

O-0428**Feedforward Activation of the Deep Fiber of Lumbar Multifidus Associated with Arm Movement at Different Standing Position
Intramuscular Electromyography Study**

Abiko Teppei^{1,2)}, Shimamura Ryota^{2,3)}, Ogawa Daisuke^{2,4)}, Hirosawa Masaki^{2,3)},
Soma Masayuki⁵⁾, Takei Hitoshi²⁾

¹⁾Department of Physical Therapy, Faculty of Human Health Sciences, Kyoto Tachibana University,

²⁾Division of Physical Therapy Science, Faculty of Human Sciences Graduate School of Human Health Sciences, Tokyo Metropolitan University, ³⁾Division of Physical Therapy, Tokyo Metropolitan Rehabilitation Hospital,

⁴⁾Department of Physical Therapy, Faculty of Human Health Sciences, Meiji University, ⁵⁾Department of Health Sciences, Tohoku Fukushi University

key words Lumbar Multifidus • Intramuscular Electromyography • Feedforward Activation

【Purpose】

Feedforward muscle activity has been shown previously to be influenced by center of gravity, posture, mental state, movement task, fatigue, pain, and proprioceptive information. In addition, the electromyographic (EMG) activity of trunk muscles is altered during movement tasks and in the presence of pain. However, no previous studies have examined the influence of posture and center of foot pressure (CFP) position on feed-forward muscle activity in detail. The purpose of this study is, therefore, to clarify the qualitative function of deep fibers of the lumbar multifidus (DM) as the local muscle, and examine how it is influenced by CFP position during arm movement.

【Methods】

Eleven healthy participants performed fast unilateral arm flexion and arm extension movements in response to auditory stimuli at three CFP positions, namely quiet standing, extreme forward leaning (EFL), and extreme backward leaning (EBL). Intramuscular and surface electrodes recorded the EMG of the DM, as well as the superficial fibers of the lumbar multifidus (SM), rectus abdominal (RA), and anterior and posterior deltoid muscles.

【Results】

The EMG onset of the DM occurred earlier at the EFL than the EBL position, but only with rapid arm flexion. The EMG onset of the SM and RA did not significantly change at any CFP position.

【Discussion】

As the CFP moves forward during arm flexion in order to maintain the CFP in the base of support, the CFP had to move back quickly at the EFL than the EBL position, which could explain our findings of an earlier EMG onset of the DM. Furthermore, alterations in the proprioceptive information of the DM are likely. Our study findings demonstrate a functional difference between the DM and SM, and that the DM is more easily influenced by the CFP than the SM.