Author’s response to reviews

Title: Increase in body weight over a two-year period is associated with an increase in midfoot pressure and foot pain

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Dr Alan Borthwick
Editor-in-Chief
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Dear Dr Borthwick,

Regarding our paper entitled “Increase in body weight over a two-year period is associated with an increase in midfoot pressure and foot pain”

We thank the reviewers for their comments and we provide our responses below.

Best regards,

Tom Walsh
Reviewer: 1

1. Reviewer’s Comment: The main focus of this manuscript is the association of weight gain and its relation to foot pain and pressure. I note the paper also reports that a proportion (n=11) also lost weight over this time period and I would be interested to know if this had any bearing on the results and perhaps this can be added into the paper? I think this is important for future interventions for instance.

Response: This is a very interesting point you have raised. Indeed, on further analysis we did find that there were positive, significant correlations between weight loss and change in foot pain. It is a small sample, but as you rightly point out, this would be of interest with respect to future interventions. Accordingly, we have added the following:

Methods, paragraph 5

“Multivariable linear regression, adjusting for age and gender, was also used for subgroup analyses of participants whom lost more than 2 kg to provide clinical context for the association of weight loss and foot pain.”

Results, paragraph 6

“Of the 11 participants whom lost more than 2kg, there was a significant positive correlation between change in weight and change in functional limitation (B = 0.654, 95% CI 0.174 to 1.134, p = 0.015), and there was a non-significant positive correlation between change in weight and change in pain intensity, (B = 0.274, 95% CI -0.009 to 0.556, p = 0.056)”

Discussion, paragraph 6:

“The 11 participants that lost more than 2 kg had a significant correlation between reduction in weight and improvement in function, this provides temporal evidence that weight loss is associated with reduced foot pain, but studies involving larger samples and clinical trials with directed weight loss interventions are needed.”

2. Reviewer’s Comment: "Pressure data from the right foot were collected from three valid trials." How did this pressure analysis relate to the painful foot? You noted that specific locations of pain were not reported but can you specify which foot, or if both were reported as painful?
Response: The right foot was chosen to ensure that the assumption of independence of data was met [1], but it is unknown whether this foot was symptomatic. As described in the limitations section of the discussion, we were unable to report which foot, or indeed which location, was affected at both baseline and follow-up. Our conclusion does suggest that the midfoot may be the most vulnerable site given the association with change in weight and change in foot pain / functional limitation, however given the lack of local foot data, we were unable to be more definitive.

3. Reviewer’s Comment: Was the pressure analysis for the left foot collected? If so, can you consider adding this data into the paper and whether there was there a difference between the pressure analysis of the painful compared to the none painful foot, or was there occasions where both feet were involved?

Response: The pressure analysis of the left foot was not collected. One foot was chosen for the analysis to ensure that the assumption of independence of data was met [1]. Whilst we agree that pressure analysis between the painful and non-painful foot would be interesting, the focus on the study was examining longitudinal changes in pain and pressure, rather than within-subject plantar pressure variance. We did find that there was a mixture of unilateral and bilateral foot pain at data collection (this was not recorded), but the inability to report it is a limitation. Accordingly, we have added the following in the paragraph listing limitations.

Discussion, paragraph 5:

“Differences in pressure between those with bilateral or unilateral foot pain was also not explored.”

4. Reviewer’s Comment: Please can you justify your data handling of the foot pressure variables? For instance correlations were made between PROMS and peak plantar pressure, is there a reason these variables were chosen over say contact area, mean pressure, PTI or force? I cannot find this in the analysis section. Please clarify.

Response: Thank you for these comments and question. We chose to examine peak plantar pressures, as this measure incorporates both the contact area and the maximum force. We were concerned that if we focused on contact area or force, alone, we may overlook what effect either had on plantar pressure. For example, if the participants increased their body weight, their force would increase, but if there was a corresponding increase in contact area then plantar pressures would remain stable. We were, therefore, interested to see if the change (increase) in weight would be mediated by a change in contact area, or if peak pressure would increase.
Previous studies have also recommended the use of peak plantar pressure rather than mean pressure or pressure-time integral given the interdependence between these measures [2, 3]. Accordingly, and given the known association of peak pressures and foot pain [4], peak plantar pressure was the most appropriate variable to study longitudinally.

We have added the following,

Methods, paragraph 4:

“Change in regional peak plantar pressure was used in this study given the known association of peak plantar pressure and foot pain [18]. Mean pressure or pressure-time integral were not used in this study given the interdependence between these measures and peak plantar pressure [19, 20].”

5. Reviewer’s Comment: "Twenty five participants gained more than 2 kg, while 11 participants lost more than 2 kg" Please can you report the proportions too?

Response: The proportions of weight loss and weight gain more than 2 kg has been added.

Results, paragraph 2:

“Twenty-five participants gained more than 2 kg, with a mean (SD) of 6.6 (3.8) kg while 11 participants lost more than 2 kg, with a mean (SD) of 5.1 (4.3) kg”

6. Reviewer’s Comment: Given that some data in the manuscript is repeated in the tables, can you consider including key correlation graphs instead? I am intrigued by the spread of data regarding body weight and pain from table 3 for instance (see first comment)?

Response: We agree that there appears to be duplication of similar data and as such we have removed Table 3 and Table 4. On reflection, these data are essentially bivariable associations between weight and pressure, and pressure and pain. Whilst some of these data are used in the path analysis, which we have now used standardised coefficients, the more informative data is provided in Table 5 and 6 (which are now labelled Table 3 and Table 4), where there is adjustment for age and gender (and change in contact time where appropriate). We have removed subheadings from the results section and now think that this is easier to read. In order to address and explain the spread of data, we have added the following (which was previously mentioned in comment 5 regarding weight change):
Results, paragraph 2:

“Twenty-five participants gained more than 2 kg, with a mean (SD) of 6.6 (3.8) kg while 11 participants lost more than 2 kg, with a mean (SD) of 5.1 (4.3) kg”

Results, paragraph 3:

“The change in peak plantar pressure from baseline to follow-up ranged from -121.0 to 58.8 kPa”

Results, paragraph 4:

“Mean (SD) functional limitation scores increased from baseline to follow-up 3.2 (4.5) points to 3.6 (5.1) points, p = 0.511, the change in scores ranged from -9.7 to 20.0 points. Mean (SD) foot pain intensity did not change between baseline and follow-up, but the change in scores ranged from -4.4 to 6.3 points.

Reviewer: 2

1. Reviewer’s comment: Please comment on the potential significance of the sex distribution of the participants.

Response: Thank you for this comment. There were more women than men in our study, but we felt this is reflective of who generally presents to clinical practice. We did adjust for sex in the multivariable models, but significant associations remained between change in weight, change in pressure and change in pain (see new Table 3 and Table 4, table numbers change in response to Reviewer 1 above). We do, however, acknowledge that there were significantly more women included, and to make this clearer to the reader we have added the following line in,

Results, paragraph 1:

“There were significantly more women than men in this study, $\chi^2 = 4.412\ p = 0.036$”
2. Reviewer’s comment: Background, Line 23. Can you provide information on other mechanisms by which increased bodyweight might result in pain as this would provide useful context.

Response: We agree that further details in this section would provide useful context, and as such we have added a line in,

Background, paragraph 2:

“Other factors linking foot pain and body mass, such as metabolic and psychological factors have been investigated [10], but whether there is mediation via mechanical pathways is not known.”

3. Reviewer’s comment: Background, 2nd paragraph. Similar to point 2, some information on other factors that might result in midfoot changes may be a useful inclusion.

Response: We have added this line,

Background, paragraph 2:

“Furthermore, a previous study has found that midfoot osteoarthritis is associated with higher midfoot pressures, suggestive of a mechanical relationship [9]”

4. Reviewer’s comment: Please provide the dates and settings of data collection.

Response: We have added the baseline and follow-up dates (and the data collection setting) in,

Methods, paragraph 1:

“The baseline and follow-up measures were taken in 2012 and 2014, respectively, at Epworth Hospital, Victoria, Australia.”

5. Reviewer’s comment: Please explain the conceptualisation of the study in terms of the anticipated weight gain in the group over the two year period.
Response: We were uncertain as to how much weight the participants would gain (or lose), but given the steady increase in overweight and obese people in the community, we expected to see an increase. Data from 2012, published by the Australian Institute of Health and Welfare (Figure 1 below), supported this assumption, and on average this is what we found.

Figure 1: Trends in overweight and obesity in Australia


6. Reviewer’s comment: I can't find information on the follow up time - this would be a useful inclusion.

Response: Thank you for this comment. We believe that we have addressed this in Reviewer 2’s comment four above.

7. Reviewer’s comment: For the demographic data you provide standard deviations as measure of the spread of scores. For the plantar pressure data you provide the 95% CI of the difference. Is there any reason that you did not provide 95% CI's for the demographic data? I find this measure of spread more informative.

Response: We have added the mean difference and the 95% confidence intervals of the difference to Table 1.

8. Reviewer’s comment: Do you have any data on foot posture? It might be interesting to determine if there is a clinical change in foot posture associated with the changes in pressure.

Response: Unfortunately, we do not have complete measures of foot posture at follow up and thus, while interesting, this analysis cannot be undertaken.

References

