Metrological study (validity and reproducibility) of plantar footprints quantification by electronic baropodometry

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Introduction: Electronic baropodometry is a tool of quantification of the footprints plenty used in podiatry. The objective was to study its metrological quality in order to optimize its use in clinical practice.

Materials and methods: 83 feet (44 patients) were analyzed (3 static acquisitions of 30 seconds) on a Win-Pod platform (Medicapteurs, Toulouse), at two different times for 50 of them. We recorded footprints on the podoscope. The surface of the footprint area (cm^2) and index-Chippaux Smirak (isthmus width / forefoot width) were recorded. Reproducibility was assessed with the ICC (intraclass correlation coefficient) and the MMDC (minimum metrically detectable change, assessing measurement error).

Results: The foot print area should be standardized to weight (SurfNorm) in order to improve the acceptability of its use in quantification and characterization of footprint types : flat feet, physiological and cavus (ANOVA, $p < 0.001$, post-hoc < 0.05). The ICC and MMDC for SurfNorm were respectively 0.94 and averaged 15cm² for 3 trials; 0.83 and 18,5cm² for a test. The index of Chippeaux does not distinguish flat foot and physiologique.

Discussion: Standardization of the surface by the weight seems necessary to improve its measurement characteristics. This parameter could be a tool for quantifying and monitoring the size of the footprint. The index of Chippaux, validated for footprints in ink, is not suited to electronic baropodometry. Consider a single test majorises discreetly measurement error but seems suitable for clinical practice.