PHYSIOTHERAPEUTIC SCOLIOSIS SPECIFIC EXERCISES (PSSE): RECENT EVIDENCE FOR THEIR EFFECTIVENESS IN SCOLIOSIS TREATMENT AND THE POSITION OF THE INTERNATIONAL SCIENTIFIC SOCIETIES, AN UPDATED REVIEW

Nikos Karavidas, MSc, PT
Certified Schroth (BSPTS) Therapist
Certified Schroth Best Practice Therapist
Certified SEAS Therapist
Certified McKenzie Therapist
MSc Sports Physiotherapy, Cardiff University
Disclosures

- I have nothing to disclose.
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)
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
PSSE indications (SRS – SOSORT guidelines)

Exclusive treatment

- Adolescents with Cobb angle < 25º, Risser 0-3
- Adolescents with Cobb angle 20º-29º, Risk of progression 40-60% (Lonstein formula)
- Adolescents with Cobb angle <35º, Risser 4-5
- Adults with painful scoliosis
- Adults of any Cobb angle /Patients refused surgery

Combined treatment

- Brace indication (adolescents with Cobb angle 25º – 40º, Risser 0-3)
- After spinal fusion (modified program)

The prediction of curve progression in untreated idiopathic scoliosis during growth.
Lonstein and Carlson, 1984
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)
Evidence for PSSE (until 2012)

- **Cochrane Review** *(Romano et al 2012)*

- **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
• 1 Systematic Review with meta-analysis (Level of Evidence I)

• 4 Randomized Controlled Trials (RCT)
  (Level of Evidence I)
  *2 RCT’s (Kuru et al 2015, Wan et al 2005) low to moderate quality of evidence

• 8 Systematic Reviews
  (Level of Evidence II)

• 10 Prospective control studies
  (Level of Evidence II)

• Many Retrospective studies and Case reports (Level of Evidence III and IV)


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**

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
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
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
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
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
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° or Bracing for curves 25°-45°) with Standard of Care alone
  - Determine effectiveness of Schroth method

- Results expected to be announced in January 2017
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

• 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.”
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° 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
Thank you for your attention

Nikos Karavidas, MSc, PT

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MSc Sports Physiotherapy, Cardiff University

Website: www.skoliosi.com