
Physical Medicine and Rehabilitation Unit, Scientific Institute of
Lisone, Salvatore Maugeri Foundation, Institute of Care and
Research, IRCCS, Via Montegiofè 15, Lisone,
20135 Milan, Italy
e-mail: marcio.monticone@hsz.it

E. Ambrosini · S. Ferrante
Department of Electronics, Information and Biomechanics,
Nanomechanics and Medical Robotics Laboratory, Politecnico
di Milano, piazza Leonardo da Vinci, 32, 20133 Milan, MI, Italy

RCT – Kuru et al 2015

45 patients, 3 groups (1st supervised Schroth, 2nd home Schroth, 3rd observation), identical baseline characteristics, 6 months follow-up

Inclusion criteria: 10-18 years, Cobb 10° – 60° (mean 30°), Risser 0-3

Results:

Schroth supervised significant improvement in Cobb angle by 2.5° (p=0.005), ATR by 4.2° (p=0.001), hump height by 68.66 mm and waist asymmetry
Control group no improvement in any parameter

Conclusions: Schroth method seems to be effective in scoliosis treatment, at least better than observation

RCT – Schreiber et al (2015)

Scoliosis and Spinal Disorders, 2015,10:24

- ▮ Schroth method added to standard care (observation or brace)
- ▮ 50 patients, 2 groups (1st standard care + Schroth, 2nd standard care- control), identical baseline characteristics, 6 months period
- ▮ Inclusion criteria: 10-18 years, Cobb 10°-45°, Risser 0-2
- ▮ **Results:**
 - Schroth group Improvement of muscle endurance and ability to keep an upright posture by 27.5 sec more than control
 - Schroth group significant improvement of pain and self-image on SRS-22 questionnaire
- ▮ **Conclusions: Adding Schroth method to standard care offers significantly better results than standard care alone**

Scoliosis, 2015 Sep 18;10:24. doi: 10.1186/s13013-015-0048-5. eCollection 2015.

The effect of Schroth exercises added to the standard of care on the quality of life and muscle endurance in adolescents with idiopathic scoliosis-an assessor and statistician blinded randomized controlled trial: "SOSORT 2015 Award Winner".

Schreiber S¹, Parent EC¹, Moez EK¹, Hedden DM², Hill D², Moreau MJ², Lou E², Watkins EM², Southon SC².

Author information

Abstract

BACKGROUND: In North America, care recommendations for adolescents with small idiopathic scoliosis (AIS) curves include observation or bracing. Schroth scoliosis-specific exercises have demonstrated promising results on various outcomes in uncontrolled studies. This randomized controlled trial (RCT) aimed to determine the effect of Schroth exercises combined with the standard of care on quality-of-life (QOL) outcomes and back muscle endurance (BME) compared to standard of care alone in patients with AIS.

MATERIAL AND METHODS: Fifty patients with AIS, aged 10-18 years, with curves 10-45°, recruited from a scoliosis clinic were randomized to receive standard of care or supervised Schroth exercises plus standard of care for 6 months. Schroth exercises were taught over five sessions in the first two weeks. A daily home program was adjusted during weekly supervised sessions. The assessor and the statistician were blinded. Outcomes included the Biering-Sorensen (BME) test, Scoliosis Research Society (SRS-22r) and Spinal Appearance Questionnaires (SAQ) scores. Intention-to-treat (ITT) and per protocol (PP) linear mixed effects models were analyzed. Because ITT and PP analyses produced similar results, only ITT is reported.

RESULTS: After 3 months, BME in the Schroth group improved by 32.3 s, and in the control by 4.8 s. This 27.5 s difference in change between groups was statically significant (95 % CI 1.1 to 53.8 s, p = 0.04). From 3 to 6 months, the self-image improved in the Schroth group by 0.13 and deteriorated in the control by 0.17 (0.3, 95 % CI 0.01 to 0.59, p = 0.049). A difference between groups for the change in the SRS-22r pain score transformed to its power of four was observed from 3 to 6 months (85.3, 95 % CI 8.1 to 162.5, p = 0.03), where (SRS-22 pain score)⁴ increased by 65.3 in the Schroth and decreased by 20.0 in the control group. Covariates: age, self-efficacy, brace-wear, Schroth classification, and height had significant main effects on some outcomes. Baseline ceiling effects were high: SRS-22r (pain = 18.4 %, function = 28.6 %), and SAQ (prominence = 26.5 %, waist = 29.2 %, chest = 46.9 %, trunk shift = 12.2 % and shoulders = 18.4 %).

CONCLUSIONS: Supervised Schroth exercises provided added benefit to the standard of care by improving SRS-22r pain, self-image scores and BME. Given the high prevalence of ceiling effects on SRS-22r and SAQ questionnaires' domains, we hypothesize that in the AIS population receiving conservative treatments, different QOL questionnaires with adequate responsiveness are needed.

TRIAL REGISTRATION: Schroth Exercise Trial for Scoliosis NCT01610908.

KEYWORDS: Adolescent idiopathic scoliosis; Muscle endurance; Quality of life; Randomized controlled trial; Schroth exercises

PMID: 26413145 [PubMed] PMCID: PMC4582716 Free PMC Article

SR Meta-analysis – Anwer et al (2015)

BioMed Research International Volume 2015, Article ID 123848

- The most recent SR, including the latest RCT's on PSSE
- Literature review: Pubmed, CINAHL, Embase, Scopus, Cochrane Register of Controlled Trials, PEDro, Web of Science
- Outcomes evaluated: Cobb angle, ATR, QoL
- 30 studies, 9 fulfilled the inclusion criteria, 6 had high methodological quality on PEDro scale, 3 RCT's
- Meta-analysis revealed moderate-quality evidence that PSSE can reduce Cobb angle and ATR and improve QoL in scoliotic patients
- **Conclusions: Now there is scientific evidence that PSSE are effective in scoliosis treatment and superior than general exercises**

Journal List > Biomed Res Int > v.2015; 2015 > PMC4637024

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Biomed Res Int. 2015; 2015: 123848. PMCID: PMC4637024
Published online 2015 Oct 25. doi: [10.1155/2015/123848](https://doi.org/10.1155/2015/123848)

Effects of Exercise on Spinal Deformities and Quality of Life in Patients with Adolescent Idiopathic Scoliosis

Shahnawaz Anwer,^{1, 2, *} Ahmad Alghadir,¹ Md. Abu Shaphe,³ and Dilshad Anwar⁴

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Abstract Go to: 

Objectives. This systematic review was conducted to examine the effects of exercise on spinal deformities and quality of life in patients with adolescent idiopathic scoliosis (AIS). *Data Sources.* Electronic databases, including PubMed, CINAHL, Embase, Scopus, Cochrane Register of Controlled Trials, PEDro, and Web of Science, were searched for research articles published from the earliest available dates up to May 31, 2015, using the key words "exercise," "postural correction," "posture," "postural curve," "Cobb's angle," "quality of life," and "spinal deformities," combined with the Medical Subject Heading "scoliosis." *Study Selection.* This systematic review was restricted to randomized and nonrandomized controlled trials on AIS published in English language. The quality of selected studies was assessed by the PEDro scale, the Cochrane Collaboration's tool, and the Grading of Recommendations Assessment, Development, and Evaluation System (GRADE). *Data Extraction.* Descriptive data were collected from each study. The outcome measures of interest were Cobb angle, trunk rotation, thoracic kyphosis, lumbar kyphosis, vertebral rotation, and quality of life. *Data Synthesis.* A total of 30 studies were assessed for eligibility. Six of the 9 selected studies reached high methodological quality on the PEDro scale. Meta-analysis revealed moderate-quality evidence that exercise interventions reduce the Cobb angle, angle of trunk rotation, thoracic kyphosis, and lumbar lordosis and low-quality evidence that exercise interventions reduce average lateral deviation. Meta-analysis revealed moderate-quality evidence that exercise interventions improve the quality of life. *Conclusions.* A supervised exercise program was superior to controls in reducing spinal deformities and improving the quality of life in patients with AIS.

Systematic review with meta-analysis (Anwer et al 2015)

The most recent SR, including the latest RCT's on PSSE
Literature review: Pubmed, CINAHL, Embase, Scopus,
Cochrane Register of Controlled Trials, PEDro, Web of
Science

Outcomes evaluated: Cobb angle, ATR, QoL
30 studies, 9 fulfilled the inclusion criteria, 6 had high
methodological quality on PEDro scale, 3 RCT's
Meta-analysis revealed moderate-quality evidence that
PSSE can reduce Cobb angle and ATR and improve QoL
in scoliotic patients

Conclusions: Now there is scientific evidence that
PSSE are effective in scoliosis treatment and superior
than general exercises

SRS statement on PSSE (May 2014)



A combination of brace and PSSE seems to provide better results in scoliosis treatment

There is scientific evidence that PSSE are superior than general or no exercises

SRS actively supports studies with PSSE for scoliosis treatment

SRS and SOSORT consensus research guidelines

SOSORT guidelines (2011)

Society on Scoliosis Orthopedic and Rehabilitation Treatment (SOSORT)

- ❑ PSSE are the first step to treat scoliosis and prevent progression or bracing
- ❑ Brace treatment must always be accompanied by PSSE
- ❑ A multi-professional therapeutic team, consisted of MD, CPO and PT, is recommended to achieve the best treatment result
- ❑ PSSE programs are designed only by Certified Physiotherapists

Negrini et al. *Scoliosis* 2012, 7:3
<http://www.scoliosisjournal.com/content/7/1/3>



METHODOLOGY

Open Access

2011 SOSORT guidelines: Orthopaedic and Rehabilitation treatment of idiopathic scoliosis during growth

Stefano Negrini^{1,2,3*}, Angelo G Aulisa⁴, Lorenzo Aulisa⁵, Alin B Circo⁶, Jean Claude de Mauroy⁷, Jacek Durlama⁸, Theodoros B Grivas⁹, Patrick Knott¹⁰, Tomasz Kotwicki¹¹, Toru Maruyama¹², Silvia Minozzi¹³, Joseph P O'Brien¹⁴, Dimitris Papadopoulos¹⁵, Manuel Rigo¹⁶, Charles H Rivard⁶, Michele Romano³, James H Wynne¹⁷, Monica Villagrasa¹⁶, Hans-Rudolf Weiss¹⁸ and Fabio Zaina³

Abstract

Background: The International Scientific Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT), that produced its first Guidelines in 2005, felt the need to revise them and increase their scientific quality. The aim is to offer to all professionals and their patients an evidence-based updated review of the actual evidence on conservative treatment of idiopathic scoliosis (CTIS).

Methods: All types of professionals (specialty physicians, and allied health professionals) engaged in CTIS have been involved together with a methodologist and a patient representative. A review of all the relevant literature and of the existing Guidelines have been performed. Documents, recommendations, and practical approach flow charts have been developed according to a Delphi procedure. A methodological and practical review has been made, and a final Consensus Session was held during the 2011 Barcelona SOSORT Meeting.

Results: The contents of the document are: methodology; generalities on idiopathic scoliosis; approach to CTIS in different patients, with practical flow-charts; literature review and recommendations on assessment, bracing, physiotherapy, Physiotherapeutic Specific Exercises (PSE) and other CTIS. Sixty-five recommendations have been given, divided in the following topics: Bracing (20 recommendations), PSE to prevent scoliosis progression during growth (8), PSE during brace treatment and surgical therapy (5), Other conservative treatments (3), Respiratory function and exercises (3), Sports activities (6), Assessment (20). No recommendations reached a Strength of Evidence level I; 2 were level II; 7 level III; and 20 level IV; through the Consensus procedure 26 reached level V and 10 level VI. The Strength of Recommendations was Grade A for 13, B for 49 and C for 3; none had grade D.

Conclusion: These Guidelines have been a big effort of SOSORT to paint the actual situation of CTIS, starting from the evidence, and filling all the gray areas using a scientific method. According to results, it is possible to understand the lack of research in general on CTIS. SOSORT invites researchers to join, and clinicians to develop good research strategies to allow in the future to support or refute these recommendations according to new and stronger evidence.

SRS Official Statement on PSSE (2014)

Scoliosis Research Society

- ▮ A combination of brace and PSSE seems to provide better results in scoliosis treatment
- ▮ There is scientific evidence that PSSE are superior than general or no exercises
- ▮ SRS actively supports studies with PSSE for scoliosis treatment

The screenshot shows the Scoliosis Research Society (SRS) website. The header includes navigation links for Member Login, Become a Member, Find a Specialist, Calendar, Contact, and Donate. The main navigation bar features 'About SRS' with sub-links for Overview & History, Quality & Safety, Corporate Supporters, SRS Store, News & Announcements, and Contact Us. The page title is 'SRS Statement on Physiotherapy Scoliosis Specific Exercises'. The content is dated May 19, 2014, and is authored by M. Timothy Hresko, MD, Chair of the SRS Non-operative committee. The text discusses the use of Physiotherapy Scoliosis Specific Exercises (PSSE) as a supplemental treatment to orthotic management of scoliosis, highlighting their benefits for pain relief and posture correction. It also notes that while PSSE show promise, more research is needed to fully establish their superiority over other treatments in a general population setting.

Multicenter Schroth Exercise Trial for Scoliosis (MultiSETS)

- Research funded and supported by SRS
- Randomized Control Trial (RCT)
- Purpose:
 - Compare Schroth + Standard of Care (Observation for curves $<25^{\circ}$ or Bracing for curves 25° - 45°) with Standard of Care alone
 - Determine effectiveness of Schroth method
- Results expected to be announced in January 2017

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Multicenter Schroth Exercise Trial for Scoliosis (MultiSETS)

This study is currently recruiting participants. (see [Contacts and Locations](#))

Verified May 2015 by University of Alberta

Sponsor:

University of Alberta

Collaborators:

Glenrose Rehabilitation Hospital Foundation

Scoliosis Research Society

SickKids Foundation CIHR Institute of Human Development, Child and Youth Health

Information provided by (Responsible Party):

University of Alberta

Scoliosis Specific Exercises for At-Risk AIS curves

- ▮ Research funded and supported by SRS
- ▮ Randomized Control Trial (RCT)
- ▮ Purpose:
 - Compare the treatment result of a PSSE group and a control group (observation) for curves below 25°
 - Research started June 2016

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Trial re
◀ Previous Study

Scoliosis-Specific Exercises for At-Risk AIS Curves (EX)

This study is enrolling participants by invitation only.

Sponsor:
Texas Scottish Rite Hospital for Children

Collaborators:
Scoliosis Research Society
Boston Children's Hospital
Columbia University
Norton Leatherman Spine Center
Johns Hopkins University
Texas Children's Hospital

Information provided by (Responsible Party):
Texas Scottish Rite Hospital for Children

ClinicalTrials.gov Identifier:
NCT02807545

First received: June 10, 2016
Last updated: June 16, 2016
Last verified: June 2016
[History of Changes](#)

Position Statement AAOS, SRS, POSNA, AAP for Adolescent Idiopathic Scoliosis (2015)

- *Scoliosis Research Society (SRS)*
- *Pediatric Orthopedic Society of North America (POSNA)*
- *American Academy of Orthopedic Surgeons (AAOS)*
- *American Academy of Pediatrics (AAP)*
- **“AAOS, SRS, POSNA and AAP believe that recent high quality studies demonstrate that non-operative interventions such as bracing and scoliosis specific exercises can decrease the likelihood of curve progression to the point of requiring surgical treatment.”**

The screenshot displays the Scoliosis Research Society (SRS) website. At the top, there is a navigation bar with links for 'Member Login', 'Become a Member', 'Find a Specialist', 'Calendar', 'Contact', and 'Donate'. The SRS logo and name are prominently featured, along with the tagline 'Dedicated to the optimal care of patients with spinal deformity'. Below this, a 'About SRS' section is visible, with a sub-menu for 'News & Announcements'. The main content area shows the title of the position statement: 'Position Statement - Screening for the Early Detection for Idiopathic Scoliosis in Adolescents'. The authors listed are M. Timothy Hresko, MD; Vishwas R. Talwalkar, MD; and Richard M. Schwend, MD. The date is 9/2/2015 v2. The text of the statement begins with 'The Scoliosis Research Society (SRS), American Academy of Orthopedic Surgeons (AAOS), Pediatric Orthopedic Society of North America (POSNA) and American Academy of Pediatrics (AAP) believe that there has been additional useful research in the early detection and management of adolescent idiopathic scoliosis (AIS) since the review performed by the United States Preventive Services Task Force (USPSTF) in 2004. This information should be available for use by patients, treating health care providers, and policy makers in assessing the relative risks and benefits of the early identification and management of AIS.' An 'Introduction' section follows, defining scoliosis as a three-dimensional spine deformity and discussing its prevalence and genetic factors.

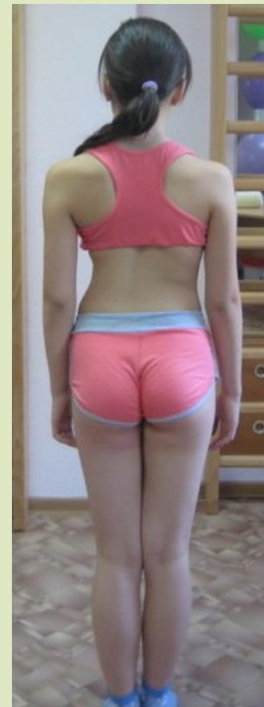
Conclusions

- ▮ **High quality evidence for the effectiveness of PSSE (Level of Evidence I)**
- ▮ According to the existed literature and the International Scientific Societies guidelines, PSSE must be the first step to treat AIS for curves $<25^\circ$ in order to halt the progression, and PSSE must always accompany bracing, when brace treatment is indicated
- ▮ The important role of PSSE is recognized by all the International Scientific Societies (SRS, SOSORT, POSNA, AAOS, AAP)
- ▮ PSSE are superior than general or no exercises, the program of PSSE is designed only by certified Physiotherapists

Conclusions

There is clear scientific evidence for the effectiveness of PSSE in scoliosis treatment

PSSE can be served as a sole treatment for mild scoliosis in adolescents and for adult scoliosis, while the combination with bracing during growth spurt seems to provide better results Both Scientific Societies, SRS and SOSORT, support the role of PSSE in scoliosis treatment and their superiority from general exercises Future studies must use SRS inclusion criteria and robust methodological quality to ensure repeatability and generalization of the results



TERIMA KASIH

