

## Evaluation of Joint Contact Forces and Muscle Forces in the Subjects with Non-Specific Low Back Pain

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**Abstract :** Background: Low back pain (LBP) is a common health and socioeconomic problem, especially the chronic one. The joint contact force is an important parameter during walking which increases the incidence of injury and degenerative joint disease. To our best knowledge, there are not enough evidences in literature on the muscular forces and joint contact forces in subjects with low back pain. Purpose: The main hypothesis associated with this research was that joint contact force of L4/L5 of non-specific chronic low back pain subjects was the same as that of normal. Therefore, the aim of this study was to determine the joint contact force difference between non-specific chronic low back pain and normal subjects. Method: This was an experimental-comparative study. 20 normal subjects and 20 non-specific chronic low back pain patients were recruited in this study. Qualysis motion analysis system and a Kistler force plate were used to collect the motions and the force applied on the leg, respectively. OpenSimm software used to determine joint contact force and muscle forces in this study. Some parameters such as force applied on the legs (pelvis), kinematic of hip and pelvic, peaks of muscles, force of trunk musculature and joint contact force of L5/S1 were used for further analysis. Differences between mean values of all data were measured using two-sample t-test among the subjects. Results: The force produced by Semitendinosus, Biceps Femoris, and Adductor muscles were significantly different between low back pain and normal subjects. Moreover, the mean value of breaking component of the force of the knee joint increased significantly in low back pain subjects, besides a significant decrease in mean value of the vertical component of joint reaction force compared to the normal ones. Conclusions: The forces produced by the trunk and pelvic muscles, and joint contact forces differ significantly between low back pain and normal subjects. It seems that those with non-specific chronic low back pain use trunk muscles more than normal subjects to stabilize the pelvic during walking.

**Keywords :** low back pain, joint contact force, kinetic, muscle force

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