

# Regarding to the Article ‘Effect of Lumbar Stabilization and Dynamic Lumbar Strengthening Exercises in Patients With Chronic Low Back Pain’

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## Dear Editor

I read the article entitled “*Effect of Lumbar Stabilization and Dynamic Lumbar Strengthening Exercises in Patients With Chronic Low Back Pain*” by Moon et al. [1] with interest. However, I would like to offer some comments regarding its results and methodology reported.

Moon et al. [1] compared ‘*Lumbar Stabilization*’ exercises with ‘*Dynamic Lumbar Strengthening*’ exercises. However the exercises pictured for each are very similar (i.e., both are a selection of floor- and ball-based exercises). This similarity of training protocols is highlighted by the authors when they stated “*Although no formal definition of lumbar stabilization exercises exists, the approach is aimed at improving the neuromuscular control, strength [our emphasis], and endurance of the muscles that are central to maintaining the dynamic spinal and*

*trunk stability.*” The similarity between what should have been protocols aimed at different aspects of lumbar spine function (strength OR stabilization) may explain the lack of differences for most outcomes between the two.

Exercises to conditioning lumbar extensor musculature (erector spinae and multifidus) have been recently reviewed [2]. Muscular activation for floor- and ball-based exercises is highly variable between those selected by Moon et al. [1]. In addition, there is little evidence that these exercises offer conditioning effect for these muscles. However, asymptomatic participants were considered in the recent review [2].

The study by Moon et al. [1] suggests that these exercises in both groups may condition the lumbar extensors. However, the recent review [2] reported that isolated lumbar extension (ILEX) training using machines to provide appropriate pelvic restraint may be optimal. In symptomatic participants, Udermann et al. [3] examined the effect of similar exercises as used by Moon et al. [1] using McKenzie techniques in comparison to combined McKenzie and ILEX over a 4-week intervention and reported no significance difference in the improvements of ILEX strength. However, they did note that acute pain relief might explain such findings. Moon et al. [1] utilised a longer intervention (8 weeks). Therefore, it is reasonable to conclude at least some improvement in ILEX strength might be due to lumbar extensors conditioning. In an-

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other study by Helmhout et al. [4] who compared ILEX to regular physical therapy (PT) which included stability based exercises, it was reported that similar significant increases in ILEX strength were found in both groups after treatment as well as after 6 and 12 months follow-up. However, in their analysis, they noted that the inclusion of between-group co-interventions (i.e., some of the PT group accidentally utilised the ILEX device) might have affected the results. In contrast, Smith et al. [5] conducted a randomised controlled trial and compared exercise using an ILEX device with and without pelvic restraints. Their results showed that only training with the use of restraints (i.e., ILEX) improved ILEX strength, pain, and disability. The authors explained that the use of pejorative terms regarding the unrestrained condition were avoided and participants were informed that the researchers did not know which training would be most effective (hence the purpose of the study, 2012 personal communication from D. Smith; unreferenced). This has been noted as a potentially confounding factor in another study [6], considering the potentially confounding effect of instruction upon outcomes might have helped avoid 'nocebo' effects in the unrestrained group [7]. Thus, these results likely represent the effects of ILEX upon the lumbar extensors as opposed to a placebo effect. This suggests that, although other studies demonstrate benefit in clinical outcomes from any kind of active rehabilitation, the greatest benefits may be achieved from specific ILEX training. Indeed, a recent research study also reported improvements in ILEX strength after an ILEX intervention correlated with improved pain and disability [8].

Recent review [2] suggests that the exercises chosen by Moon et al. [1] could provide poor effect of lumbar extensor conditioning in asymptomatic participants. However, ILEX might be the most effective one. It will be of interest to compare these two approaches. Moon et al. [1] had access to a machine allowing ILEX to be performed (and was used to test ILEX strength as an outcome measure). Thus, a better comparison may have been to include a group performing ILEX exercise using this machine.

There is evidently contrasting evidence in this regard. Much is still to be learnt about the 'black box' of mechanisms with which exercise exerts positive effects on those suffering from chronic low back pain [9]. The present letter highlights a number of questions that still require further clarification: 1) Can exercise other than ILEX con-

dition the lumbar extensors (e.g., improve ILEX strength) in symptomatic participants? 2) Does ILEX provide greater improvements in ILEX strength, pain, and disability than other exercise in symptomatic participants? and 3) Is there indeed any relationship between improved ILEX strength as a result of exercise interventions and changes in pain and disability?

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## A Reply to the Questions

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### Dear James Steele

We appreciate your interest in our study.

In this study, we did not focus on lumbar extensor strength. Our interventions were consisted of trunk extensor, flexor, and rotator muscles strength. Isolated lumbar extensor strengthening machine MedX (MedX Holdings Inc., Ocala, FL, USA) was used to compare superficial muscles of trunk and deep spinal muscles strength between baseline and post-intervention.

You pointed out the similarities between lumbar stabilization and dynamic lumbar strengthening exercises. In exercise method of the two groups, the posture was somewhat similar on the picture. But in the text, we described that “before each exercise, the physical therapist gave detailed verbal explanation and visual instructions, regarding the start and end positions.” All exercises were conducted according to the following specific principles: “breathe in and out, gently and slowly draw in your lower abdomen below your umbilicus without moving your

upper stomach, back or pelvis.” In addition, the group of lumbar stabilization exercises subjects practiced ‘abdominal hollowing maneuver’ with a therapist providing verbal instruction and tactile feedback until they were able to perform the maneuver in a satisfactory manner [1,2].

We thought that lumbar stabilization exercises should include strengthening deep lumbar muscles as well as neuromuscular control and endurance of these muscles. Conventional lumbar dynamic strengthening exercises were practiced to activate the erector spinae and rectus abdominis muscles.

You mentioned that the floor and ball based exercises had little evidence in conditioning effect of lumbar extensor muscles. However, floor- and ball-based exercises are commonly referred to as lumbar stability exercises in many studies [3,4].

I would like to answer your question as follows:

1) Can exercises other than isolated lumbar extension (ILEX) condition the lumbar extensors (e.g., improve ILEX strength) in symptomatic participants,

2) Does ILEX provide greater improvements in ILEX strength, pain and disability than other exercises in symptomatic participants?

At present, there is no study that has compared specific isolated lumbar extension training and lumbar stabilization exercise directly. Therefore, it is difficult to say which exercise method is more effective. In my opinion, lumbar extensor strengthening exercise is the most appropriate exercise for chronic LBP. That is why the study

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of Nachemson and Linch [5] showed that strengthening exercise on lumbar extensor increased the muscle activity, but increased loading of compression on the low back affects injury of tissue. It can cause pain and deteriorate the symptom. Some researchers demonstrated that traditional exercise methods on the deficiencies of stabilizer muscles can make an incorrect compensation. It also has effect on changes of proper muscle coordination pattern and recurrence [6,7]. However, the pathogenic mechanism of back pain is not ensuring. In addition, the effect of exercise treatment showed various results according to the study. Generally, clinical guidelines recommend exercise treatment rather than rest.

Today, exercise programs designed to improve lumbar stability and core strengthening are popular to increase athletic performance and treat pain. Movement patterns that were altered by faulty strength and flexibility, fatigue from poor endurance, and abnormal neural control would eventually cause tissue damage. Tissue damage would lead to decreased stability of spinal structures, increased challenges to the already inefficient muscles and the perpetuation of a degenerative cascade. Spinal stability could be compromised by motor control errors or poor muscular endurance of inter segmental muscles and allow for overloading of passive tissues. Patients with back pain also seem to over-activate superficial global muscles whereas control and activation of the deep spinal muscles is impaired. Thus, core stability exercises have strong theoretical basis for prevention of different musculoskeletal conditions and the treatment of spinal disorders [8]. Although a great deal of research has shown that exercises in general are effective treatment for lower back pain, much more research is needed that specifically addresses if lumbar stabilization exercises are more effective than other types of exercise in treating back pain.

3) Whether there is indeed any relationship between improved ILEX strength as a result of exercise interventions and changes in pain and disability.

I think that improvement of ILEX strength is contributing to the decrease of pain and disability. The optimal

treatment for chronic low back pain is to provide ILEX training and superficial global muscles of trunk and deep spinal muscle strength exercises considering of individual physical characteristics.

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