Reviewer’s report

Title: Cross-sectional associations between variations in ankle shape by statistical shape modeling, injury history, and race: the Johnston County Osteoarthritis Project

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Reviewer: Michele Conconi

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The paper is well written and organized. The methods are clearly stated and the discussion of the results are detailed and denote a clear perspective on the topic and the impact of this research.

There are however some points that should be assessed in the reviewer's opinion

1 - It is not proper to speak of ankle shape: this terminology should be better explained or modified.

While a bone as a shape, a joint is described by the relative position and orientation, or briefly configuration, of all the bones that participate to the articulation. The articular configuration may change according to the joint mobility. As a result, the bones relative geometry and thus the shape of the ankle is not uniquely defined.

2 - How is it granted that the joint configurations of the considered participants are comparable?

When assessing differences in the articular geometry among individuals, a reference configuration must be established and kept during the acquisition of all the data, in order to exclude the effect of joint mobility from the analysis.

In this work it seems that the scanning ankle configuration is defined simply as the standing position. Is opinion of the reviewer that this is not sufficient to define uniquely the joint configuration. It is in fact possible to stand with different flexion of the ankle.

In this condition, the result of the analysis cannot completely separate postural from geometrical correlation with ankle injury. Indeed, differences associated with mode 1 could reflect postural variation.

3 - How is the scanning plane defined?

Similarly to the definition of the joint configuration, also the choice of the scanning plane may affect the measure, determining how the three-dimensional shape of the bones is projected on a two dimensional space.

It should thus be clarified how the subjects are placed with the X-ray scanner.
4 - What is the impact of the inter/intra-reader reproducibility on the proposed measure?

With respect to the dimension of the ankle, having 40% of the points defining the bones shape differing of more than 1 mm between two observers can considerably change how the bones shape is reconstructed. The impact of these differences in term of mode variation should be assessed.

In particular, two points showing a distance of 1mm in the projecting plane can be much more apart in the 3D space.

5- As a minor comment, it would be of interest to assess if there is correlation with activity/sedentary of the subjects.

6 - As a final suggestion, there are several measure to evaluate quantitatively joint congruence. This quantification could improve the causality insight of this analysis. Among the many, the measure presented in [1] was explicitly developed for the analysis of the ankle joint. It can be applied also when cartilage information are missing [2] and with some modification could reasonably be adapted for the planar analysis.


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