Author's response to reviews

Title: The correlation between postural control and upper limb position sense in patients with chronic ankle instability

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Version: 2
Date: 29 March 2015

Author's response to reviews:

Response to the Comments of the Reviewers on Manuscript entitled: The correlation between postural control and upper limb position sense in patients with chronic ankle instability

We thank the reviewers for their review of our manuscript. The reviewers generally felt that the findings of the manuscript were of interest and that the manuscript would contribute to the literature. Nonetheless, they also offered suggestions for enhancing readability. We have revised the manuscript, and have attempted to incorporate the suggestions of the reviewers.

Below we briefly summarize each of the comments raised by the reviewers and present our response.

Reviewer 1: C. Collin C Herb
1. Line 41 - Need to give a definition of CAI in the context of this study. Recent recommendations on diagnosis of CAI have been made.
Response: In accordance with the reviewer’s comment we have added a recent definition for CAI suggested by Delahunt et al 2010.

2. Line 49 - Throughout, make sure you are clear on use of terms proprioception, postural control and balance. Proprioception is a sensory function and effective postural control requires motor response as well as sensory function therefore making comparisons between a static postural control test and proprioceptive function is misleading. I recommend you review Riemann and Lephart, JAT, 2002, The Sensorimotor System; Part I. Balance is a sensorimotor task and may be affected by the sensory and motor dysfunction in this population.
Response: We thank the reviewer for his recommendation. Per the reviewer’s comment we changed the terms throughout the manuscript to comply with the appropriate definitions.

We believe that there is rationale to assess the correlation between postural control and proprioception. Postural control and position sense (proprioception)
represent aspects of sensorimotor function. Furthermore, there is a clear link between postural control and proprioception, as the contribution of proprioceptive information is critical to sound postural control. The damage to the sensory receptors after ankle injuries is believed to create proprioceptive deficits that modify the central nervous system’s perception (Hertal, 2008, Clin Sports Med). The difference in the sensorimotor integration and processing post-injury may resulted in deficits in aspects rather than the ankle itself, as demonstrated in the current study.

3. Line 67 – The methods used in assessing postural control do not solely reflect proprioception function in the current study.

Response: In accordance with the reviewer’s comment the sentence was changed. The revised sentence refers to sensorimotor function and not solely to proprioception (line 70 in the revised manuscript).

4. Line 75 - To say subjects were divided is misleading. There were two groups based on the pathology of CAI.

Response: The sentence was revised per the reviewer’s comment.

5. Line 77 - Does this include the use of Subjective questionnaires, such as the FAAM and IdFAI. These need to be reported in the subject’s demographics table. If they were not collected, please justify this decision.

Response: The study did not include the use of subjective ankle instability questionnaire, such as the identification of functional ankle instability (IdFAI). Per the reviewer’s comment we have added this issue to the study limitations section (please see lines 283-286 in the revised manuscript).

6. Line 125 – Can you site the sensitivity of the Biodex Multi-Joint System?

Response: A citation was added.

7. Line 135 - Has this method of measuring joint position sense been used in the past. Justify your use of shoulder rotation as your measure of upper extremity joint position testing. Did you consider any different testing positions? This method only assesses the ability to position the joint in one plane of motion with the shoulder abducted.

Response: The shoulder was chosen for measuring of upper extremity joint position sense, since similar to the ankle, motor control plays a significant role in ensuring the joint stability. The technique of measuring shoulder joint position sense is frequently used in the literature, and previous research has found it to be an accurate and reliable method. Per the reviewer’s comment, we have added to the methods sentences that explicitly focus on these issues (line 154-5 in the revised manuscript). It should be also noted that, as mentioned in the discussion, the shoulder test simulates the abducted, externally rotated position of the shoulder required in many sporting activities, thus maximizing the ecological validity of the assessment.

8. Line 151 – It is not clear whether you are comparing lower extremity or upper extremity measures here.

Response: The comparison included both, upper and lower extremities measures
(i.e., OSI and AES). The revised manuscript makes this point more clearly.

9. Line 166 - Justify your comparisons. What is the significance of making comparisons in balance on the side with no history of injury? Would you expect to have differences in the side that is not unstable?

Response: As mentioned in the introduction section (lines 62-63), earlier studies of patients with ankle injuries indicated bilateral associations of unilateral injury. For example, Waddington and Adams (Australian journal of physiotherapy 1999) have shown that there was no significant difference between movement discrimination score for both ankles of subjects with unilateral injuries. These previous findings were the rational for the current comparison.

10. Line 191: Again, use of the term proprioception is not entirely correct here. Proprioception is a sensory function and balance, specifically, depends on motor function as well.

Response: Was revised to sensorimotor function.


Response: As suggested by the reviewer this issue is discussed (with the related references) in the revised manuscript (see lines207-213 in the revised manuscript).

12. Line 207 - Recommend you expand on this paragraph to include discussion on what this may mean clinically.

Response: Based on the reviewer’s comment we have added more details regarding the clinical implications of our findings. These details were included in a separate paragraph, lines 242-252 in the revised manuscript.

Reviewer 2: Gwen Fernandes

Minor Essential Revisions:

1. The conclusion of the abstract needs to be a bit stronger in terms of linking study findings to the implications on current clinical practice. It almost jumps from your findings to the fact that there needs to be a change in current practice - could you specify the detail.

Response: In accordance with the reviewer’s comment, in order to link the findings to clinical practice a more precise recommendation was included in the abstract’s conclusions (“Clinicians can use this information and employ activities which focus on coordinating the upper and lower extremities when designing neuromuscular control training programs for patients with CAI”)

2. In the analysis section, I would like to see what tests of normality were used by the researcher. Further to this, as the data was indeed non-parametric, the use of mean and the standard deviation to present the data is almost redundant. If the data is skewed, then the mean is also distorted and is almost meaningless. It would be better to present the median and the inter-quartile ranges for the data
points that are not non-parametric.

Response: The Anderson-Darling test was used to assess data normality, the revised data analysis specify this test. We have done as suggested and replaced means and SDs with median and the interquartile range (see table 2).

3. In the discussion section, it would be good to see some reference to the sensitivity and specificity of the individual postural and positional tests used, if this has been done previously? I found it interesting that there wasn't much of a difference between the CAI group and control but is your equipment actually sensitive enough to pick up the difference? Proprioception is, as you say, made up of different components. So which are you measuring and are you using the best method to do this.

Response: Per the reviewer’s comments we have added more references supporting the postural and positional tests used in the study. These references were added to the method section, where the tests are described (lines 127-8).

As noted in the introduction, two recent systematic reviews of postural stability, including a meta-analysis, that aimed to determine whether postural control is adversely affected in those with CAI, indicated that such deficits have not been detected consistently in this population. Therefore, it was recommended that the clinical diagnosis of CAI should not be based solely on static postural control testing, but rather on more challenging and complex evaluations of performance (regardless of the equipment that should be sensitive). The present study has shown that such complex evaluation can be done.

As noted by reviewer #1, postural control requires motor response as well as sensory function (proprioception). Therefore, in the revised manuscript we used the term sensorimotor function which can more accurately describe the deficits in the CAI group (Sefton et al. 2009, Clinical Biomechanics, and Hertal. 2008, Clin Sports Med).

4. Lines 208-210 and 257-258 almost contradict each other. You suggest there might be a pre-existing global deficit in proprioception but later you state (and have shown) that there is no difference in LL postural control and UL positional sense between the CAI group and the healthy controls. Therefore, maybe there isn't a pre-existing global deficit but with CAI, a difference in the way proprioception works post-injury given your result of a correlation between LL and UL in only the healthy controls. Just something you may want to make clearer to a reader.

Response: We thank the reviewer for suggesting this clarification. As suggested we have added this point to our discussion (lines 228-131).

Reviewer 3: Smadar Peleg

Minor essential revisions:

1. Legends to figures: they include headlines with no further information. Please add a brief explanation (in brackets).

Response: We have done as suggested and added to the figures a brief explanation (in brackets).
2. Results: Correlations between body sites: the authors present the results of Pearsons correlations between four body sights. Please note:

a. Table 3 not table 4 (page 9, line 181)
Response: The table number was corrected.

b. When presenting p value please state p<0.05, p<0.01 or p<0.001 and not the actual number (should be presented in table 3 and not in the text) [*Editorial note: the editors are happy with exact p-values.]
Response: Per the editorial note the presentation of the p-values was not changed. The p-values are presented in Table 3 as well as in the text to enable a clear presentation of results to the reader.

3. Discussion: page 11 lines 230-234 and page 12 lines 235-237. This paragraph is the only part that lacks a detailed explanation and clarity. I ask the authors to rewrite this paragraph.
Response: As suggested by the reviewer this paragraph was rewritten and more details and explanations were added (lines 253-270). We believe this will indeed provide the reader with a clearer picture.