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Overcoming the limitations of the Harmonic Ratio for the reliable assessment of gait symmetry

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Abstract

The Harmonic Ratio (HR) is an index based on the spectral analysis of lower trunk accelerations that is commonly used to assess the quality of gait. However, it presents several issues concerning reliability and interpretability. As a consequence, the literature provides very different values albeit corresponding to the same populations. In the present work, an improved harmonic ratio (iHR) was defined, relating the power of the intrinsic harmonics (i.e. associated with the symmetric component of gait) to the total power of the signal for each stride, leading to a normalised index ranging from 0 to 100%. The effect of the considered number of harmonics and strides on the estimate of both HR and iHR was assessed. The gait of three groups of volunteers was investigated: young healthy adults, elderly women and male trans-femoral amputees. Both HR and iHR were able to discriminate gait deviations from the gait of young healthy adults. Moreover, iHR proved to be

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