

ORAL PRESENTATION

Open Access

Test-retest standard error of measurements for full-torso surface topography parameters obtained with the arms at 30 and 90 degrees of elevation in healthy teenagers

E Watkins, Eric Parent*, M Emrani, D Hill

From 7th International Conference on Conservative Management of Spinal Deformities
Montreal, Canada. 20-22 May 2010

Introduction

The objective of this study was to report full-torso surface topography (ST) parameters and to determine test-retest standard error of measurement (SEM) in adolescents without spinal deformities. ST is used to quantify the external deformity of the torso due to scoliosis. A normative ST database is being developed to help interpret the ST parameters used to describe scoliosis. Test-retest SEM has not been estimated for most parameters in this population.

Materials and methods

Subjects

Forty-two healthy volunteers (43% females) between 10-18 years old, with a body mass index of 19.7 ± 3.1 kg/m², scoliometer measure of $3.2^\circ \pm 1.8^\circ$, and without pain were included.

Data acquisition

Four Minolta 910 Laser Scanners and a positioning frame were used to record ST scans. One evaluator positioned all subjects with arms resting at 90° of elevation, marked 15 reference points, and scanned. Immediately after, subjects were repositioned and scanning repeated. ST parameters were extracted with custom designed software in Matlab by one evaluator digitizing reference points.

ST parameters

Seven previously published parameters and 7 newly proposed measures were extracted. The total range and the range between the 10th and 90th percentile were reported for the measures extracted from 54 cross-sections of the torso.

Statistical analyses

Test-retest SEM was calculated. SEM <4mm, <5° or <0.2 for a ratio were considered adequate based on values in patients with scoliosis.

Results

Normative full-torso ST parameter means, standard deviations (SD), and the estimated test-retest SEMs are in Table 1. Fourteen parameters had adequate SEMs. Total range SEMs of the parameters extracted from cross-sections were inadequate for 5 out of the 6 measures. The SEMs for all but one new parameter were adequate.

Discussion

Test-retest error was adequate for scans with the arms at 90° of elevation. For parameters obtained from torso cross-sections, the 10-90th percentile range may reduce errors compared to the total range. The percentile range excludes extreme values due to edge, motion or breathing artifacts on the scans while still providing a representation of torso deformity. Scanning with arms in this position provides an unobstructed view of the torso and may reduce error in merging.

University of Alberta, Edmonton, Canada
Full list of author information is available at the end of the article

Conclusion

Adequate test-retest error was found for previously published and newly proposed full-torso ST parameters. For measures of cross-sections, we recommend using the 10-90th percentile range.

Published: 10 September 2010

doi:10.1186/1748-7161-5-S1-O6

Cite this article as: Watkins *et al.*: Test-retest standard error of measurements for full-torso surface topography parameters obtained with the arms at 30 and 90 degrees of elevation in healthy teenagers. *Scoliosis* 2010 **5**(Suppl 1):O6.

**Submit your next manuscript to BioMed Central
and take full advantage of:**

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

