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: Shirley A. Sahrmann

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Minor Essential Revisions

1. Abstract: The initials ES and MC are used but the words that they represent are not provided.

2. The sentence further diagnostic studies are needed is not relevant. The authors are not trying to establish a diagnosis but just demonstrate that patients with low back pain move their back differently than individuals who do not have back pain. A statement that would be more accurate is. Tests such as these may be useful in distinguishing groups of back pain patients now that this study has demonstrated a difference between individuals with back pain those without back pain.

Introduction

3. This is more a suggestion for accuracy that is appropriate because of the reference. The term should be kinesiopathology not pathokinesiology. That means how movement induces pathology rather than how pathology induces movement faults.

4. 1st paragraph last sentence: However, there is limited evidence of a difference between movement patterns in patients with low back pain (LBP) and individuals without LBP. - makes the sentence clearer and more accurate than the one in the manuscript.

5. 2nd paragraph: change effort to resistance

6. 3rd paragraph, 1st sentence: The importance of being able to observe variations in movement control of the low back in patients with low back pain is great ( )

7. 4th paragraph. Here again initial are used without explanation. I do not believe the authors need to use initials for MCD because they never use the term again.

8. page 4, 1st paragraph, last sentence. insert published before reliability and eliminate done.

9. 2nd paragraph, last sentence. Change affections to conditions.
Comment: I do not believe the statement, "there is no gold standard for
movement of the low back". Studies have reported how much the lumbar spine should flex during forward bending and movements that elicit pain can also be used as an indicator of the appropriateness of movement. As I will comment later, I am not clear what your are trying to identify as your "gold standard". Clearly gross clinical movements cannot demonstrate "instability" which involves no more than a millimeter of movement or less. But a movement fault does not have to be specifically associated with a specific tissue pathology but rather with a deviation from the kinesiological standard for movement of that region or even to just be associated with pain. Thus I do not believe that usefulness of the tests is dependent upon a radiological test that shows tissue damage or that parts are moving. The literature has lots of studies where tissue is damaged, even disc herniation but the patient does not have any symptoms. The authors need to clarify just what they are trying to obtain or use as the gold standard.

Methods:

10. page 5. Subjects performed the set of tests in a standardized manner. That is not clear. What is the standardized manner? on page 6, the test procedure is again discussed. The authors need to provide a more detailed description of what the standardized instructions were. Were the patients seen on their first visit to physio or had they had any instruction in movement patterns before the data were collected? What does the statement if the patient did not understand how to perform the test mean? The patient said, I do not know how to do that, or the patient did not demonstrate correct performance? How many tries did the patient get to understand? or do it right? Did the patient have any pain when performing the test? Did the physio base his/her judgment on one performance by the patient or did they try to perform the test several times? Were any criteria set for how far from the standard the performance had to be to be incorrect?

11. I am also unclear in the instructions to the physios what the practical application statement means.

12. page 8, first sentence. Why the statement, although these tests cannot be used as diagnostic tests? If these tests are used in some type of systematic and purposeful way they could be used as diagnostic tests, just as tendon jerks and sensory tests can be used as diagnostic tests. Certainly this study was not designed to use the tests for diagnostic purposes but that does not rule out their usefulness under a different set of circumstances.

13. 3rd paragraph: I do not understand how functional x-rays or MRI are necessary to establish a gold standard for these tests. The use of motion analysis to document whether everyone who was judged to move incorrectly actually had more lumbar flexion, for example, than someone who was judged to move correctly to provide quantitative data, is a more accurate way of establishing a gold standard. The authors need to clarify what they are looking for in a gold standard.

14. 4th paragraph, 3rd sentence. Chagne to This study demonstrated that there is a difference between subjects with and without back pain, that is a first step in
the validation process for developing diagnostic tests. the next sentence is repetitious and unnecessary. then: In clinical practice identifiable subgroups of patients with LBP have been proposed that are distinguishable from one another based on MC problems. Next sentence is okay. But I not understand the next sentence because it is not written clearly. Not clear what is meant by "various subgroups of MC and pain exist".

15. The second to last sentence same paragraph: substitute assess for look into judgment does not have an "e" after g

16. page 9: I have never seen the word anamnesis before, maybe there are more readers like me and the word history would help us less word wise people.

17. 2nd paragraph. 1st sentence ----- MC cannot be expected to be the total explanation for the development of low back back. However, in this first stage of validation (of what), the finding using a group of 6 clinically applicable tests showed a clear difference between groups of patients with LBP and non-LBP controls.

18. 4th paragraph, 2nd sentence: change based classification to syndromes.

19. 6th paragraph, 2nd sentence: A dysfunction in MC could be a subgroup of LBP itself and possibly form a part of the diagnosis of clinical instability. This term (?) what term) was first ---

20. Page 10 2nd paragraph: Same comments about the reference standard. Need more explanation from the authors about what are the specifics that the MRI is going to provide that would be the gold standard for the movement test.

21. conclusions. The word disease generally refers to a system problem rather than a regional condition, possibly the word dysfunction is more accurate than disease.

**Level of interest**: An article of importance in its field

**Quality of written English**: Needs some language corrections before being published

**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.