Reviewer’s report

Title: Can an Insole for Obese Individuals Maintain the Arch of the Foot Against Repeated Hyper Loading?

Version: 0 Date: 29 May 2019

Reviewer: John Albright

Reviewer's report:

This is a well done cadaver-based research project looking at the effects of silicone rubber shoe inserts with a medial longitudinal arch support in order to investigate the effects of insoles on time dependent changes in arch structure during a repeat repeated-loading simulation designed to represent 20,000 contiguous steps in individuals with BMI as of 30-40. The questions asked for 1) whether or not the insole can maintain the foot arch against repeated loading in the presence of obesity and 2) does the use of an insole affect the flexibility and energy absorption of the foot arch in obesity.

18 cadaver specimens were used with some of them being in the normal range and some obese. The tibia and fibula were fixed with Kirshner wires and embedded into methacrylate. The foot was placed on a force plate with a tibial shaft perpendicular to the plate and then fixed in a custom jig in the neutral position. Time dependent changes in arch height doing cyclical loading was monitored with a two-dimensional analyzer. Muscle activity during mid stance phase of gait was replicated by exerting traction on the posterior tibial tendon. The results indicated that the insole use could slow the progression of flatfoot in obese individuals however flexibility and energy absorption of the foot may be unsustainable against 10,000 cycles of load.

Limitations: The authors provide four different limitations which are well covered. This reviewer suggests an additional fifth limitation which is in the design of the project itself. The issue that is not covered here needs to be discussed since it is contained in some of the references provided. That is the dynamics of a gait pattern involves heel lift as the foot is going through a walking cycle. This push off phase is very dynamic and involves different biomechanical stresses which are not replicated in the current model. This does not mean that the study is invalid it merely means that this is a limited view of the dynamics of shoe insert and its function during the walking activity. A thorough discussion of the findings of these other studies involving heel lifts should be covered in reasonable detail.

Otherwise, I feel that this is a reasonable contribution to the literature done on limited but solid biomechanical basis. It represents an initial study on obesity from a group from which I would expect to also see subsequent work done.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
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Yes

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