



PREVENTION & REHABILITATION: COMPARATIVE STUDY

# Effect of spinal stabilization exercise on dynamic postural control and visual dependency in subjects with chronic non-specific low back pain



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## KEYWORDS

Low back pain;  
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**Summary** *Background:* Motor control approach towards chronic non-specific low back pain (CNLBP) has gained increasing attention. CNLBP patients have shown to be more visually dependent for the postural control process than control subjects but no study has yet investigated the treatment programs effect on this disorder.

*Methods:* Forty CNLBP patients volunteered to participate in this experimental study. The subjects were randomly assigned into either stabilization exercise (SE) or control group both receiving 12 sessions of routine physiotherapy for four weeks. The SE group also received

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intensive stabilization exercise. Balance (in terms of overall (OSI), anteroposterior (APSI) and mediolateral stability indices (MLSI)) and functional disability were assessed by Biodex Balance System<sup>®</sup> (BBS) and Oswestry Low Back Disability Questionnaire, respectively prior and after the interventions. The balance tests were performed with open and closed eyes.

**Results:** Both interventions significantly decreased all stability indices but the SE group showed a more pronounced improvement in OSI and APSI. In the SE group, vision deprivation had smaller destabilizing effects on OSI and APSI as compared with the control group. The groups were not statistically different prior and after the interventions on all dependent variables. Oswestry index reduction in the SE group was more pronounced but the interaction of time and group variables were not significant on pain intensity.

**Conclusion:** Both interventions effectively enhanced stability indices and functional capabilities and reduced pain intensity in CNLBP patients. The SE protocol made the patients less visual dependent perhaps via better stability. Since pain reduction was not different between the groups, more functional improvement in SE group cannot simply be interpreted via the pain interference and might be related to postural control capabilities of the patients.

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## Introduction

Low back pain (LBP) is one of the most frequent musculoskeletal disorders and a major cause of work absence which puts a considerable cost on societies (Maher et al., 2005). Among different categories of LBP, Chronic non-specific LBP (CNLBP) is a significant class with no satisfying treatment available (Itz et al., 2013). Lack of specific sources to explain the symptoms have raised challenge in the management of CNLBP. It seems that factors other than simple mechanical explanations contribute to patients' symptoms (Lamoth et al., 2004). Poor control of deep and altered activation pattern of global trunk muscles and impaired stability and control of the spine have been proposed as contributing factors to LBP onset and persistence (Panjabi, 2003; Macedo et al., 2009; Ghamkhar and Kahlaee, 2015). Therefore, treatment protocols addressing control and coordination of spinal muscles are thought to be effective in the management of CNLBP (Macedo et al., 2008).

Recently, motor control aspects of CNLBP such as postural control deficits and information processing capabilities of the central nervous system (CNS) have been emphasized (Salavati et al., 2009; Sherafat et al., 2013; Mazaheri et al., 2010). Since proprioceptive inputs and processing have shown to be adversely affected, it has been suggested that these patients rely on other sources of afferents, namely the visual inputs, to provide balance and stability (Mann et al., 2010). In this regard, visual dependency might correlate with severity of LBP. Most commonly measured outcomes of motor control based exercise programs of CNLBP have been pain, disability and quality of life (Niemisto et al., 2003). To our knowledge, no study has yet addressed the effectiveness of different

therapeutic approaches to CNLBP on reducing visual dependency of the motor control system. Therefore the purpose of this study was to compare the effect of two common treatment approaches to CNLBP on visual dependency and balance capabilities of these patients.

## Methods

The study was a double-blinded, randomized clinical trial. A trained, expert physiotherapist was responsible for the treatment of all patients of both groups. The patients were all coded and the researcher performing and reporting the statistical analyses was unaware of the patients' assignment.

## Subjects

The subjects were selected by non-probability convenient method from the population of CNLBP patients referred by three orthopedic surgeons from outpatient clinics in Tehran. Forty volunteers participated in this study by signing an informed consent form after the disclosure of the aims and content of the study. The study was approved by the Human Ethics Committee of the University of Social Welfare and Rehabilitation Sciences. Periodic or constant LBP for more than twelve months was the major inclusion criteria for the subjects. Those with major spinal complications, cauda equina, nerve root and sciatic nerve involvement, spinal stenosis and referring pain down the buttock fold or using any tranquilizer that could affect their balance were excluded from the study. Subjects were 20–40 years old male patients who were randomly assigned into one of the routine (control) and active stabilization exercise (SE) groups (flow diagram). The

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