

Geometric morphometric approach in the study of the footprint variation in children between 6 and 12 years of age

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Introduction. Footprint evaluation is a widely used method for determination of foot morphology. Generally, variation in footprint have been associated to vertical variation of the plantar vault, with particular attention to the middle longitudinal arch (MLA). In the children, MLA tends to be lower and accentuates naturally when approaching adolescence (Forriol and Pascual, 1990). Though this condition is mostly asymptomatic, permanence of lower MLA after development is associated to flatfoot. In this study the morphology of the baropodometrical footprint was analysed by using geometric morphometric approach (Slice, 2000). This method permits to quantify the geometrical look of the anatomical structures by mean of coordinate system method.

Material and methods. The footprints of 50 children with age spanning from 6 to 12 years were sampled using an electronic baropodometry. The external profile of the footprints were reduced to 50 equally spaced landmarks and superimposed using the Procrustes superimposition method. A principal component analysis was performed to evaluate the morphological variability of the footprints and sex and age difference were observed.

Results. geometric morphometric results show that principal variations are localized in the medial region of the isthmus and are associated to a narrowing/widening of the footprint. No sex and age differences were observed, a part from a small group with age spanning from 6 to 9 years, showing a wider footprint.

Conclusions. It is thought that principal modification of the MLA occurs in the pre-school years (Stavlas et al, 2005). The results of this analysis show an high variability of the footprint geometry, suggesting that ongoing development of the foot structure takes place also during school ages. Although these results are preliminary, they should carefully considered in the treatment of the flatfoot in children, considering that the development of the foot proceeds also after 6 years

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