

## Abstract

This dissertation aims at verifying methodology used for somatographic evaluation of the shape and statics of the spine. The potential of the methodology verified lies in increased objectivity of upright body posture evaluation and thereby contributes to the specification of preventative measures for postural defects, and their consequences.

Under a cross-sectional pilot study, a non-invasive somatographic method—a diagnostic DPT-3 system designated for spine shape diagnostics—was used to examine selected biomechanical parameters (spinal curves and statics in the sagittal plane in the upright position) in a total of 508 probands. Of this, 326 were school-age children and 182 adults. Among the key parameters monitored were: **CI** (depth of cervical lordosis); **LI** (depth of lumbar lordosis); the sagittal balance of **CI/LI**, and **V<sub>Thk</sub>** (distance of the peak of the thoracic kyphosis from the ideal verticals-IV).

A questionnaire was used to evaluate the level of movement activity in probands and the relation between the occurrence of painful back and headaches and the measurement of biomechanical parameters and movement activity.

A total of 81.3 % of children and 94.5 % of adults were found to have deviations from the biomechanically ideal posture model, which signals a postural defect.

The values of the **CI** ( $p < 0.001$ ), the **CI/LI** index ( $p < 0.001$ ), and the position of the thoracic kyphosis **V<sub>Thk</sub>** ( $p < 0.05$ ) in children versus those for adults, differ to a statistically significant degree. However, no statistically significant changes were recorded for parameter **LI** in children compared to adults. Among the individual age categories, no statistically significant differences were found in any of the parameters monitored. Sagittal curves and spine statics are gender-related in adulthood: a statistically significant difference was found for the **CI** parameter and the position of **V<sub>Thk</sub>** in adult men versus **CI** ( $p < 0.05$ ) and **V<sub>Thk</sub>** ( $p < 0.05$ ) in adult women. Sagittal curves and a static spine are linked to nutritional status. In adult women, back pain was associated with a higher value of **CI** ( $p < 0.01$ ). In the set of all pre-school children ( $p < 0.01$ ), as well as only in girls ( $p < 0.05$ ), greater depth of cervical lordosis (parameter **CI**) was associated with at least occasional headaches. An increasing trend was found for sitting time with the age. No relation between back pain, headaches, movement activity, and the time spent sitting was found in either age category.

The survey results were used to formulate principles for targeted compensatory and intervention programs aimed at the prevention of postural defects in specific population groups.

**Key words:** postural function, spinal curve, spine statics, back pain, headache, prevention of postural defects