Reviewer's report

Title: Upper limb position control in fibromyalgia

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Reviewer: Christian Duval

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The authors wanted to verify whether the ability to maintain limb position with and without loading was different in patients with fibromyalgia. Their hypothesis is that there is a deficit in proprioceptive feedback that may modify this capacity. They used a protocol where subjects were asked to maintain limb position by using visual feedback. They used variability in limb position during the task, as well as power distribution to examine the proposed deficits. They found that variability in limb position was different, but it did not reach statistical significance. However, there was a clear increase of power distribution in lower frequencies in fibromyalgic patients compared to controls. They attribute this fact to disruption of sensory feedback mechanisms.

In general, the paper is well written, and deserves attention. However, there are numerous issues that need to be addressed before the paper is considered for publication.

MAJOR

1. In the Background section, you hypothesized “that the patient group will show higher amplitude oscillations than HCs”. However, this hypothesis is not addressed any more in the Discussion section. In fact, the results presented in this study tend to refute this hypothesis. What does this mean clinically? Moreover, literature mentioned in “Time domain” section of the Discussion indicated that patients in pain condition should not present difference in steadiness compare to control subjects. Then, on which literature your hypothesis is based on?

2. In the entire document, the terms “vertical acceleration of the limb” and “position of the limb” were almost used as synonyms. However, they not mean the same. You must mention how the conversion from acceleration to position has been made. Some issues can rise from the conversion. Firstly, the double integration of acceleration to obtained displacement value is not very efficient (Norman, Edwards et al. 1999). Secondly, for instance, a slow drift of the arm would probably not be detected by the accelerometer. Here, I suggest using the term “displacement” instead of “position”. Finally, how the linear “displacement” has been transformed in angular “displacement”? Is the length of different segments of the upper limb have been measured? You must provide more information about the feedback presented to participants. What were they seeing on the screen (e.g. acceleration of the limb)? Is it an enhanced feedback? There is ample literature on the effect of enhanced feedback, and its influence on limb oscillations (see Loncharich & Newell (2011)).
3. In the discussion section (page 13), you mentioned that muscles co activation should explained difference between FM patients and HC participants. However, muscle co contraction is known to increase oscillations amplitude (Carignan, Daneault et al. 2009; Daneault, Carignan et al. 2010) (tremor). This is not the case since amplitude were similar between groups and variance of limbs is similar between groups (even lower in the FM group).

4. There are missing results in the Result section. For instance, shoulder/neck pain was compare before and after the testing, but only the before value was mentioned in the manuscript (table 1). Also, SDs average of the two groups were compared, but never showed. This is only a few examples; there are more missing results in the manuscript.

5. In the Muscle strength section of the Discussion, it is suggested that lower strength of the shoulder abductors of the FM group should be explained by presence of pain in that region. Then, this interpretation is used to suggest the role of pain in the oscillation power spectrum distribution. This is too speculative.

6. Results addressing confounding factors should be added to the paper. Also, the gender of the healthy controls should be mentioned.

MINOR

Why results of the middle frequency band are not presented in Fig. 5?

Did you do post-hoc (t tests) for the time domain analysis? If yes, please mention these results. Have you performed any corrections for multiple statistical comparison (e.g. Bonferroni correction)?

Can you define the type of oscillations mentioned in the first sentence of the third paragraph? Do you mean tremor or variation in limb position due to unsustained muscle contraction?

What are the “selected anthropometric measures”? And how were they measured? For instance, where was the upper arm girth measured? Did you intend to measure the amount of fat, muscle volume, or simply take into account the mass of the limb? Please be more specific.

Where, on the upper limb (e.g. distance from the elbow), were attached the force transducers in the MVC condition? Why use two force transducers? Is the MVCs were performed in both arm at the same time? A better description of the methodology is needed.

Why the elbow flexion condition was performed unilaterally while the shoulder abduction task was performed bilaterally? And why the latter task was performed bilaterally while the non-dominant side was not assessed?

Since the acceleration of the upper arm was measured in a 45 degrees abduction of the shoulder position, how and why the vertical acceleration was calculated? Why don’t simply use the tangential acceleration?

Please explain why you use loading. Just mentioning that you want to see the effect of loading is insufficient. You must explain the rationale behind it.

It would be wise to remove non-pertinent information, if it does not influence the
protocol or the results.

**Level of interest:** An article of limited interest

**Quality of written English:** Acceptable

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.