Reviewer's report

Title: The role of tibialis posterior fatigue on foot kinematics during walking

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Reviewer: George S Murley

This study investigated whether foot kinematics changed during walking following a fatigue protocol targeting tibialis posterior. This study also correlated static rearfoot angles with dynamic rearfoot angles.

The paper is generally well written and easy to follow. The experiment is relative simple and should be easy to repeat. There are some significant details that the authors have not included in the paper – these are discussed in more detail below.

1. Is the question posed by the authors new and well defined?
   Yes

2. Are the methods appropriate and well described, and are sufficient details provided to replicate the work?
   Partially

3. Are the data sound and well controlled?
   Yes

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
   Partially

5. Are the discussion and conclusions well balanced and adequately supported by the data?
   Partially

6. Do the title and abstract accurately convey what has been found?
   Yes

7. Is the writing acceptable?
Yes

MAJOR COMPULSORY REVISIONS
(which the author must respond to before a decision on publication can be reached)

1. Please clarify which phase/s of the gait were assessed in the kinematic analyses. Were participants gait data simply analysed wherever peak values occurred for each parameter, or did the authors focus on specific phases of the gait cycle.

2. The authors should include 95% confidence intervals and effect size calculations (i.e. Cohen’s d or standardised mean difference) for the data. Even though few significant findings were detected in this study, these statistics are routinely reported for clinical and biomechanical research.

SPECIFIC COMMENTS:

Methods section:


4. Page 8. Line 1 to 6. The MVC procedure is confusing and it would be very difficult for the reader to repeat this protocol. It would be ideal if the authors could include a diagram illustrating how the MVC were undertaken with specific reference to the sequence of rest periods, sets, fatigue thresholds, recovery periods.

5. Page 7. One of the key issues with this study is whether the participants were sufficiently fatigued, particularly as more than ¼ of the participants were not fatigued beyond the pre-specified threshold. While it is made clear in the methods that previous work by Kulig et al have demonstrated this apparatus selectively activate tibialis posterior, there is no mention of its reliability. In addition, has the fatigue protocol been published elsewhere? If so, can the authors indicate whether it is reliable/valid?

6. Page 8. Line 6. Please state what the average time was between the fatigue exercises and the gait trials and or the static rearfoot measurements.

7. Page 9. Line 4 to 6. Some words are missing and the sentence does not make sense. ‘….a pearson product moment correlation was performed’? Please revise the whole sentence.

Results section:

8. Page 9. Line 19. ‘Eight subjects did not drop below….’. Please revise this sentence

9. Page 9. Line 21 and 23. ‘strength’ versus ‘fatigue’ versus ‘force output’. Is ‘strength’ the correct term here? The participants ‘strength’ technically did not increase or decrease, rather their ‘force output’ had decreased with fatigue; or conversely that had recovered, were ‘less fatigued’ and had a greater ‘force
output'. Please check the terminology used here.

10. Page 10. The 'kinematic' results are reported awkwardly.
   a. The second half of line 7 should start as a new paragraph.
   b. For the ‘forefoot data’ (line 11), the actual data has been included but this is not done for the ‘rearfoot data’. Please be consistent here.
   c. For line18/19, what is the difference between ‘within-day reliability’ and ‘precision error’?
   d. Line 18 is poorly worded (i.e. ‘exceeded the reliability’ does not make sense). I suggest saying something like ‘the changes detected were smaller than the magnitude of error’.

11. Page 11. Was the mean rearfoot angle (i.e. 6.8°) ‘inverted’ or ‘everted’ relative to the vertical?

Discussion


14. Page 13. Line 16. I think the authors need to be careful not to over speculate the results of the correlation here because tibialis posterior EMG was not recorded. It is possible that in fact tibialis posterior was working harder, but the authors have very little evidence to support or refute this statement.


16. Another limitation that requires some discussion is related to the reliability study that comprised only 5 participants. Given that most reliability studies include at least 30 participants, the use of only 5 participants may have caused an inaccurate estimation of the true error. This is an issue because the authors have qualified the significance of the results by referring to the magnitude of error detected in this study. Perhaps the authors could also refer to other related work to tease out this issue (i.e. McGinley JL, et al. The reliability of three-dimensional kinematic gait measurements: a systematic review. Gait & posture 2009;29:360-9).

17. Could the authors also clarify whether the unit measurement for the error (RMSE) is same as the unit of measurement used for kinematic analyses?

Level of interest: An article whose findings are important to those with closely related research interests

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