Reviewer's report

Title: Movement control tests of the low back; evaluation of the difference between patients with back pain and healthy controls

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Reviewer: Andrew Briggs

Reviewer's report:

Thank you for the opportunity to review this paper. The authors report a case-control study which sought to determine whether the number of positive motor control tests (from a battery of six) differed between individuals with and without low back pain. The findings of the study are relevant to clinical practice.

Major Compulsory Revisions

1. Methods
   i) Study Design: refer to data in table 1 when describing ‘acceptable reliability’. ii) The introduction refers to the hip extension test by Murphy. This test is not included as part of the battery in this study – why?
   iii) A commentary in either the introduction or the Discussion should be provided about the large ranges in reliability coefficients in the literature for the clinical tests chosen. For example, k=0.17-0.72 for the sitting knee extension test. I do not consider k=0.17 acceptably reliable. Please provide some information as to the reasons for variation in reliably scores for the tests chosen. Moreover, some information should be provided about the face validity of the tests, ie why have these tests specifically been chosen.

2. Test procedure: please provide a rationale for not randomizing the order of the tests

3. Analysis: it is not clear why/how Mann Whitney U tests were performed for what appears to be nominal data (gender, working, retired, student, disability allowance, sport, other musculoskeletal problems). If these are indeed nominal datasets, then a Chi square statistic is appropriate to determine the difference in frequencies/proportions. There appears to be a mix between parametric and non-parametric analyses for nominal data (assuming nominal data) – please provide clarification.

4. Results
   i) The authors should also present the results by subgroup (acute + subacute compared with chronic). The LBP group is very heterogeneous, so a subgroup analysis (based on duration of symptoms) would be worthwhile and offer more clinical value. Another Figure (similar to Fig 2 would be useful to this end).
   ii) The duration of pain as a continuous variable should be provided if those data area available.
5. Discussion

i) Limitations: a comment should also be added about a non-objective based method for interpreting joint angles.

ii) Other studies – sentence 1: state that you have tested a battery of tests, for movement control, rather than just ‘movement control ability’.

Other studies

iii) EMG biofeedback can be used effectively in private practice, eg VMO control. A comment on EMG biofeedback would be useful

Paragraph 2 of this section needs further development. What are the implications / relevance of the study cited (Van Dillen). The point you make in this paragraph is not clear to me. Please reference Sahrmann.

iv) Future directions

I think it is contentious to use imaging as a reference standard. How would this be done considering that clinical signs don’t correlate well with imaging, unless performed in a very discrete LBP subgroup (eg disc prolapse). Moreover, imaging is not in agreement for best practice in acute low back pain management. A comment on imaging is needed here, or further explanation of the proposed study design.

v) The discussion requires a commentary on the face validity of the clinical tests used. There is insufficient information in the introduction or discussion about why these particular tests were used and the implications for ‘positive’ or ‘negative’ movement control is for clinical instability. The potential confounding issues in each test should also be considered, e.g. instructions, start positions, end positions, hamstring length and neural mechanosensitivity (test 4), rectus femoris length (test 6).

Minor Essential Revisions

1. Title: should specify 'low' back pain

2. Abstract: need to be clearer that the objective is to determine the difference in the number of movement control tests in a battery. Define the abbreviations ES and MC

3. Introduction

i) Paragraph 1: movement patterns are not necessarily faulty – they may be adaptive or maladaptive. Physiotherapists can identify the deviation from normal. Also important to note that ‘movement’ control is one aspect of motor control.

ii) Paragraph 3: important to note that abnormal movement may also be present in hypomobility disorders, not just clinical instability.

iii) Paragraph 4 – define MCD
4. Figure 1:
i) test 4 – define ‘corrected lumbar lordosis’
ii) test 5 – label start and finish positions for the test

Discretionary Revisions

**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