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## Why X-rays are not reliable to assess sagittal profile: a cross sectional study.

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### Abstract

**BACKGROUND:** X-rays are the gold standard evaluation for sagittal plane deformities even if, to see the spine, it's necessary to move the arms from the resting position to a forward one. The postural impact of arm positions has never been verified. The aim of this study is to measure the effect of arm positioning on surface topography measure.

**METHODS:** Study Design: cross sectional.

**POPULATION:** 83 consecutive adolescents (50 hyperkyphosis, 33 scoliosis). Hardware: 4-D Formetric. Methods: each subject has been consecutively evaluated in normal standing, then with progressive extension of the shoulders with extended arms (45°, 90°, 135°, 180°), then with arms crossed on the chest (CROSS) and with flexion of the shoulders and elbows, with hands steady on the shoulders (REST). All sagittal parameters given by Formetric have been considered. Statistics: ANOVA for total and sub-groups. Results. The absolute differences of angles from the standing position ranged from 4.8° to 13.3° (kyphosis) and from 4.6° to 10.4° (lordosis): they were statistically significantly different with rare exceptions. The biggest differences have been found with REST and 180°; the lowest with 45°, and CROSS. Lordosis and kyphosis did not change in the same direction, nor symmetrically: while kyphosis decreased with progressive arm extension, lordosis reached a maximum increase at 90-135°; REST and CROSS did not show consistent variations of lordosis and kyphosis. Changes were not consistent in several adolescents, and did not allow to find an ideal position.

**CONCLUSION:** These results showed that arm position changes spinal posture, at least when measuring with surface topography. According to these results, it does not exist an optimal position comparable with the normal standing; moreover, it is not possible to reconstruct in individual patients what the real standing angles would be without moving the arms. Surface devices may possibly be more ecologic measurement instruments than radiographs because they allow the patient to maintain the normal position of their arms and so are more reliable.

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**MeSH Terms**

**LinkOut - more resources**