Author’s response to reviews

Title: Dry needling in a manual physiotherapy and therapeutic exercise protocol for patients with chronic mechanical shoulder pain of unspecific origin: a protocol for a randomized control trial

Authors:

Emma Tejera Falcón (emma.tejera90@gmail.com)
Nuria Toledo Martel (nurictm@gmail.com)
Francisco Sosa Medina (franmsosamedina@gmail.com)
Fátima Santana González (fatimasantanagonzalez@gmail.com)
Miriam Quintana de la Fe (miriamqdlf8@gmail.com)
Tomás Gallego-Izquierdo (tomas.gallego@uah.es)
Daniel Pecos-Martín (daniel.pecos@uah.es)

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Author’s response to reviews:

At first, we are very grateful for your reports. According to reviewer reports, we answer below, in 20 sections, all of your questions and considerations. Please, contact us if you have any questions. Moreover, we modified our text according your corrections (modifications are highlighted in yellow). We hope to have responded to all of your questions.

Reviewer 1

- (1) Introduction. From the literature reviewed, how much pain relief is achieved with manual therapy and exercise? What level of pain relief are you hoping to achieve with the addition of dry needling?

According to the reviewed literature, in the study by Lombardi et al. (included in the systematic review and meta-analysis of Hanratty et al.) patients in the experimental group of therapeutic exercise showed a significant improvement of shoulder pain in VAS of 1.8 cm at rest and 2.2 cm of pain during movement. In the study by Micheneyer et al. (included in the systematic review and meta-analysis of Kietrys et al.), they established on the numerical scale of pain score 2.17 points as a clinical significance of pain change in comparisons between groups for patients with shoulder pain after receiving a manual therapy program and 3-4 week exercises.
Finally, in the study by Di Lorenzo et al. (included in the systematic review and meta-analysis of Kietrys et al.), experimental group that received dry needling had a significant improvement of 2.26 cm in VAS, compared to the group of who received a conventional physiotherapy treatment in patients with hemiparetic shoulder syndrome, measured immediately after the intervention.

So, based on the previous literature, we expect a more immediate relief of pain with the application of the dry needling, compared to the placebo group who will only receive manual therapy and therapeutic exercise, with values of improvement greater than 2 cm in VAS.

Lastly, in the literature review we did not find a study of these characteristics; 1 single dry needling session, and a 6 sessions of manual therapy and therapeutic exercise (with domiciliary exercises 2 times per week). We expect a greater improvement of the pain in the participants, reflected in VAS.

- (2) Methods. There appears to be a typographical error in the randomisation allocation ratio (8,8,8,4,8) think the 4 needs to be deleted.

The random assignment does not suffer a typographical error. When performing the randomization by permuted blocks, thus maintaining homogeneity of the sample at the end of each block, we obtained 5 blocks, 4 of them with 8 people and 1 with 4. Having 4 possible randomization groups, the statistical program used, only allowed Use multiples of 4, so that the numbers shown (8,8,8,4,8) were those needed to reach the sample of 36 participants.

- (3) Eligibility criteria for the participants- need a referenced definition of non-specific shoulder pain. At the moment this is unclear how this is defined and therefore assessed.

Participants who have a medical diagnosis whose findings may be related to the symptomatology of the participants will not be included. In addition, as we can see in scientific literature (as an example the study of: Peek, Aimie L., Caroline Miller, and Nicola R. Heneghan, "Thoracic manual therapy in the management of non-specific shoulder pain: a systematic."), definition of specific or nonspecific shoulder pain is very complex because of the difficulties surrounding the diagnosis of shoulder pain. These difficulties include poor agreement on diagnostic criteria, lack of specificity of common clinical trials, coexistence of multiple pathologies of the shoulder and the lack of any diagnostic test that is considered a "gold standard." As a consequence, clinical trials tend to use the term "non-specific shoulder pain" rather than a specific diagnosis.
• (4) Interventions. There are multiple interventions- it would be useful if these were mapped to the previous literature. This seems quite an intense programme - is this normal practice for chronic pain?

With the implementation of treatment program, due to the heterogeneity of the patients, we seek a comprehensive approach of possible articular and muscular components involved in the mechanisms of pain, including active therapeutic exercise, due to the demonstrated benefits of incorporating exercise in the treatment of chronic pain.

In previous studies of chronic shoulder pain, it is usual to apply isolated techniques to know their effectiveness against other techniques and / or against placebo. However, in this study, we want to check whether a comprehensive program, including joint and muscle manual therapy techniques along with active exercise, would be beneficial for these patients in spite of conditions of chronic pain.

• (5) Outcomes. Why is DASH a primary outcome? The study is not powered for this outcome.

DASH is the primary outcome, since we want to see if the changes in pain are translated into a direct change in the activities of daily living, through this scale that measures values of quality of life and functionality.

• (6) A minimally clinically significant difference of 9-11mm on the VAS is on the low side in the literature it is usually 15-20mm.

Reviewing the literature included in the manuscript, we detected a content failure, the difference significantly lower according to these is greater or equal to 13 mm and not 9-11 mm as we had written. In addition, contrasting the information that has provided us, we have found that it is used in studies of drugs, treatments for cancer, post-surgical situations, etc. Referring to a specific population, So we have chosen to use this reference which we have found in a new research that is more similar to our study population, than those found previously, with the minimum clinical difference detectable of 1.4 cm. “Tashjian, Robert Z., et al. Minimal clinically important differences (MCID) and patient acceptable symptomatic state (PASS) for visual analog scales (VAS) measuring pain in patients treated for rotator cuff disease. Journal of Shoulder and Elbow Surgery, 2009, vol. 18, no 6, p. 927-932”

• (7) Secondary outcome- recording pressure pain threshold on the tibialis anterior presumes a systemic effect of dry needling- yet this is not considered anywhere.
The purpose of using pressure pain in the anterior tibial along with the C7 process is to observe the general hypoalgesic effects that can occur in the body as seen in “Hidalgo-Lozano, Amparo, et al. Changes in pain and pressure pain sensitivity after manual treatment of active trigger points in patients with unilateral shoulder impingement: a case series. Journal of bodywork and movement therapies, 2011, vol. 15, no 4, p. 399-404”

- (8) Sample size- this seems a bit on the low side. Is 'TE 0.25' a small effect size? This would not be clinically observable

The program used as indicated in the text is the Gpower 3.0.18 Software. In this case, the family of F tests was used, and more specifically ANOVA: repeated measures, within-between interaction, this test uses a F distribution of Snedecor and Eta (η2) when significant for the calculation of the sample. An effect size of 0.01 was considered small, 0.06 medium and 0.14 large (Cohen, 1988).

The output of the program is attached:

F tests - ANOVA: Repeated measures, within-between interaction

Analysis: A priori: Compute required sample size

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<table>
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<td>Denominator df</td>
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<tr>
<td>Total sample size</td>
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</table>
Actual power = 0.9536297

- (9) Blinding- there is insufficient detail on the placebo condition. What were the participants informed?

All participants in the study will be given an information sheet. This information sheet reflect everything that will be done in the study and contain the explanation of the technique of dry needling, with its contraindications and possible risks. In this way we ensure that the patients before starting the whole process of the study is informed that they can receive both the placebo dry needling or the real dry needling.

At no time will it be explained that the dry needling looks conduces to a spasm reaction. We will explain dry needling is the introduction of a dry needling needle, similar to those of acupuncture, inside muscle and that only one will feel the sensation of an initial puncture accompanied by the movements of manipulation of the needle.

- (10) How can the clinician (who is performing the dry needling) be blind to baseline VAS?

The clinician performing dry needling will at no time know what is participant's baseline VAS, since this variable will be collected by one of the evaluating physiotherapists prior to the intervention of dry needling. Participants will be instructed not to give information about the quantitative value of pain they feel during the myofascial trigger points and dry needling procedure. Therefore, the clinician in charge of performing the dry needling can only know how much or how little each myofascial trigger point and pain reproduction can hurt, but in no case will it know the numerical value of its pain.

- (11) Do they not seek feedback from the participant re pain levels for the appropriateness of the dry needling technique?

Yes, although the only feedback that will be taken into account will be for the determination of the painful spot that best reproduces the pain of the participant, since, once it has been located the application of the technique will be equal (twelve incisions) for all participants.

- (12) Was the statistician blind to group allocation?
Yes, the statistician was blinded to the group, only the dichotomous data of 0 and 1 were given but in no case was informed of which groups belonged. This information has been included in the manuscript, you will find it underlined in the section of "Randomization and Blinding".

- (13) Statistical Analysis. The first paragraph mentions students t test for independent samples or Mann Whitney if the data are not normally distributed. Then the rest of this section is about repeated measures ANOVA with corrected contrasts. Which will be used as all outcomes are recorded multiple times? In addition difference scores are likely to regress to the mean it is better if raw scores and used and the baseline score is used as a covariate in the ANCOVA.

Perhaps we do not adequately explain this paragraph, I just want to say in the text "... to check the differences of the variables within the group itself at different times of life ..."

We believe that such analysis using the repeated measures ANOVA and their respective contrasts guarantees the reliability of the data for the existence of differences if there were any.

Other articles similar to ours use this analysis:


However if you consider that we should carry out an analysis through ANCOVA we would not have any problem of changing it.

Reviewer 2

- (14) The authors mentioned that one of the treatment approaches for MTrPs is ischemic compression, but that is an outdated concept. MTrPs are thought to be hypoxic already and causing ischemia is not an appropriate treatment option.

It has not been demonstrated that MTrPs is a focus of ischemic compromise. The term ischemic compression is still used today. Recently there have been published works where this nomenclature is used.


- (15) The Kietrys et al study is not a very convincing study.

We believe that the study by Kietrys et al. is an article to be taken into account in the preparation of this study, since it gives us information about the DN compared to other treatments and sham DN, although precautions should be taken with respect to some studies due to their methodological quality, such as that of Hsieh et al. in which they used the contralateral side of the patients as control. On the other hand, it has other studies with a good methodological quality, such as the study by Tekin et al. in which DN is compared with sham DN. All studies of this review are classified in the MacDermid quality checklist.

In addition, in our study, we have another systematic review and more recent meta-analysis by Liu et al. (2015) in which they support the use of DN in the short and medium term compared to control / sham.

- (16) Why only one DN treatment session? Is that not the flaw of other studies including the study by Arias-Buría et al? In which clinical setting is DN only used in one session especially for "complex painful conditions?" Would it not make more sense to include DN for multiple sessions? Why is needling done only once, but exercise and manual therapies twice weekly? Are you really going to make a "new contribution in the field of chronic shoulder pain treatment?"

First, we must bear in mind that DN is an invasive procedure, and as such has greater risks than other noninvasive interventions. On the other hand, because in the study the participants of the experimental group should receive the same number of sessions of DN, it could be the case in which some patients in this group with a single session of DN, improve their symptomatology. So, why are these patients going to receive more DN sessions if their muscle symptomatology has already improved and no longer refer to the presence of myofascial trigger points?

Since there is no solid evidence to support the number of suitable dry puncture sessions, we have established a single dry puncture session to be able to observe the very short-term benefits. If these benefits appear, we will be able to see if they will be maintained throughout the treatment
and follow-up, or if, however, it is observed that a single DN session is insufficient to perpetuate the patient's symptomatology improvement, requiring multiple interventions of DN.

For these reasons, we can not consider as a study defect the inclusion of 1 single DN session, since we precisely want to study the effects that have 1 single session within a multimodal treatment program, to establish a treatment as minimally invasive as possible.

If clear benefits were found in the short-term in the experimental group, but without perpetuation over time, we could establish the need to do more than one DN session.

Manual therapy will be performed once a week for 6 weeks. However, the therapeutic exercise will be performed 3 times per week (1 during the face-to-face session with the physiotherapist and the other 2 at home). This configuration was thus established, due to the need to include supervised active exercise in chronic pain, over passive interventions.

- (17) The word "escapulohumeral" is not a word in the English language. It was a mistake in the translation from Spanish to English, it is already corrected and underlined in the text.

- (18) In the dry needling protocol, the authors wrote that "the most painful" MTrP will be needled. How will the pain level be determined?

The most painful spot will be determined by the palpation of trigger points by the clinician in charge of evaluating myofascial trigger points and performing the dry needling, asking participants to identify which of these points reproduce more pain. In case that any of the mentioned muscles does not have presence of painful myofascial trigger point will not be punctured.

- (19) The use of a Streitberger needle is not accepted universally as a valid placebo needling procedure. The fact that it has been used in another study is probably not enough of a justification. This reviewer would recommend to include a brief discussion about the validity of using a Streitberger needle.

Currently, the use of placebo needles is accepted as such. However, due to the complexity of masking a technique such as dry needling, validity of this needle may be questioned, although we believe it is the most appropriate method. In this article we have reviewed validity of the use of this needle in acupuncture, in a population that, although very specific, it shows the effectiveness of its use.

- (20) This reviewer finds it confusing when at times the authors write in the past tense suggesting that the study has been completed already while at other points, they talk in the future tense, i.e., the following descriptive characteristics were collected vs. Participants will mark the intensity of their pain. It would be preferable to use future tense consistently.

It is a writing error that has already been corrected in the text.

We hope you have understood all the answers. Thank you very much for your attention. We wait your answer.