Reviewer's report

Title: Changes in multi-segment foot biomechanics for a heat-mouldable semi-custom foot orthotic device.

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Reviewer: Douglas Powell

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Journal of Foot and Ankle Research
Manuscript Review
Title: Changes in multi-segment foot biomechanics for a heat-mouldable semi-custom foot orthotic device

General: The manuscript presents a well-written study pertaining to the effects of molded and non-molded orthotics on motions tibia, rearfoot and arch. While the study is methodologically sound and provides novel insight into the function of orthotics in controlling rearfoot mechanics and attenuating strain on the plantar fascia, some small changes could improve the manuscript.

Appropriate responses to the following points will improve this manuscript. Note: the suggested changes are marked by category as follows: Major Compulsory Revisions (MCR), Minor Essential Revisions (MER) and Discretionary Revisions (DR).

General:
1. MER: The present study includes male and female participants; however, no tests were conducted to assess the effect of gender. Previous research has suggested that females (at least in a landing movement) exhibit a greater contribution from the ankle compared to the knee and hip (McLean 2006, Kernozek 2005). Perhaps a comparison of gender differences could explain some of the non-significant results. References included at end of review.

2. MER: Why did the current study select individuals with a 'normal' foot type to study orthotics? It seems that individuals with a normal foot type would have muted responses with the addition of an orthotic compared to a low-arched or flexible foot. Would you expect similar findings if this study was conducted with low-arched individuals? Perhaps this could be presented in the Discussion. Two potentially useful references pertaining to multi-segment foot motion in normal (Lundgren 2008) and low-arched individuals (Rattanaprasert 1999, Powell 2011) could be discussed.

3. MCR: A figure showing representative or ensemble curves of tibial internal rotation, rearfoot eversion and arch motion would aid in the presentation and interpretation of data.

Introduction:
1. MER: The topic is well introduced. Perhaps some discussion of the kinematics and possibly kinetics addressed by the use of orthotics would be helpful in assessing the evidence this manuscript presents.

2. MER: Paragraph 3: top of page 4, “underlying mechanics underpinning the clinical efficacy or orthoses…” . Should be “of”.

Methods:
1. MCR: It is unclear why the AHI was recorded in both sitting and standing positions as neither arch stiffness, relative arch deformity nor any other quasi-static measurement of the arch is not presented.

2. MCR: More description of how the midfoot or forefoot was modeled would be helpful.

3. MER: It could be made more clear that the subjects performed treadmill walking rather than over-ground. It is mentioned; however, it is not unmistakably clear.

4. MCR: It is unclear if the data processing occurred prior to temporal normalization (100 points) or after. If data were processed after being temporally normalized, some resolution could be lost.

Results:
1. The results are straightforward and clear.

Discussion:
1. MCR: While the current study presents data in regard to walking, few people suffer overuse injuries while walking. How might these findings relate to running? Previous research (Powell 2011) has revealed greater differences in multi-segment foot biomechanics between high- and low-arched athletes in walking compared to running.

2. MER: It could also be noted more heavily that generally, the molded compared to unmolded orthotic was associated with greater reductions in PFS.

References:


Level of interest: An article of importance in its field

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.