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Editorial comment

Transcranial magnetic stimulation, paravertebral muscles training, and postural control in chronic low back pain

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In this issue of the *Scandinavian Journal of Pain* Hugo Massé-Alarie and coworkers compared the effect of 3 weeks with isometric exercises of the multifidus muscles with exercises with more dynamic and general involvement of the low back muscles on pain and disability in patients with low back pain [1]. However, their main contribution is the application of transcranial magnetic stimulation to study the influence of low back pain on the mechanisms involved in motor planning, and how different exercise approaches may alter central motor control. In an experimental pre-post two group training design, it is assumed that the isometric exercise of the multifidus offers larger challenge to motor skills than the more global exercises of the low back muscles, and hence have higher impact on motor cortex functioning and the anticipatory postural adjustments of the muscles. Based on previous studies, a delay in the anticipatory postural adjustments is considered to represent loss of inhibitory mechanisms in the primary motor cortex.

1. The immense burden on patients and on society of low back pain, psychosocial factors

Low back pain is the most common of the musculoskeletal conditions and recognized as a main global burden for disability [2]. In addition to the individual suffering, the costs for the society are considerable [3]. Low back pain alone represents about 16% of the total sick leave, and is the most common cause of disability pension in subjects below 40 years [4]. Although, the low back pain itself may origin from structural changes in the discs and vertebral joints or dysfunctions in muscles [5], the relationship between structural changes and the clinical pain is weak [6]. Clinical research document a multifactorial basis for low back pain with socio-demographic and emotional factors playing a particularly prominent role in the development of chronic back pain and associated disability [7–9]. Hence, recent research has focused on the relationship between psychological factors and pain [10].

2. Importance of trunk muscles and muscle-brain interaction in low back pain

However, focus has also been put on the role of the trunk muscles regarding development of low back pain [11]. These muscles are important for trunk stability [12], and swift anticipatory responses to postural changes are considered important. The scarce evidence for structural changes in these muscles [13] underscores the need to focus on the activation pattern and the muscle–brain interaction. The methodological challenges within this research are overt. Muscle activity can be assessed by electromyography, but muscle specificity and reliability of the registrations are not easily obtained, particularly not with superficial registrations as applied in the present study.

3. Transcranial magnetic stimulation (TMS)

Transcranial magnetic stimulation (TMS) offers a method of pain free stimulation of specific regions of superficial areas of the brain, and the electrical brain responses to the TMS standardized stimuli recorded by electroencephalography (EEG). EEG is a well established and sound method. The novelty but also the limitations of the present study is the aim to assess the changes in the brain–muscle interaction as a response to two different exercises regimens. The limited number of low back pain patients ($N = 22$) included and the changes in pain over the three weeks treatment represent a challenge regarding confounding. As all experimental designs, the external validity of responses to standardized test stimuli can be questioned.

4. Can isometric back muscle exercise now be recommended for low back pain?

However, the authors provide a detailed background and rationale for their study [1]. The design of the study is complicated, but well described and the authors have tried to reduce test confounders. All patients report reduced pain and disability over the three week period, which may be an effect of repeated measures, time, or exercises effect which are beyond the scope of the present paper to entangle. However, changes in motor cortex activity and faster postural activation of the muscles were only observed in the

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group receiving isometric exercises. These changes are considered to represent increased intracortical inhibition and decreased corticospinal excitability. The authors state that this knowledge may impact the clinicians' prescriptions of specific exercises in low back pain, which possibly is a bit premature conclusion. These results clearly have to be reproduced in different and preferably larger patient samples. Healthy control groups would be preferable, and when assuming that the isometric exercises is more skill requiring, a purely cognitive oriented treatment task should be controlled for. Nevertheless, the methodological triangulation in the present papers is very interesting and represent a possibility to improve our understanding of the pain–brain–muscle relationship.

Conflict of interest

None declared.

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